Copies of the State submittal are available at the Maryland Department of the Environment, 1800 Washington Boulevard, Suite 705, Baltimore, Maryland 21230.

FOR FURTHER INFORMATION CONTACT: Emlyn Vélez-Rosa, (215) 814–2038, or by email at *velez-rosa.emlyn@epa.gov.*

SUPPLEMENTARY INFORMATION: For further information regarding the amendments to Maryland's Low Emission Vehicle Program, please see the information provided in the direct final rulemaking action, with the same title, that is located in the ''Rules and Regulations'' section of this **Federal Register** publication.

Dated: June 13, 2014.

W.C. Early,

Acting Regional Administrator, Region III.

[FR Doc. 2014–15885 Filed 7–8–14; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 82

[EPA–HQ–OAR–2013–0748; FRL–9906–56–OAR]

RIN 2060–AS04

Protection of Stratospheric Ozone: Listing of Substitutes for Refrigeration and Air Conditioning and Revision of the Venting Prohibition for Certain Refrigerant Substitutes

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of proposed rulemaking.

SUMMARY: Pursuant to the U.S. Environmental Protection Agency's Significant New Alternatives Policy program, this action proposes to list a number of flammable refrigerants as acceptable substitutes, subject to use conditions, for ozone-depleting substances in several end-uses: Household refrigerators and freezers, stand-alone commercial refrigerators and freezers, very low temperature refrigeration, non-mechanical heat transfer, vending machines, and room air conditioning units. This action also proposes to exempt from Clean Air Act Section 608's prohibition on venting, release, or disposal the hydrocarbon refrigerant substitutes that we are proposing to list in this action as acceptable subject to use conditions in specific end-uses. We are proposing this exemption on the basis of current evidence that their venting, release, or disposal would not pose a threat to the environment.

DATES: Comments must be received on or before September 8, 2014. 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 July 24, 2014. If a hearing is held, it will take place on or about August 8, 2014 in Washington, DC and further information will be provided on EPA's Stratospheric Ozone Web site at *www.epa.gov/ozone/snap.*

ADDRESSES: Submit your comments, identified by Docket ID No. EPA–HQ–OAR–2013–0748, by one of the following methods:

- *www.regulations.gov.* Follow the on-line instructions for submitting comments.
- *Email: A-And-R-Docket@epa.gov.*
- *Mail:* Air and Radiation Docket, Environmental Protection Agency, Mail Code 6102T, 1200 Pennsylvania Ave. NW., Washington, DC 20460, Attention Docket ID No. EPA–HQ–OAR–2013–0748.
- *Hand Delivery:* EPA Docket Center, (EPA/DC) EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC, Attention Docket ID No. EPA–HQ–OAR–2013–0748. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to Docket ID No. EPA–HQ–OAR–2013–0748. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *www.regulations.gov*, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through *www.regulations.gov* or email. The *www.regulations.gov* Web site is an ''anonymous access'' system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an email comment directly to EPA without going through *www.regulations.gov*, your email address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD–ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters and any form of encryption, and should be free of any defects or viruses. For additional instructions on submitting comments, go to Section I.B. of the **SUPPLEMENTARY INFORMATION** section of this document.

Docket: All documents in the docket are listed in the *www.regulations.gov* index. Although listed in the index, some information is not publicly available, i.e., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either electronically in *www.regulations.gov* or in hard copy at the Air and Radiation Docket, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Air and Radiation Docket is (202) 566–1742.

FOR FURTHER INFORMATION CONTACT: Margaret Sheppard, Stratospheric Protection Division, Office of Atmospheric Programs, Mail Code 6205J, Environmental Protection Agency, 1200 Pennsylvania Ave. NW., Washington, DC 20460; telephone number (202) 343–9163; fax number (202) 343–2338, email address: *sheppard.margaret@epa.gov.* Notices and rulemakings under EPA's Significant New Alternatives Policy (SNAP) program are available on EPA's Stratospheric Ozone Web site at *www.epa.gov/ozone/snap/regs.*

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I. General Information

A. Background

This rule lists as acceptable subject to use conditions a number of flammable refrigerant substitutes that EPA believes present overall lower risk to human health and the environment compared to other available or potentially available alternatives in the same end-uses. The proposed refrigerants include one hydrofluorocarbon (HFC) refrigerant—HFC–32—and four hydrocarbon refrigerants—ethane, isobutane, propane, and R–441A. This proposed rule, if finalized as proposed, would list one or more of these substitutes as acceptable subject to use conditions in a number of stationary air conditioning (AC) and refrigeration end-uses under the SNAP program, including: household refrigerators and freezers, retail food refrigeration, very low temperature refrigeration, non-mechanical heat transfer, vending machines, and residential and light commercial AC and heat pumps. The use conditions would set requirements to ensure that these substitutes do not present significantly greater risk in the end-use than other substitutes that are currently or potentially available.

All of the end-uses proposed in this rule are for stationary refrigeration or AC; EPA previously addressed flammable refrigerants in motor vehicle air conditioning (MVAC). On June 13, 1995, at 60 FR 31092, the Agency found all flammable substitutes to be unacceptable for use in MVAC unless specifically listed as acceptable subject to use conditions because of flammability risks and the lack of sufficient risk assessment and sufficient information to demonstrate safe use in that end-use at that time. 40 CFR Part 82, Subpart G, Appendix B. Some of these risks are unique to motor vehicles. In recent years, EPA has listed three low global warming potential (GWP) refrigerants as acceptable subject to use conditions for motor vehicles (i.e., R–152a, R–1234yf, and R–744).[1]

This proposed rule responds to a number of SNAP submissions for four hydrocarbon refrigerants and HFC–32 and also lists some of these refrigerants as acceptable subject to use conditions in the same end-uses. Additionally, this action proposes to exempt from Section 608's prohibition on venting, release, or disposal, the four hydrocarbon refrigerant substitutes that we are proposing to list as acceptable subject to use conditions in specific end-uses, on the basis of current evidence that their venting, release, or disposal does not pose a threat to the environment. Note that other environmental regulatory requirements still apply. For example, for those refrigerants that are volatile organic compounds (VOC) as defined in 40 CFR 50.100(s), i.e., isobutane, propane, and R–441A,[2] a State might adopt additional control strategies if necessary for an ozone nonattainment area to attain the National Ambient Air Quality Standard (NAAQS) for ozone.

With the exception of HFC–32, the refrigerants proposed acceptable subject to use conditions in this action are hydrocarbons or blends consisting solely of hydrocarbons. Hydrocarbon refrigerants have been in use for over 15 years in countries such as Germany, the United Kingdom, Australia, and Japan in household and commercial refrigerators and freezers. To a lesser extent, hydrocarbon refrigerants have also been used internationally in small AC units such as mini-splits and portable room air conditioners.

Because hydrocarbon refrigerants have zero ozone depletion potential (ODP) and very low GWPs compared to most other refrigerants, many companies recently have expressed interest in using hydrocarbons in the United States. Also, some companies have reported improved energy efficiency with hydrocarbon refrigerants (A.S. Trust & Holdings, 2012; A/S Vestfrost, 2012; CHEAA, 2013).

In a final rule in the **Federal Register** on December 20, 2011 at 76 FR 78832, EPA's SNAP program listed isobutane and R–441A as acceptable subject to use conditions in household refrigerators, freezers, and combination refrigerators and freezers and found propane acceptable subject to use conditions in retail food refrigerators and freezers (stand-alone units only). In this action, EPA is considering isobutane, propane, and R–441A for different end-uses.

There is interest in use of HFC–32 (difluoromethane, Chemical Abstracts Service Registry Number [CAS Reg. No.] 75–10–5) in residential AC systems and heat pumps because it has a GWP of 675, which is lower than the GWPs of hydrochlorofluorocarbon (HCFC)-22 (1,810) and most other HFC-based refrigerants (approximately 1,500 to 4,000). It also has mild flammability compared to hydrocarbon refrigerants. Mini-split systems using HFC–32 are

[1] Two of these refrigerants are flammable, although less flammable than hydrocarbons. Under 40 CFR part 82, Subpart G, Appendix B, all other flammable substitutes remain unacceptable for use in MVAC because EPA has not taken action to specifically list them as acceptable subject to use conditions.

[2] Both ethane and HFC–32 are not VOC under the definition at 40 CFR 51.100(s).

now being sold in Japan and are being introduced in India and Indonesia.

This action proposes to list one or more of these five lower-GWP refrigerant substitute options as acceptable subject to use conditions in the end-uses identified previously. This is a regular update to EPA's lists of acceptable substitutes through the SNAP program under the authority of Section 612 of the Clean Air Act.

This action also responds to a call in the Climate Action Plan announced June 2013 for EPA to ''use its authority through the Significant New Alternatives Policy Program to encourage private sector investment in low-emissions technology by identifying and approving climate-friendly chemicals'' (Climate Action Plan, 2013). This rule proposes to approve a number of climate-friendly alternatives for various kinds of refrigeration and AC equipment, as discussed below. This is the first listing action EPA has taken since the Climate Action Plan was issued.

This action, if finalized, would expand the menu of available climate-friendly alternatives. Many of these alternatives can substitute both for ozone-depleting substances and for high-GWP HFCs. Using low-GWP alternatives instead of high-GWP HFCs would reduce climate-damaging emissions. Use and emissions of HFCs is rapidly increasing because they are the primary substitutes for ozone-depleting substances in many of the largest end-uses, and because use is growing worldwide, mostly as a result of increased demand for refrigeration and AC, particularly in developing countries. Although they represent a small fraction of current total greenhouse gas (GHG) emissions, their warming impact is hundreds to thousands of times higher than that of CO_2 and other GHGs and their emissions are projected to increase significantly over the next several decades, if left unregulated. In the United States, emissions of HFCs are expected to double from current levels of 1.5 percent of greenhouse gas emissions to 3 percent by 2020 and nearly triple by 2030.[3]

HFCs are rapidly accumulating in the atmosphere. For example, the atmospheric concentration of HFC–134a, the most abundant HFC, has increased by about 10% per year from 2006 to 2012, and concentrations of HFC–143a and HFC–125 have risen over 13% and 16% per year from 2007–2011, respectively (Montzka, 2012; NOAA, 2013).

This action proposes to find acceptable, for specific end-uses and subject to use conditions, several alternatives that have GWPs significantly lower than both the ozone-depleting substances (ODS) and HFC substitute refrigerants currently used in those end-uses. For example, this action, if finalized, would allow the use of isobutane (R–600a) and the hydrocarbon blend R–441A in stand-alone commercial refrigerators. The GWPs[4] of these hydrocarbon refrigerants are less than 10, while HFCs typically used in this end-use—HFC–134a and R–404A (a blend of three HFCs)—have GWPs of 1,430 and approximately 3,920, respectively. In addition, this action proposes to find propane (R–290) acceptable for use in household refrigerator-freezers, subject to use conditions. The GWP of R–290 is 3.3 compared to the GWP of 1430 for HFC–134a, which is typically used in such equipment at present in the U.S. Finally, this action, if finalized, would allow for the use of propane, R–441A, and difluoromethane (HFC–32) in stand-alone room air conditioners. These alternatives have GWPs of 675 or less and could replace the use of R–410A (a blend of two HFCs), which has a GWP of approximately 2,090. ODS replaced in the end-uses in this rule include chlorofluorocarbon (CFC)-12 (ODP[5] of 1 and GWP of 10,900), R–13B1 (also known as bromotrifluoromethane or halon 1301, with ODP of 10 and GWP of 7,140), CFC–113 (ODP of 0.8 and GWP of 6,130), R–502 (a blend of CFC–115 and HCFC–22, with ODP of 0.334 and GWP of 4,660), and HCFC–22 (ODP of 0.055 and GWP of 1,810).

B. Does this action apply to me?

This notice of proposed rulemaking (NPRM) would list the following flammable refrigerants as acceptable subject to use conditions for use in specific end-uses within the refrigeration and AC sector: ethane (R–170), HFC–32 (R–32), isobutane (R–600a), propane (R–290), and the hydrocarbon blend R–441A. Types of residential and light commercial AC equipment addressed in this NPRM include window AC units; packaged terminal AC units and heat pumps; and portable room AC units. Types of refrigeration equipment include stand-alone commercial refrigerators and freezers (retail food refrigeration), very low temperature freezers, thermosiphons (non-mechanical transfer equipment), household refrigerators and freezers, and vending machines.

Table 1 identifies the potential entities that may wish to use ethane, HFC–32, R–441A, isobutane, propane, and other flammable refrigerants in these end-uses.

TABLE 1—POTENTIALLY REGULATED ENTITIES BY NORTH AMERICAN INDUSTRIAL CLASSIFICATION SYSTEM (NAICS) CODE OR SUBSECTOR

Category	NAICS code or subsector	Description of regulated entities
Industry	325412	Pharmaceutical Preparations (e.g., Capsules, Liniments, Ointments, Tablets) Manufacturing.
Industry	333415	Manufacturers of Refrigerators, Freezers, and Other Refrigerating or Freezing Equipment, Electric or Other; Heat Pumps Not Elsewhere Specified or Included (NESOI); and Parts Thereof.
Industry	443111	Appliance Stores: Household-type.
Industry	445120	Convenience Stores.

[3] Climate Change and President Obama's Action Plan. June, 2013. Available online at *www.whitehouse.gov/share/climate-action-plan*

[4] GWPs for HFC–134a, HFC–32, the component HFCs comprising R–404A and R–410A, propane and ethane are listed 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.* GWPs for isobutane and R–441A were provided by the submitters to EPA and they are consistent with available information for their components and the range of GWPs found for other hydrocarbons in IPCC, 2007. For refrigerant blends, EPA has taken the 100-year integrated time horizon GWP from IPCC, 2007 for the component compounds and multiplied them by the weight fraction of each component in the blend to obtain an approximate GWP. Unless otherwise stated, GWPs stated in this document are 100-year integrated time horizon values taken from IPCC, 2007.

[5] Unless otherwise stated, the ODP values used in this document are those published in appendices A and B to subpart A of 40 CFR part 82. For refrigerant blends, EPA has taken the ODPs for the component compounds and multiplied them by the weight fraction of each component in the blend to obtain an approximate ODP.

TABLE 1—POTENTIALLY REGULATED ENTITIES BY NORTH AMERICAN INDUSTRIAL CLASSIFICATION SYSTEM (NAICS) CODE OR SUBSECTOR—Continued

Category	NAICS code or subsector	Description of regulated entities
Industry	445110	Supermarkets and Other Grocery (except Convenience) Stores.
Industry	722211	Limited-Service Restaurants.
Industry	238220	Plumbing, Heating, and Air Conditioning Contractors.
Industry	811412	Appliance Repair and Maintenance.
Industry	423620	Household Appliances, Electric Housewares, and Consumer Electronics Merchant Wholesalers.
Industry	423740	Refrigeration Equipment and Supplies Merchant Wholesalers.

This table is not intended to be exhaustive, but rather a guide regarding entities likely to adopt the substitutes whose use would be regulated by this proposed action. If you have any questions about whether this action applies to a particular entity, consult the person listed in the preceding section, **FOR FURTHER INFORMATION CONTACT**.

C. What should I consider as I prepare my comments for EPA?

1. Submitting Confidential Business Information (CBI)

Do not submit confidential information to EPA through *www.regulations.gov* or email. Clearly mark the part or all of the information that you claim to be CBI. For CBI information in a disk or CD–ROM that you mail to EPA, mark the outside of the disk or CD–ROM as CBI and then identify electronically within the disk or CD–ROM the specific information that is claimed as CBI. In addition to one complete version of the comment that includes information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket. Information marked as CBI will not be disclosed except in accordance with procedures set forth in 40 Code of Federal Regulations (CFR) Part 2.

2. Tips for Preparing Your Comments

When submitting comments, remember to:

- Identify the rulemaking by docket number and other identifying information (subject heading, **Federal Register** date, and page number).
- Follow directions. The agency may ask you to respond to specific questions or organize comments by referencing a CFR part or section number.
- Explain why you agree or disagree; suggest alternatives and substitute language for your requested changes.
- Describe any assumptions and provide any technical information and/or data that you used.
- If you estimate potential costs or burdens, explain how you arrived at your estimate in sufficient detail to allow for it to be reproduced.
- Provide specific examples to illustrate your concerns, and suggest alternatives.
- Explain your views as clearly as possible, avoiding the use of profanity or personal threats.
- Make sure to submit your comments by the comment period deadline identified.

D. What acronyms and abbreviations are used in the preamble?

Below is a list of acronyms and abbreviations used in this preamble.

AC—air conditioning
ACGIH—American Conference of Governmental Industrial Hygienists
ACH—air changes per hour
AEGL—acute exposure guideline level
AHRI—Air Conditioning, Heating and Refrigeration Institute
ANSI—American National Standards Institute
ASHRAE—American Society of Heating, Refrigerating and Air-Conditioning Engineers
BTU—British thermal unit
CAA—Clean Air Act
CAS Reg. No.—Chemical Abstracts Service Registry Identification Number
CBI—Confidential Business Information
CFC—chlorofluorocarbon
CFR—Code of Federal Regulations
CMAQ—Community Multiscale Air Quality
DOE—the United States Department of Energy
EO—Executive Order
EPA—the United States Environmental Protection Agency
FR—**Federal Register**
GHG—greenhouse gas
GWP—global warming potential
HCFC—hydrochlorofluorocarbon
HFC—hydrofluorocarbon
ICF—ICF International, Inc.
ICR—Information Collection Request
IEC—International Electrotechnical Commission
IPCC—Intergovernmental Panel on Climate Change
IPR—industrial process refrigeration
kJ—kilojoule
kPa—kilopascal
lb—pound
LFL—lower flammability limit
MSDS—Material Safety Data Sheet
MVAC—motor vehicle air conditioning
NAAQS—National Ambient Air Quality Standard
NAICS—North American Industrial Classification System
NIOSH—the United States National Institute for Occupational Safety and Health
NOAEL—No Observed Adverse Effect Level
NPRM—Notice of Proposed Rulemaking
NTTAA—National Technology Transfer and Advancement Act
OEM—original equipment manufacturer
ODP—ozone depletion potential
ODS—ozone-depleting substance
OHA—Office of Hearing and Appeals
OMB—the United States Office of Management and Budget
OSHA—the United States Occupational Safety and Health Administration
PEL—permissible exposure limit
PFC—perfluorocarbon
PMS—Pantone Matching System
ppb—parts per billion
ppm—parts per million
PRA—Paperwork Reduction Act
PTAC—packaged terminal air conditioner
PTHP—packaged terminal heat pump
REL—recommended exposure limit
RFA—Regulatory Flexibility Act
SBA—the United States Small Business Administration
SNAP—Significant New Alternatives Policy
STEL—short term exposure limit
TLV—threshold limit value
TSCA—Toxic Substances Control Act
TWA—time-weighted average
UL—Underwriters Laboratories Inc.
UMRA—Unfunded Mandates Reform Act
VOC—volatile organic compounds

II. How does the Significant New Alternatives Policy (SNAP) program work?

A. What are the statutory requirements and authority for the SNAP Program?

Section 612 of the Clean Air Act (CAA) requires EPA to develop a program for evaluating alternatives to ODS. EPA refers to this program as the Significant New Alternatives Policy (SNAP) program. The major provisions of section 612 are the following:

1. Rulemaking

Section 612(c) requires EPA to promulgate rules making it unlawful to replace any class I substance (chlorofluorocarbon, halon, carbon tetrachloride, methyl chloroform, and hydrobromofluorocarbon) or class II

substance (hydrochlorofluorocarbon) with any substitute that the Administrator determines may present adverse effects to human health or the environment where the Administrator has identified an alternative that (1) reduces the overall risk to human health and the environment and (2) is currently or potentially available.

2. Listing of Unacceptable/Acceptable Substitutes

Section 612(c) requires EPA to publish a list of the substitutes unacceptable for specific uses and to publish a corresponding list of acceptable alternatives for specific uses. The list of acceptable substitutes may be found at *www.epa.gov/ozone/snap/lists,* and the lists of ''unacceptable,'' ''acceptable subject to use conditions,'' and ''acceptable subject to narrowed use limits'' substitutes are found in the appendices to Subpart G of 40 CFR part 82 as well as at *www.epa.gov/ozone/snap/lists.*

3. Petition Process

Section 612(d) grants the right to any person to petition EPA to add a substance to, or delete a substance from, the lists published in accordance with section 612(c). The Agency has 90 days to grant or deny a petition. Where the Agency grants the petition, EPA must publish the revised lists within an additional six months.

4. 90-Day Notification

Section 612(e) directs EPA to require any person who produces a chemical substitute for a class I substance to notify the Agency not less than 90 days before new or existing chemicals are introduced into interstate commerce for significant new uses as substitutes for a class I substance. The producer must also provide the Agency with the producer's unpublished health and safety studies on such substitutes.

5. Outreach

Section 612(b)(1) states that the Administrator shall seek to maximize the use of federal research facilities and resources to assist users of class I and II substances in identifying and developing alternatives to the use of such substances in key commercial applications.

6. Clearinghouse

Section 612(b)(4) requires the Agency to set up a public clearinghouse of alternative chemicals, product substitutes, and alternative manufacturing processes that are available for products and manufacturing processes which use class I and II substances.

B. What is EPA's regulation implementing section 612?

On March 18, 1994, EPA published the original rulemaking (59 FR 13044) which established the process for administering the SNAP program and issued EPA's first lists identifying acceptable and unacceptable substitutes in the major industrial use sectors (Subpart G of 40 CFR Part 82). These eight sectors—refrigeration and air conditioning; foam blowing; cleaning solvents; fire suppression and explosion protection; sterilants; aerosols; adhesives, coatings and inks; and tobacco expansion—are the principal industrial sectors that historically consumed the largest volumes of ODS.

Section 612 of the CAA instructs EPA to list as acceptable those substitutes that present a lower overall risk to human health and the environment as compared with other substitutes that are currently or potentially available for a specific use.

C. How do the regulations for the SNAP program work?

Under the SNAP regulations, anyone who plans to market or produce a substitute in one of the eight major industrial use sectors where class I or class II substances have been used must provide notice to the Agency, including health and safety information on the substitute, at least 90 days before introducing it into interstate commerce for significant new use as an alternative. 40 CFR 82.176(a). This requirement applies to the persons planning to introduce the substitute into interstate commerce,[6] who typically are chemical manufacturers but may include importers, formulators, equipment manufacturers, and end users when they are responsible for introducing a substitute into commerce.[7] The CAA and the SNAP regulations, 40 CFR 82.174(a), prohibit use of a substitute earlier than 90 days after notice has been provided to the Agency. EPA considers that notice has been received once EPA receives the submission and determines that the submission includes complete and adequate data. 40 CFR 82.180(a). At that point, the SNAP review begins.

The Agency has identified four possible decision categories for substitutes that are submitted for evaluation: acceptable; acceptable subject to use conditions; acceptable subject to narrowed use limits; and unacceptable[8] (40 CFR 82.180(b)). Use conditions and narrowed use limits are both considered ''use restrictions'' and are explained below. Substitutes that are deemed acceptable with no use restrictions (no use conditions or narrowed use limits) can be used for all applications in the relevant end-uses within the sector. Substitutes that are acceptable subject to use restrictions may be used only in accordance with those restrictions.

After reviewing a substitute, the Agency may make a determination that a substitute is acceptable only if certain conditions are met in the way that the substitute is used to minimize risks to human health and the environment. EPA describes such substitutes as ''acceptable subject to use conditions.'' Entities that use these substitutes without meeting the associated use conditions are in violation of section 612 of the CAA and EPA's SNAP regulations. 40 CFR 82.174(c).

For some substitutes, the Agency may permit a narrowed range of use within an end-use or sector. For example, the Agency may limit the use of a substitute to certain end-uses or specific applications within an industry sector. EPA describes these substitutes as ''acceptable subject to narrowed use limits.'' A person using a substitute that is acceptable subject to narrowed use limits in applications and end-uses that are not consistent with the narrowed use limit is using the substitute in an unacceptable manner and is in violation of section 612 of the CAA and EPA's SNAP regulations. 40 CFR 82.174(c).

The Agency publishes its SNAP program decisions in the **Federal Register** (FR). EPA publishes proposed decisions concerning substitutes that are deemed acceptable subject to use restrictions (use conditions and/or narrowed use limits), or substitutes deemed unacceptable, as proposed rulemakings to provide the public providing an opportunity to comment, before publishing final decisions.

[6] As defined at 40 CFR 82.104, ''interstate commerce'' means the distribution or transportation of any product between one state, territory, possession or the District of Columbia, and another state, territory, possession or the District of Columbia, or the sale, use or manufacture of any product in more than one state, territory, possession or District of Columbia. The entry points for which a product is introduced into interstate commerce are the release of a product from the facility in which the product was manufactured, the entry into a warehouse from which the domestic manufacturer releases the product for sale or distribution, and at the site of United States Customs clearance.

[7] As defined at 40 CFR 82.172, ''end-use'' means processes or classes of specific applications within major industrial sectors where a substitute is used to replace an ODS.

[8] The SNAP regulations also include ''pending,'' referring to submissions for which EPA has not reached a determination under this provision.

In contrast, EPA publishes decisions concerning substitutes that are deemed acceptable with no restrictions as ''notices of acceptability'' or ''determinations of acceptability,'' rather than as proposed and final rules. As described in the preamble to the rule initially implementing the SNAP program in the **Federal Register** at 59 FR 13044 on March 18, 1994, EPA does not believe that rulemaking procedures are necessary to list alternatives that are acceptable without restrictions because such listings neither impose any sanction nor prevent anyone from using a substitute.

Many SNAP listings include ''Comments'' or ''Further Information'' to provide additional information on substitutes. Since this additional information is not part of the regulatory decision, these statements are not binding for use of the substitute under the SNAP program. However, regulatory requirements so listed are binding under other regulatory programs (e.g., worker protection regulations promulgated by the Occupational Safety and Health Administration (OSHA)). The ''Further Information'' identified in the listing does not necessarily include all other legal obligations pertaining to the use of the substitute. While the items listed are not legally binding under the SNAP program, EPA encourages users of substitutes to apply all statements in the ''Further Information'' column in their use of these substitutes. In many instances, the information simply refers to sound operating practices that have already been identified in existing industry and/or building codes or standards. Thus many of the statements, if adopted, would not require the affected user to make significant changes in existing operating practices.

D. Where do I find additional information about the SNAP program?

For copies of the comprehensive SNAP lists of substitutes or additional information on SNAP, refer to EPA's Ozone Depletion Web site at: *www.epa.gov/ozone/snap.* For more information on the Agency's process for administering the SNAP program or criteria for evaluation of substitutes, refer to the SNAP final rulemaking in the **Federal Register** at 59 FR 13044 on March 18, 1994, codified at 40 CFR Part 82, Subpart G. A complete chronology of SNAP decisions and the appropriate citations is found at: *www.epa.gov/ozone/snap/chron.html.*

III. What substitutes in what end-uses are considered in this proposed rule?

A. What listing decisions is EPA proposing in this action?

In this action, EPA proposes to list the following refrigerants as acceptable substitutes, subject to use conditions, in the identified end-uses.

1. *Retail food refrigeration.* EPA proposes to list isobutane (also referred to as R–600a) and the hydrocarbon blend R–441A as acceptable subject to use conditions as substitutes in retail food refrigeration (new stand-alone commercial refrigerators and freezers only). EPA proposes the following use conditions:

i. The quantity of the substitute refrigerant (i.e., ''charge size'') must not exceed 150 grams (5.29 ounces);

ii. These refrigerants may be used only in new equipment designed specifically and clearly identified for the refrigerant—i.e., none of these substitutes may be used as a conversion or ''retrofit'' [9] refrigerant for existing equipment;

iii. These refrigerants may be used only in stand-alone commercial refrigerators and freezers that meet all requirements listed in Supplement SB to the 10th edition of Underwriters Laboratories (UL) Standard 471, dated November 24, 2010. In cases where the proposed rule includes requirements more stringent than those of the 10th edition of UL Standard 471, the appliance must meet the requirements of the rule, as finalized;

iv. The refrigerator or freezer must have red Pantone Matching System (PMS) #185 marked pipes, hoses, or other devices through which the refrigerant passes, to indicate the use of a flammable refrigerant. This color must be applied at all service ports and other parts of the system where service puncturing or other actions creating an opening from the refrigerant circuit to the atmosphere might be expected and must extend a minimum of one (1) inch in both directions from such locations;

v. The following markings, or the equivalent, must be provided and must be permanent:

(a) ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. Do Not Use Mechanical Devices To Defrost Refrigerator. Do Not Puncture Refrigerant Tubing.'' This marking must be provided on or near any evaporators that can be contacted by the consumer.

(b) ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing.'' This marking must be located near the machine compartment.

(c) ''CAUTION—Risk of Fire or Explosion. Flammable Refrigerant Used. Consult Repair Manual/Owner's Guide Before Attempting To Service This Product. All Safety Precautions Must be Followed.'' This marking must be located near the machine compartment.

(d) ''CAUTION—Risk of Fire or Explosion. Dispose of Properly In Accordance With Federal Or Local Regulations. Flammable Refrigerant Used.'' This marking must be provided on the exterior of the refrigeration equipment.

(e) ''CAUTION—Risk of Fire or Explosion Due To Puncture Of Refrigerant Tubing; Follow Handling Instructions Carefully. Flammable Refrigerant Used.'' This marking must be provided near all exposed refrigerant tubing.

With regard to the proposed use conditions, we note the following. First, regarding the use of red marking for pipes, hoses and other devices in proposed use condition iv., we discuss and solicit comment on direct color application on the applicable parts of the system, such as a red plastic sleeve, in Section V.D, ''Color-coded hoses and piping.'' Discussion of application of red coloring for equipment utilizing a process tube is also provided there. Second, regarding proposed use condition v., the difference between this proposed requirement and clauses SB6.1.2 to SB6.1.5 of UL Standard 471 is that all of these markings must be in letters no less than 6.4 mm (¼ inch) high. In UL 471, the markings are required to be no less than 3.2 mm (⅛ inch) high.

2. *Very low temperature refrigeration and non-mechanical heat transfer.* EPA proposes to list ethane (also referred to as R–170), as acceptable, subject to use conditions, in very low temperature refrigeration equipment and in non-mechanical heat transfer, subject to the same use conditions as described above for isobutane and R–441A in stand-alone commercial refrigerators and freezers.

3. *Household refrigerators and freezers.* EPA proposes to list propane (also referred to as R–290), as acceptable subject to use conditions as a substitute in household refrigerators and freezers and combination refrigerator/freezers subject to the following use conditions.

i. The charge size for any household refrigerator, freezer, or combination refrigerator and freezer for each circuit using R–290 must not exceed 57 grams (2.01 ounces);

[9] Sometimes conversion refrigerant substitutes are inaccurately referred to as ''drop in'' replacements.

ii. This refrigerant may be used only in new equipment specifically designed and clearly identified for the refrigerant—i.e., none of these substitutes may be used as a conversion or ''retrofit'' refrigerant for existing equipment;

iii. This substitute may be used only in equipment that meets all requirements in Supplement SA to the 10th edition of UL Standard 250, dated August 25, 2000. (In cases where the proposed rule includes requirements more stringent than those of the 10th edition of UL Standard 250, the appliance must meet the requirements of the final SNAP listing);

iv. The refrigerator or freezer must have red Pantone Matching System (PMS) #185 marked pipes, hoses, and other devices through which the refrigerant passes to indicate the use of a flammable refrigerant;

v. Permanent markings must be provided on the equipment, as described above for stand-alone commercial refrigerators and freezers. All of these markings must be in letters no less than 6.4 mm (¼ inch) high. (The difference between this requirement and clauses SA6.2.1 to SA6.2.5 of UL Standard 250 is that in UL 250, the markings are required to be no less than 3.2 mm [⅛ inch] high instead of 6.4 mm [¼ inch]).

4. *Vending machines.* EPA proposes to list R–441A, isobutane and propane as acceptable substitutes in vending machines, subject to the same use conditions described above for stand-alone commercial refrigerators and freezers, except that paragraph iii. would read as follows:

Equipment must meet all requirements of Supplement SA to the 7th edition of UL Standard 541, ''Refrigerated Vending Machines,'' dated December 30, 2011 (instead of the 10th edition of UL 471).

Note that in UL 541, the relevant references on equipment markings for flammable refrigerants in Supplement A are sections SA 6.1.2–SA 6.1.5.

5. *Residential and light commercial AC and heat pumps.* EPA proposes to list propane (also known as R–290), difluoromethane (also known as HFC–32 or R–32), and R–441A as acceptable subject to use conditions as substitutes in residential and light commercial AC for self-contained room air conditioners, including packaged terminal air conditioners (PTACs) and packaged terminal heat pumps (PTHPs), window AC units, and portable AC units designed for use in a single room.[10] EPA proposes the following use conditions:

i. These refrigerants may be used only in new equipment designed specifically and clearly identified for the refrigerant—i.e., none of these substitutes may be used as a conversion or ''retrofit'' refrigerant for existing equipment;

ii. These refrigerants may be used only in air conditioners that meet all requirements listed in Supplement SA to the 8th edition, dated August 2, 2012, of Underwriters Laboratories (UL) Standard 484, ''Room Air Conditioners.'' If this rule is finalized as proposed, in cases where the final rule would include requirements more stringent than those of the 8th edition of UL Standard 484, the appliance would need to meet the requirements of the final rule in place of the requirements in the UL Standard;

iii. UL 484 includes charge limits for room air conditioners and adherence to those charge limits would normally be confirmed by the installer. In addition to proposing the charge limits in the UL 484 standard as a requirement, EPA is proposing the following charge size limits adherence to which must be confirmed by the original equipment manufacturer (OEM). In cases where the charge size limit listed is different from those determined by UL 484, the smaller of the two charge sizes would apply. For a review of how these charge size limits were derived, see ''Derivation of Charge Limits for Room Air Conditioners,'' EPA, 2014 in the docket. The charge size limit must be determined based on the type of equipment, the alternative refrigerant used, and the normal rated capacity of the unit. The proposed limits are presented in Tables 3 through 6 below in section V.C, ''Charge size,'' and in Tables A, B, C and D of the regulatory text at the end of this document.

iv. The air conditioner must have red Pantone Matching System (PMS) #185 marked pipes, hoses, or other devices through which the refrigerant passes to indicate the use of a flammable refrigerant. This color must be applied at all service ports and other parts of the system where service puncturing or other actions creating an opening from the refrigerant circuit to the atmosphere might be expected and must extend a minimum of one (1) inch in both directions from such locations;

v. The following markings, or the equivalent, must be provided and must be permanent:

(a) On the outside of the air conditioner: ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing.''

(b) On the outside of the air conditioner: ''CAUTION—Risk of Fire or Explosion. Dispose of Properly In Accordance With Federal Or Local Regulations. Flammable Refrigerant Used.''

(c) On the inside of the air conditioner near the compressor: ''CAUTION—Risk of Fire or Explosion. Flammable Refrigerant Used. Consult Repair Manual/Owner's Guide Before Attempting To Service This Product. All Safety Precautions Must be Followed.''

(d) For portable air conditioners, packaged terminal air conditioners and packaged terminal heat pumps, on the outside of the product: ''WARNING: Appliance shall be installed, operated and stored in a room with a floor area larger than ''X'' m^2 (Y ft^2).'' The value ''X'' must be determined using the minimum room size in m^2 calculated using Appendix F of UL 484. The evaporator must remain no higher than 0.6 m above the floor.

(e) For window air conditioners, on the outside of the product: ''WARNING: Appliance shall be installed, operated and stored in a room with a floor area larger than ''X'' m^2 (Y ft^2).'' The value ''X'' must be determined using the minimum room size in m^2 calculated using Appendix F of UL 484. The evaporator must remain no higher than 1.06 m above the floor.

All of these markings must be in letters no less than 6.4 mm (¼ inch) high. (The difference between this requirement and clauses SA6.2.1 to SA6.2.5 of UL Standard 484 is that in UL 484, the markings are required to be no less than 3.2 mm [⅛ inch] high instead of 6.4 mm [¼ inch]).

The regulatory text of our proposed decisions appears in tables at the end of this document. If finalized as proposed, this text would be codified at 40 CFR Part 82 Subpart G. The proposed regulatory text contains listing decisions for the end-uses discussed above. We note that there may be other legal obligations pertaining to the manufacture, use, handling, and disposal of hydrocarbons that are not included in the information listed in the tables (e.g., section 608 prohibition on venting, releasing, or disposing of refrigerant substitutes or Department of Transportation requirements for transport of flammable gases).

[10] Packaged terminal air conditioners are intended for use in a single room and use no ducts to carry cooled air and no external refrigerant lines. Typical applications include motel or dormitory air conditioners.

In summary, EPA is proposing to list ethane, isobutane, propane, HFC–32, and R–441A as acceptable subject to use conditions as substitute refrigerants in certain refrigeration and AC end-uses. If this proposal were to become final, it would be legal to use those refrigerants in the specified types of equipment under the conditions identified above. Use in the specified types of equipment that is not consistent with the use conditions, as finalized, would be a violation of CAA section 612 and EPA's implementing regulations. Both the equipment manufacturers and the end users should be familiar with these proposed use conditions and EPA would expect them to comply with any final use conditions.

B. What are ethane, isobutane, propane, HFC–32, R–441A, and the ASHRAE classifications for refrigerant flammability?

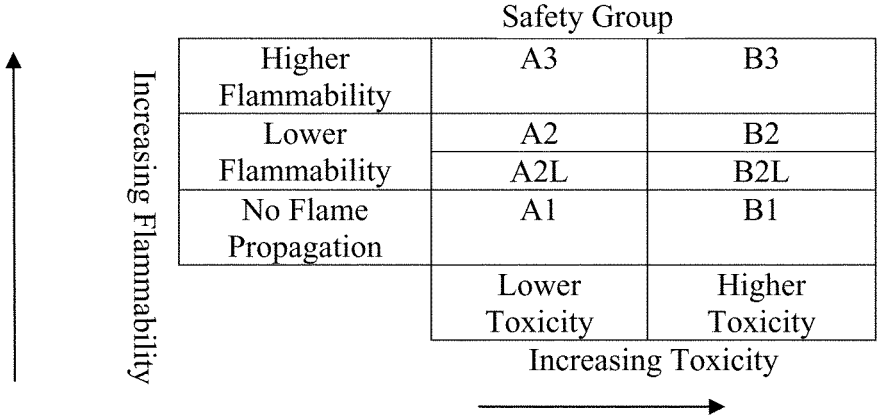
Ethane, isobutane, and propane are hydrocarbons and R–441A is a hydrocarbon blend. Hydrocarbons are highly flammable organic compounds made up of hydrogen and carbon. Ethane has two carbons and a chemical formula of C_2H_6. Propane has three carbons and the formula C_3H_8. Isobutane has four carbons and the formula C_4H_{10}, also written as $CH(CH_3)_2CH_3$ to distinguish it from n-butane. The respective Chemical Abstracts Service Registry Numbers (CAS Reg. Nos.) of ethane, propane, and isobutane are 74–84–0, 74–98–6, and 75–28–5. As refrigerants, ethane, propane, and isobutane can be referred to by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) designations R–170, R–290 and R–600a, respectively.

R–441A, also known by the trade name ''HCR–188C,'' is a highly flammable hydrocarbon blend consisting of 55% propane, 36% n-butane, 6% isobutane, and 3% ethane by weight. HFC–32 is a mildly flammable organic compound made up of hydrogen, carbon, and fluorine with the chemical formula CF_2H_2 (CAS Reg. No. 75–10–5).

The American National Standards Institute (ANSI)/ASHRAE Standard 34–2010 assigns a safety group classification for each refrigerant which consists of two alphanumeric characters (e.g., A2 or B1). The capital letter indicates the toxicity and the numeral denotes the flammability. ASHRAE classifies Class A refrigerants as refrigerants for which toxicity has not been identified at concentrations less than or equal to 400 parts per million (ppm) by volume, based on data used to determine threshold limit value-time-weighted average (TLV–TWA) or consistent indices. Class B signifies refrigerants for which there is evidence of toxicity at concentrations below 400 ppm by volume, based on data used to determine TLV–TWA or consistent indices. The refrigerants are also assigned a flammability classification of 1, 2, or 3. Tests are conducted in accordance with ASTM E681 using a spark ignition source at 60 °C and 101.3 kPa (ASHRAE, 2010). Figure 1 in ANSI/ASHRAE Standard 15–2007 uses the same safety group but limits its concentration to 3400 ppm.

The flammability classification ''1'' is given to refrigerants that, when tested, show no flame propagation. The flammability classification ''2'' is given to refrigerants that, when tested, exhibit flame propagation, have a heat of combustion less than 19,000 kJ/kg (8,174 BTU/lb), and have a lower flammability limit (LFL) greater than 0.10 kg/m^3. Refrigerants within flammability classification 2 may optionally be designated in the lower flammability subclass ''2L'' if they have a maximum burning velocity of 10 cm/s or lower when tested at 23.0 °C and 101.3 kPa. The flammability classification ''3'' is given to refrigerants that, when tested, exhibit flame propagation and that either have a heat of combustion of 19,000 kJ/kg (8,174 BTU/lb) or greater or an LFL of 0.10 kg/m^3 or lower. For both toxicity and flammability classifications, refrigerant blends are designated based on the worst case of fractionation determined for the blend (which may be different when evaluating toxicity than when evaluating flammability).

Figure 1. Refrigerant Safety Group Classification



Using these safety group classifications, ANSI/ASHRAE Standard 34–2010 categorizes ethane, isobutane, propane, and R–441A in the A3 Safety Group and categorizes HFC–32 in the A2L Safety Group.

C. What end-uses are included in EPA's proposed decision?

1. Household Refrigerators, Freezers, and Combination Refrigerator/Freezers

Household refrigerators, freezers, and combination refrigerator/freezers are intended primarily for residential use, although they may be used outside the home. Household freezers only offer storage space at freezing temperatures, unlike household refrigerators. Products with both a refrigerator and freezer in a single unit are most common. Wine coolers used in residential settings are considered part of this end-use. EPA previously found the flammable

hydrocarbon refrigerants isobutane and R–441A acceptable subject to use conditions in this end-use. December 20, 2011, at 76 FR 78832, codified at Appendix R of Subpart G of 40 CFR part 82.

2. Retail Food Refrigeration—Stand-Alone Commercial Refrigerators and Freezers

Retail food refrigeration includes the refrigeration systems, including cold storage cases, designed to chill food or keep it at a cold temperature for commercial sale. In this proposed rule, we are considering the use of hydrocarbons only in stand-alone equipment. A stand-alone appliance is one utilizing a sealed hermetic compressor and for which all refrigerant-containing components, including but not limited to the compressor, condenser, and evaporator, are assembled into a single piece of equipment before delivery to the ultimate consumer or user. Such equipment does not require the addition or removal of refrigerant when placed into initial operation. Stand-alone equipment is used to chill or to store chilled beverages or frozen products (e.g., reach-in beverage coolers, stand-alone ice cream cabinets, and wine coolers in commercial settings). This proposed rule does not apply to large commercial refrigeration systems such as, but not limited to, multiplex direct expansion refrigeration systems typically found in supermarkets. Such equipment typically requires larger charge sizes than those considered in this proposed rule. This proposal also does not apply to walk-in coolers, a type of equipment that typically requires larger charges than those considered in this proposed rule. EPA has already listed propane as acceptable subject to use conditions for use in stand-alone commercial refrigerators and freezers. December 20, 2011, at 76 FR 78832, codified at Appendix R to Subpart G of 40 CFR part 82.

3. Very Low Temperature Refrigeration and 4. Non-Mechanical Heat Transfer Equipment

Very low temperature refrigeration equipment is intended to maintain temperatures considerably lower than for refrigeration of food—for example, −80 °C (−170 °F) or lower. Examples of very low temperature refrigeration equipment include medical freezers and freeze-dryers, which generally require extremely reliable refrigeration cycles to maintain low temperatures and must meet stringent technical standards. In some cases, very low temperature refrigeration equipment may use a refrigeration system with two refrigerant loops or with a direct expansion refrigeration loop coupled with an alternative refrigeration technology (e.g., Stirling cycle). This allows a greater range of temperatures and may reduce the overall refrigerant charge.

There is no U.S. standard that we are aware of that applies specifically to very low temperature refrigeration or non-mechanical heat transfer. The submitter of information for use of ethane in very low temperature refrigeration has indicated that Underwriters Laboratories, Inc. has tested their equipment for compliance with the UL 471 standard for commercial refrigeration equipment, which addresses stand-alone commercial refrigerators and freezers. We are proposing compliance with the UL 471 standard as one of the conditions for use of ethane in very low temperature refrigeration equipment. This submission also addressed the use of ethane in a type of non-mechanical heat transfer equipment called a thermosiphon. Non-mechanical heat transfer involves cooling systems that rely on convection to remove heat from an area, rather than mechanical refrigeration. A thermosiphon is a type of heat transfer system that relies on natural convection currents, as opposed to using a mechanical pump. This proposal would allow use of ethane in non-mechanical heat transfer uses, provided that they meet the use conditions, including the requirements of Supplement B to the UL 471 standard and a charge limit of 150 g.[11]

5. Vending Machines

Vending machines are self-contained units for refrigerating beverages or food which dispense goods that must be kept cold or frozen. This end-use differs from other retail food refrigeration because goods are dispensed, rather than allowing the consumer to reach in to grab a beverage or food product. The design of the refrigeration system of a vending machine is similar to that of a self-contained commercial refrigerator or freezer. Typically the difference lies in how payment for goods is made and in the selection mechanisms found in vending machines but not in self-contained commercial refrigerator-freezers, and possibly the outer casing (e.g., glass doors and open, reach-in designs are generally used in self-contained commercial refrigerator-freezers whereas glass wall and other types of casings are used for vending machines). The standard UL 541 applies to vending machines. It contains a Supplement SA specifically addressing flammable refrigerants that is very similar to the Supplement SB in the UL 471 standard for commercial refrigerators and freezers.

6. Residential and Light Commercial AC and Heat Pumps

This end-use includes equipment for cooling air in individual rooms, in single-family homes, and sometimes in small commercial buildings. This end-use differs from commercial comfort AC, which uses chillers that cool water that is then used to cool air throughout a large commercial building, such as an office building or hotel. Examples of equipment for residential and light commercial AC and heat pumps include:

- Central air conditioners, also called unitary AC or unitary split systems. These systems include an outdoor unit with a condenser and a compressor, refrigerant lines, an indoor unit with an evaporator, and ducts to carry cooled air throughout a building. Central heat pumps are similar but offer the choice to either heat or cool the indoor space. These systems are not addressed in this rule.
- Multi-split air conditioners. These systems include one or more outdoor unit(s) with a condenser and a compressor and multiple indoor units, each of which is connected to the outdoor unit by refrigerant lines. These systems are not addressed in this rule.
- Mini-split air conditioners. These systems include an outdoor unit with a condenser and a compressor and a single indoor unit that is connected to the outdoor unit by refrigerant lines. Cooled air exits directly from the indoor unit rather than being carried through ducts. These systems are not addressed in this rule.
- Window air conditioners. These are self-contained units that fit in a window with the condenser extending outside the window. These types of units would be regulated under this rule if it becomes final.
- Packaged terminal air conditioners and packaged terminal heat pumps. These are self-contained units that consist of a separate, un-encased combination of heating and cooling assemblies mounted through a wall. These types of units would be regulated under this rule if it becomes final.
- Portable room air conditioners. These are self-contained units used inside rooms that are designed to be

[11] EPA expects that equipment designed for cooling the engine compartment of heavy duty vehicles, a potential non-mechanical heat transfer application, does not meet the requirements of UL 471 and thus, would not meet the requirements of this rule. Similar issues may exist for some other non-mechanical heat transfer equipment.

moved easily from room to room, usually having wheels. They may contain an exhaust hose that can be placed through a window or door to eject heat to the outside. These types of units would be regulated under this rule if it becomes final.

Of these types of equipment, window air conditioners, packaged terminal air conditioners, packaged terminal heat pumps, and portable room air conditioners are self-contained equipment with the condenser, compressor, evaporator, and tubing all within casing in a single unit. These units all fall under the scope of the UL 484 standard for Room Air Conditioners. In contrast, unitary split systems, multi-split systems and mini-split systems have an outdoor condenser that is separated from an indoor unit. Compared to split systems, self-contained equipment typically has smaller charge sizes, has fewer locations that are prone to leak, and is less likely to require servicing by a technician, thereby causing refrigerant releases. A lower risk of refrigerant releases and a potential for smaller releases and lower concentration releases would result in lower risk that flammable refrigerant could be ignited. Thus, self-contained air conditioners and heat pumps using a flammable refrigerant have lower risk for fire than split systems using a flammable refrigerant.

IV. What criteria did EPA consider in determining whether to propose to list the substitutes as acceptable and in determining the proposed use conditions and how does EPA consider those criteria?

Section 612(c) of the Clean Air Act directs EPA to publish a list of acceptable replacement substances (''substitutes'') for class I and class II substances for specific uses. EPA compares the risks to human health and the environment of a substitute to the risks associated with other substitutes that are currently or potentially available. EPA also considers whether the substitute for class I and class II ODS ''reduces the overall risk to human health and the environment'' compared to the ODS historically used in the end-use. The criteria we review are listed at 40 CFR 82.180(a)(7). These criteria are: (i) Atmospheric effects and related health and environmental impacts; (ii) general population risks from ambient exposure to compounds with direct toxicity and to increased ground-level ozone; (iii) ecosystem risks; (iv) occupational risks; (v) consumer risks; (vi) flammability; and (vii) cost and availability of the substitute.

EPA evaluated each of the criteria for each substitute in each end-use for which we are proposing action and then for each substitute we considered overall risk to human health and the environment in comparison to other available or potentially available alternatives in the same end-uses. Based on our evaluations, we may reach different conclusions on the same substitute in different end-uses, because of different risk profiles (e.g., different exposure levels and usage patterns) and different sets of available or potentially available substitutes for each end-use.

As noted previously on May 17, 2013, at 78 FR 29035, environmental and human health exposures can vary significantly depending on the particular application of a substitute—and over time, information available regarding a substitute can change. SNAP's comparative risk framework does not imply fundamental tradeoffs with respect to different types of risk, either to the environment or to human health. EPA recognizes that during the nearly two-decade history of the SNAP program, new information about alternatives already found acceptable and new alternatives have emerged. To the extent possible, EPA considers current information that improves our understanding of the risk factors for the environment and human health in the context of the available or potentially available alternatives for a given use.

A. Effects on the Environment

The SNAP program considers a number of environmental criteria when evaluating substitutes: Ozone depletion potential (ODP); climate effects, primarily based on global warming potential (GWP); local air quality impacts, particularly potential impacts on smog formation from emissions of volatile organic compounds (VOC); and ecosystem effects, particularly from negative impacts on aquatic life. These and other environmental and health risks are discussed below.

The ODP is the ratio of the impact on stratospheric ozone of a chemical compared to the impact of an identical mass of CFC–11. Thus, the ODP of CFC–11 is defined to be one (1.0). Other CFCs and HCFCs have ODPs that range from 0.01 to one (1.0).

All refrigerant substitutes in this proposal have an ODP of zero, lower than the ODP of the ozone depleting substances that they replace: CFC–12 (ODP = 1.0); HCFC–22 (ODP = 0.055); R–13B1 (ODP = 10) and R–502 (ODP = 0.334). The most commonly used substitutes in the end-uses addressed in this proposal also have an ODP of zero (e.g., R–404A, R– 134a, R–410A, and R–407C).[12] Some less common alternatives for these end-uses, such as R–401A, R–414A and other blends containing HCFC–22 or HCFC–142b,[13] have ODPs ranging from 0.01 to 0.047. Thus, the refrigerant substitutes in this proposal have ODPs lower than or identical to the ODPs of other available substitutes and of the substances they replace.

The GWP is a means of quantifying the potential integrated climate forcing of various greenhouse gases relative to carbon dioxide. All of the hydrocarbon refrigerants in this proposal have a relatively low 100-year integrated GWP of less than ten. HFC–32 has a GWP of 675. For comparison, some other commonly used, acceptable refrigerants in these end-uses are R–134a, R–404A, R–407C, and R–410A with GWPs of about 1,430, 3,920, 1,770, and 2,090, respectively. In very low temperature refrigeration, a common refrigerant is R–508B, with a GWP of 13,400. The GWPs of the ozone-depleting substances that they replace are: CFC–12 (GWP = 10,900); HCFC–22 (GWP = 1,810); R–13B1/halon 1301 (GWP = 7,140) and R–502 (GWP = 4,660) (IPCC, 2007). The GWPs of the substitutes reviewed in this proposal are significantly lower than those of other refrigerants currently being used in the residential and light commercial AC and heat pump end-use. As stated above, EPA considers overall risk to human health and the environment compared to ODS as well as alternatives that are available and potentially available in a given end-use. Therefore, the GWP of 675 for HFC–32 may not be considered low in other end-uses that have a larger variety of options available with lower GWPs. Among the acceptable substitutes listed in this end-use, only ammonia absorption and the non-vapor compression technologies evaporative cooling and desiccant cooling would have lower GWPs. Given technical limits on the effective use of the non-vapor compression technologies in different climates and the higher toxicity of ammonia than that of the alternatives proposed here, the proposed substitutes still reduce risk overall compared to the available and potentially available substitutes in this end-use.

The GHG impacts of these refrigerants also depend upon the energy use of

[12] We assume that substitutes containing no chlorine, bromine, or iodine have an ODP of zero.

[13] Under EPA's phaseout regulations, virgin HCFC–22, HCFC–142b, and blends containing HCFC–22 or HCFC–142b may only be used to service existing appliances. Consequently, virgin HCFC–22, HCFC–142b and blends containing HCFC–22 or HCFC–142b may not be used to manufacture new pre-charged appliances or appliance components or to charge new appliances assembled onsite.

appliances, since the ''indirect'' GHG emissions associated with electricity consumption typically exceed those from refrigerants over the full lifecycle of refrigerant-containing products. (ORNL, 1997). If appliances using the refrigerants being considered in this proposal are less energy efficient than the appliances they replace, then it is possible that these appliances would result in higher lifecycle GHG emissions than appliances using a higher GWP refrigerant or refrigerant substitute. Conversely, higher energy efficiency of these appliances would lead to even lower lifecycle GHG emissions. While we have not undertaken a comprehensive assessment of all sources of GHG emissions associated with substituting ODS and other commonly used refrigerants with the proposed refrigerants, we note that for most of the types of equipment covered here, energy efficiency standards exist.[14] Thus, total energy use with alternative refrigerants can be expected to be no higher than that required by the standards for those classes of equipment.[15] Further, testing data, peer-reviewed journal articles and other information provided by the submitters for these substitute refrigerants indicated that equipment using these refrigerants is likely to have a higher coefficient of performance and use less energy than equipment currently being manufactured that uses common ODS and HFC refrigerants that are listed as acceptable under SNAP. This implies that equipment that uses the refrigerants proposed to be listed will have the same or lower climate impacts than other available substitutes (Daikin, 2011; A.S. Trust & Holdings, 2012; A/S Vestfrost, 2012; CHEAA, 2013).

In addition to global impacts on the atmosphere, EPA evaluated potential impacts of the proposed substitutes on local air quality. Ethane and HFC–32 are exempt from the definition of VOC under CAA regulations (see 40 CFR 51.100(s)) addressing the development of State Implementation Plans (SIPs) to attain and maintain the national ambient air quality standards. The other proposed refrigerants, isobutane, propane, and components of R–441A, including isobutane, n-butane and propane, are VOC. Potential emissions of VOC from all substitutes for all end-uses in the refrigeration and AC sector are addressed by the venting prohibition under Section 608 of the CAA. Under that prohibition, refrigerant substitutes (and thus the VOC they contain) may only be emitted where EPA issues a final determination exempting a refrigerant substitute from the venting prohibition on the basis that venting, releasing or disposing of such substance does not pose a threat to the environment, as proposed elsewhere in this action (see Section VI, ''How is EPA proposing to address venting, release, or disposal of the refrigerant substitutes proposed to be listed under section 608 of the Clean Air Act?'' below). EPA estimates that potential emissions of hydrocarbons when used as refrigerant substitutes in all end-uses in the refrigeration and AC sector have little impact on local air quality, with the possible exception of unsaturated hydrocarbons such as propylene (ICF, 2014a). However, for those refrigerants that are VOC as defined in 40 CFR 50.100(s), a State could adopt additional control strategies if necessary for an ozone nonattainment area to attain the National Ambient Air Quality Standard (NAAQS) for ozone.

EPA analyzed a number of scenarios to consider the potential impacts on local air quality if hydrocarbon refrigerants were used widely. We used EPA's Vintaging Model to estimate the hydrocarbon emissions from these scenarios and EPA's Community Multiscale Air Quality (CMAQ) model to assess their potential incremental contributions to ground-level ozone concentrations (ICF, 2014a). That analysis assumed that the most reactive hydrocarbon proposed to be acceptable (isobutane) was used in all refrigeration and AC uses, and that all refrigerant used was emitted to the atmosphere even though isobutane is not being proposed as acceptable for use in all refrigeration and AC uses. In that extreme scenario, the model predicted that the maximum increase in the 8-hour average ground-level ozone concentration would be 0.72 ppb in Los Angeles. Further, in the analysis, the additional ground-level ozone did not result in exceeding the NAAQS where an area was in compliance without the additional refrigerant emissions. Given the potential sources of uncertainty in the modeling, the conservativeness of the assumptions, and the finding that the incremental VOC emissions from this refrigerant emissions would not cause any area that otherwise would meet the NAAQS to exceed it, we believe that the use of isobutane consistent with the use conditions will not result in significantly greater risk to the environment than other substitutes that are currently or potentially available. Further, propane, ethane, and n-butane, the remaining component of R–441A, are less reactive than isobutane and we reach a similar conclusion for those refrigerants.

EPA also analyzed the potential impacts of the uses of hydrocarbon refrigerants proposed to be acceptable under this rule. In this less conservative analysis, EPA looked at a set of end-uses that would be more likely to use hydrocarbon refrigerants between now and 2030. The analysis assumed use of hydrocarbon refrigerants in those uses for which UL currently has standards in place, for which the SNAP program has already listed the uses as acceptable subject to use conditions, or for which the SNAP program is reviewing a submission, including those in this rule.[16] In addition, the air quality analysis assumed several different hydrocarbons [17] would be used based upon those under review by the SNAP program in the end-uses for which they were submitted. For example, we assumed use of propane, R–441A, and another hydrocarbon refrigerant under review in room air conditioners and isobutane, propane, and R–441A in vending machines, stand-alone retail food refrigeration equipment, and household refrigerators and freezers, but no use of hydrocarbons in chillers used for AC of large buildings. (For further

[14] For example, Department of Energy (DOE) standards apply to portable air conditioners, room air conditioners, PTACs and PTHPs, household refrigerators and freezers, refrigerated beverage vending machines, and commercial refrigeration equipment. See *https://www1.eere.energy.gov/buildings/appliance_standards/standards_test_procedures.html*.

[15] Refrigeration or air conditioning equipment in the applicable covered equipment class would still be subject to DOE's standards, regardless of the refrigerant that the equipment uses. If a manufacturer believes that its design is subjected to undue hardship by DOE's regulations, the manufacturer may petition DOE's Office of Hearing and Appeals (OHA) for exception relief or exemption from the standard pursuant to OHA's authority under section 504 of the DOE Organization Act (42 U.S.C. 7194), as implemented at subpart B of 10 CFR part 1003. OHA has the authority to grant such relief on a case-by-case basis if it determines that a manufacturer has demonstrated that meeting the standard would cause hardship, inequity, or unfair distribution of burdens.

[16] The analysis included stand-alone commercial refrigerators, freezers, and coolers; vending machines; refrigerated transport; water coolers; commercial ice machines; household refrigerators and freezers; and room air conditioners (window AC, packaged terminal AC and packaged terminal heat pumps). The analysis did not expressly break out very low temperature refrigeration or non-mechanical heat transfer from commercial refrigerators and freezers.

[17] Refrigerants in this scenario included propane, isobutane, and R–441A in the end-uses where they are proposed to be acceptable subject to use conditions, among others. Ethane was not expressly included, since the type of equipment using ethane is not broken out separately in the analysis. However, ethane is less reactive than the other refrigerants included in the analysis, so this omission is expected to result in a slight overestimation of impacts, if any.

information on the specific assumptions, see ICF, 2014a, in the docket for this rulemaking.) Based on this still conservative but more probable assessment of refrigerant use, we found that even if all the refrigerant in appliances in end-uses addressed in this proposed rule were to be emitted, there would be a worst-case impact of 0.15 ppb ozone in the Los Angeles area, which is the area with the highest level of ozone pollution in the United States. In the other cities examined in the analysis, Houston and Atlanta, impacts were smaller (no more than 0.03 and 0.01 ppb, respectively) (ICF, 2014a). These impacts did not cause any areas to exceed the NAAQS that otherwise would have met the NAAQS without the additional refrigerant emissions. Because of the relatively low air quality impacts of these refrigerants if they are released to the atmosphere in limited amounts, EPA believes that these refrigerants do not have a significantly greater impact on human health and the environment based on their effects on local air quality than other refrigerants listed as acceptable in the end-uses proposed in this rule.

The substitutes in this proposal are all highly volatile. They typically evaporate or partition to air, rather than contaminating surface waters. Effects on aquatic life of the substitutes are expected to be small and pose no greater risk of aquatic or ecosystem effects than those of other available substitutes for these uses.

Based on EPA's analysis, the overall environmental risks, including ODP, GWP, local air quality effects and ecosystem impacts are lower than or comparable to those of other acceptable substitutes in the same end-uses.

B. Flammability and Fire Safety

The flammability risks of the proposed substitutes are of potential concern because household and retail food refrigerators and freezers and room AC units have traditionally used refrigerants that are not flammable. Without appropriate use conditions, the flammability risk posed by these refrigerants could be higher than non-flammable refrigerants because individuals may not be aware that their actions could potentially cause a fire, and existing equipment has not been designed specifically to minimize flammable risks. In this section, we discuss the risks posed by the refrigerants considered in this rule and explain the proposed use conditions we believe are necessary to mitigate risks to ensure that the overall risk to human health and the environment posed by these proposed substitutes is not greater than the overall risk posed by other substitutes in the same end-uses. In addition, we discuss why the flammability risks have led us to propose that these substitutes are only acceptable for use in new equipment specifically designed for these flammable refrigerants.

Because of their flammable nature, ethane, isobutane, propane, HFC–32, and R–441A could pose a significant safety concern for workers and consumers in the end-uses addressed in this proposal if they are not handled correctly. In the presence of an ignition source (e.g., static electricity spark resulting from closing a door, using a torch during service, or a short circuit in wiring that controls the motor of a compressor), an explosion or a fire could occur when the concentration of refrigerant exceeds its lower flammability limit (LFL). The LFLs of the proposed substitutes are: ethane—30,000 ppm; HFC–32—139,000 ppm; isobutane—18,000 ppm; propane—21,000 ppm; and R–441A—20,500 ppm. Therefore, to use these substitutes safely, it is important to minimize the presence of potential ignition sources and to reduce the likelihood that the levels of ethane, HFC–32, isobutane, propane, or R–441A will exceed the LFL. Under the proposed listing decision, these substitutes would be acceptable for use only in new equipment (refrigerators, freezers and air conditioners) specifically designed for the refrigerant. We expect that the original equipment manufacturers, who would be storing large quantities of the refrigerant, are familiar with and use proper safety precautions to minimize the risk of explosion, because of the OSHA and building code requirements under which they operate. We are proposing to include in the ''Further Information'' section of the SNAP listings recommendations that these facilities be equipped with proper ventilation systems and be properly designed to reduce possible ignition sources.

To determine whether flammability would be a concern for manufacturing and service personnel or for consumers, EPA analyzed a plausible worst-case scenario to model a catastrophic release of the proposed refrigerants. The worst-case scenario analysis for each refrigerant revealed that even if the unit's full charge is emitted within one minute, none of these refrigerants reached their respective LFLs of 1.8% for isobutane, 2.1% for propane, 2.05% for R–441A, or 3.0% for ethane, provided that the charge sizes were no greater than those specified in the relevant standard from Underwriters Laboratories (ICF, 2014b,c,d,e,f,g,h,i,j,k). Thus, there would not be an excessive risk of fire or explosion, even under those worst-case assumptions, so long as the charge meets the use conditions in this proposed rule. Detailed analysis of the modeling results are discussed below in the next section regarding ''Toxicity.'' EPA also reviewed the submitters' detailed assessments of the probability of events that might create a fire and engineering risk and approaches to avoid sparking from the refrigeration equipment. Further information on these analyses and EPA's risk assessments are available in public docket EPA–HQ–OAR–2013–0748 at *www.regulations.gov*. Although the analysis showed no potential for the released refrigerant from one piece of equipment to reach the LFL, manufacturing and service personnel or consumers may not be familiar with refrigeration or AC equipment containing a flammable refrigerant. Therefore, use conditions are necessary to ensure people handling such equipment are aware that equipment contains a flammable refrigerant and to ensure safe handling. This allows the flammable refrigerants to be used without increasing overall risk to human health and the environment.

C. Toxicity

In evaluating potential toxicity impacts of ethane, HFC–32, isobutane, propane, and R–441A on human health, EPA considered both occupational and consumer risks. EPA investigated the risk of asphyxiation and of exposure to toxic levels of refrigerant for a worst-case scenario and a typical use scenario for each refrigerant. In the worst-case scenario of a catastrophic leak, we modeled release of the unit's full charge within one minute into a confined space to estimate concentrations that might result. We considered a conservatively small space appropriate to each end-use, such as a small convenience store of 244 m^3 for retail food refrigeration, a small galley kitchen of 18 m^3 for a household refrigerator/freezer, or a small bedroom of 41 m^3 for a room air conditioner.

To evaluate toxicity of all five refrigerants, EPA estimated the maximum time-weighted average (TWA) exposure both for a short-term exposure scenario, with a 15-minute and 30-minute TWA exposure, and for an 8-hour time weighted average that would be more typical of occupational exposure for a technician servicing the equipment. We compared these short-term and long-term exposure values to relevant industry and government workplace exposure limits for ethane, HFC–32, isobutane, propane, and

components of R–441A, (including potential impurities in the substitutes). The modeling results indicate that both the short-term (15-minute and 30-minute) and long-term (8-hour) worker exposure concentrations would be below the relevant workplace exposure limits, such as the Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL), the National Institute for Occupational Safety and Health's (NIOSH) recommended exposure limit (REL), the American Conference of Governmental Industrial Hygienists' (ACGIH) threshold limit value (TLV), or in the case of HFC–32, the manufacturer's recommended workplace exposure limit. In some cases where there was not an established short-term exposure limit (STEL), we considered information on short-term exposure such as the no observed adverse effect level (NOAEL) from available toxicity studies or the National Research Council's Acute Emergency Guideline Limits (AEGL).[18] The respective workplace exposure limits we considered for the various compounds, including components of the refrigerant blend R–441A, are as follows:

- n-Butane, a component in R–441A: 800 ppm REL on 10-hr TWA; 6,900 ppm AEGL–1 over 30 minutes
- Ethane: 1000 ppm TLV on 8-hour TWA
- HFC–32: 1000 ppm manufacturer's exposure guideline on 8-hour TWA; 3000 ppm over 15 minutes
- Isobutane: 800 ppm REL on 10-hr TWA; 18,000 ppm NOAEL over 30 minutes
- Propane: 1000 ppm PEL on 8-hr TWA; 6,900 ppm AEGL–1 over 30 minutes

For equipment with which consumers might come into contact, such as retail food refrigerators and freezers, vending machines, household refrigerators and freezers, and room air conditioners, EPA performed a consumer exposure analysis. In this analysis, we examined potential catastrophic release of the entire charge of the substitute in one minute under a worst-case scenario. We did not examine exposure to consumers in very low temperature refrigeration, as equipment for this end-use would typically be used in the workplace, such as in laboratories, and not in a home or public space. The analysis was undertaken to determine the 15-minute or 30-minute TWA exposure levels for the substitute, which were then compared to the toxicity limits to assess the risk to consumers.

EPA considered toxicity limits for consumer exposure that reflect a short-term exposure such as might occur at home or in a store or other public setting where a member of the general public could be exposed and could then escape. Specific toxicity limits that we used in our analysis of consumer exposure include:

- n-Butane: 6,900 ppm AEGL–1 over 30 minutes
- HFC–32: cardiotoxic NOAEL of 350,000 ppm over 5 minutes
- Isobutane: 18,000 ppm NOAEL over 30 minutes
- Propane: 6,900 ppm AEGL–1 over 30 minutes

The analysis of consumer exposure assumed that 100 percent of the unit's charge would be released over one minute, at which time the concentration of refrigerant would peak in an enclosed space, and then steadily decline. Refrigerant concentrations were modeled under two air change scenarios, believed to represent the baseline of potential flow rates for a home or other public space, assuming flow rates of 2.5 and 4.5 air changes per hour (ACH) (Sheldon, 1989). The highest concentrations of the refrigerant occur in the lower stratum of the room when assuming the lower ventilation level of 2.5 ACH. Calculating the TWA exposure using 2.5 ACH results in a higher concentration than calculating the TWA exposure using 4.5 ACH. Even under the very conservative assumptions used in the consumer exposure modeling, the estimated 15-minute or 30-minute consumer exposures to the proposed refrigerants are much lower than the relevant toxicity limits and thus should not pose a toxicity risk any greater than that of other acceptable refrigerants in the proposed end-uses.

For further information, including EPA's risk screens and risk assessments as well as fault tree analyses from the submitters of the substitutes, see docket number EPA–HQ–OAR–2013–0748 at *www.regulations.gov.*

V. Why is EPA proposing these specific use conditions?

EPA is proposing to list ethane, isobutane, propane, HFC–32, and R–441A as acceptable subject to use conditions in the specified end-uses, as described above in section III.A., ''What listing decisions is EPA proposing in this action?.'' EPA is proposing these uses in new equipment designed and manufactured specifically to use these alternatives. The use conditions include conditions consistent with industry standards, limits on charge size, and requirements for warnings and markings on equipment to inform consumers and technicians of potential flammability hazards. The proposed listings with the specific use conditions are intended to allow for the use of these flammable refrigerants in a manner that will ensure they do not pose a greater risk to human health or the environment than other substitutes that are currently or potentially available. We seek comment on the proposed listing as well as the specific use conditions discussed below.

A. New Equipment Only; Not Intended for Use as a Retrofit Alternative

EPA is proposing that the flammable refrigerants considered in this proposal be limited to use only in new equipment that has been designed and manufactured specifically for use with the listed alternative refrigerant. We are proposing that these substitutes may be used only in new equipment [19] that is designed to address concerns unique to flammable refrigerants. The flammable refrigerants were not submitted under the SNAP program to be used in retrofitted equipment, and no information was provided on how to address hazards of flammable refrigerants when used in equipment that was designed for non-flammable refrigerants. Introduction into interstate commerce of these refrigerants for use in existing equipment without giving timely and adequate notice to EPA would be in violation of section 612(e) of the CAA and the SNAP regulations at 40 CFR Part 82, Subpart G. In addition, if the rule is finalized as proposed, use of these refrigerants in existing equipment would be in violation of

[18] The AEGL limit is an emergency guideline for exposures to the general population (including susceptible populations) and is not time-weighted. It also considers the chemical's flammability in addition to its toxicity. EPA develops a set of AEGL values for a chemical for five exposure periods (10 and 30 minutes, 1 hour, 4 hours and 8 hours). For each exposure period, three different AEGL values are developed to address different levels of toxicological impacts. Of relevance for the modeled scenario is the AEGL–1 (10,000 ppm), which is defined as: ''the airborne concentration, expressed as parts per million or milligrams per cubic meter (ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.'' While permanent toxicological effects are not expected up to the AEGL–2 value, this limit is not relevant for this analysis because at that level, flammability would be a greater concern.

[19] This is intended to mean a completely new refrigeration circuit containing a new evaporator, condenser and refrigerant tubing. We are aware that for some types of equipment, e.g., vending machines, it is possible to detach easily and replace the refrigeration circuit from the outer casing of the equipment. In such a situation, replacing the old refrigeration circuit with a new one within the old casing would be considered ''new'' equipment and not a retrofit of the old, existing equipment.

section 612(c) of the CAA and the corresponding SNAP regulations at 40 CFR Part 82, Subpart G.

B. Standards

EPA is proposing that the flammable refrigerants be used only in equipment that meets all requirements in the relevant supplements for flammable refrigerants in certain applicable UL Standards for refrigeration and AC equipment. Specifically, the standards cited include UL 471 10th edition for commercial refrigerators and freezers (including stand-alone freezers for very low temperature refrigeration), UL 250 10th edition (for household refrigerators and freezers), UL 541 7th edition for refrigerated vending machines, and UL 484 8th edition for room air conditioners.

UL has tested equipment for flammability risk in both household and retail food refrigeration. Further, UL has developed acceptable safety standards including requirements for construction, for markings, and for performance tests concerning refrigerant leakage, ignition of switching components, surface temperature of parts, and component strength after being scratched. These standards were developed in an open and consensus-based approach, with the assistance of experts in the AC and refrigeration industry as well as experts involved in assessing the safety of products. While similar standards exist from other bodies such as the International Electrotechnical Commission (IEC), we are proposing to rely on UL standards as those that are most applicable and recognized by the U.S. market. This proposed approach is the same as that in our previous rule on flammable refrigerants (December 20, 2011 at 76 FR 78832).

C. Charge Size

EPA is proposing use conditions that limit the amount of refrigerant allowed in each type of appliance. As before, we believe it is necessary to set limits on charge size in order for these refrigerants not to pose a risk to human health or the environment that is greater than the risk posed by other available substitutes. These limits will reduce the risk to workers and consumers since under worst-case scenario analyses, a leak of the proposed charge sizes did not result in concentrations of the refrigerant that met or exceeded the LFL, as explained above in Section IV.B, ''Flammability and fire safety.''

EPA is proposing limitations on refrigerant charge size for household and stand-alone commercial refrigerators and freezers, vending machines, and room AC units that reflect the UL 250, UL 471, UL 541 and UL 484 standards. As discussed above in paragraph B of this section, we believe UL standards are most applicable to the U.S. market and offer requirements developed by a consensus of experts. EPA is proposing a charge size not to exceed 57 grams (2.01 ounces) for household refrigerators and freezers, not to exceed 150 grams (5.29 ounces) for retail food refrigeration in stand-alone units, and not to exceed 150 grams (5.29 ounces) for vending machines. We are proposing a varying charge size limit for room AC units as discussed below. To place these quantities in a familiar context, EPA estimates the charge size of a disposable lighter is equal to 30 grams (1.06 ounces).

The UL 250 standard for household refrigerators and freezers limits the amount of refrigerant that may leak to 50 grams (1.76 ounces). EPA is proposing a charge size of 57 grams (2.01 ounces) to allow for up to 7 grams (0.25 ounces) of refrigerant that might be solubilized in the oil (and assumed not to leak or immediately vaporize with the refrigerant in the case of a leak). EPA bases this estimate on information received from a manufacturer of hydrocarbon-based refrigerator-freezers (see EPA–HQ–OAR–2009–0286–0033 on *www.regulations.gov*).

UL standards 541 (retail food refrigeration) and 471 (vending machines) limit the amount of refrigerant leaked to 150 grams (5.29 ounces). Furthermore, the charge size limit for A3 refrigerants (for retail food refrigeration) is in line with the IEC 60335–2–89 standard for commercial appliances, which has a charge size limit of 150 grams (5.29 ounces).

As noted above, EPA is proposing a varying charge size for room AC units. We are proposing that the maximum charge must be no greater than the amount calculated for a given sized space according to Appendix F to Supplement SA of UL Standard 484. This section of the UL standard uses a formula for charge of a fixed room air conditioner based upon the size of the space where the refrigerant may escape and the lower flammability limit of the refrigerant. The formula is as follows:

$$m_{max} = 2.5\ (LFL)^{\frac{5}{4}}\ h_o\sqrt{A}$$

Where:

M_{max} is the maximum charge size allowed for the space, in kg,
LFL is the lower flammability limit of the refrigerant in kg/m^3,
h_0 is the installation height of the indoor unit in m (0.6 m for an AC unit on the floor, 1.0 m for an AC unit in a window, 1.8 m for a wall-mounted AC unit, and 2.2 m for a ceiling-mounted AC unit), and
A is the floor area of the room, in m^2.

The equipment manufacturer would then design AC units to be used in rooms with a minimum size and would label the minimum room size on the equipment. Table 2 below gives examples of room sizes and appropriate charge sizes for the three refrigerants proposed to be listed for use in room AC units, assuming a typical height of 1.0 m for a window-mounted unit.

In addition to the formula mentioned above, UL 484 has a requirement that the maximum charge for a room air conditioner may not exceed the amount calculated using the following formula:

$$m_2 = (26\ m^3) \times LFL$$

Where:

m_2 is the maximum charge size allowed, in kg,
26 m^3 is a constant, and
LFL is the lower flammability limit of the refrigerant in kg/m^3.

That formula sets maximum limits on refrigerant in a room air conditioner, as shown in Table 2. With the A3 refrigerants, the maximum value is 1 kg.

TABLE 2—MAXIMUM REFRIGERANT CHARGE SIZES

If you are using this refrigerant	Then its lower flammability limit is . . .		The maximum allowable charge in kg for room air conditioner is . . .	And the maximum charge, in kg, to use in a room of this size [20] is . . .		
	In % by volume	In kg/m^3		1.7 m × 1.7 m × 2.5 m (7.2 m^3) A = 2.89 m^2	6 ft × 8 ft × 8 ft (384 ft^3/ 10.9 m^3) A = 4.46 m^2	12 ft × 10 ft × 10 ft (1200 ft^3/ 34.0 m^3) A = 11.15 m^2
HFC–32	14.4	0.306	7.956	0.971	1.192	1.900
Propane (R–290)	2.1	0.038	0.986	0.071	0.087	0.139

TABLE 2—MAXIMUM REFRIGERANT CHARGE SIZES—Continued

If you are using this refrigerant	Then its lower flammability limit is . . .		The maximum allowable charge in kg for room air conditioner is . . .	And the maximum charge, in kg, to use in a room of this size[20] is . . .		
	In % by volume	In kg/m^3		1.7 m × 1.7 m × 2.5 m (7.2 m^3) A = 2.89 m^2	6 ft × 8 ft × 8 ft (384 ft^3/ 10.9 m^3) A = 4.46 m^2	12 ft × 10 ft × 10 ft (1200 ft^3/ 34.0 m^3) A = 11.15 m^2
R–441A	2.05	0.041	1.000	0.078	0.095	0.152

Although using a formula to determine the maximum charge size and minimum room size is appropriate from an engineering perspective, it does not ensure that a consumer will select an appropriate AC unit for the size of their room. It is likely that some consumers may be unaware of the exact size of the room to be cooled and thus may select an inappropriately sized AC unit that increases the flammability risk. A consumer may believe that a larger, more powerful AC unit will provide better, faster cooling and therefore may select an inappropriately sized AC unit that increases the flammability risk. To address these concerns, EPA proposes to supplement the charge size guidelines in Appendix F of UL 484 with a use condition that restricts the maximum refrigerant charge of equipment based upon the cooling capacity needed, in British thermal units (BTU) per hour. Equipment manufacturers would be responsible for designing equipment below a maximum charge size consistent with the intended cooling capacity. This would allow the manufacturer, who has greater understanding of the issue than a consumer, to address the issue in a manner under the manufacturer's control. Placing the burden on the manufacturer also provides a better means for EPA to ensure compliance and thus to ensure that the risk to human health will not be greater than that posed by other available substitutes.

We believe that these requirements, in combination with the other use conditions and commonly found informational materials, provide sufficient safeguards against instances of consumers selecting inappropriately-sized equipment. For instance, packaging, technical literature and sales display material will often guide a consumer in choosing the correct capacity for a given room size.

EPA has based its proposed charge limits upon appropriate capacity needs for an area to be cooled and the requirements for refrigerant charge relative to room size in Appendix F of UL 484, discussed above. A document in the docket describes this relationship in tables in a spreadsheet (EPA, 2014). The proposed charge limits for each refrigerant by equipment type and mounting location are as follows:

TABLE 3—MAXIMUM DESIGN CHARGE SIZES FOR WINDOW AC UNITS *

Refrigerant	Maximum design charge size (kg)													
	Associated cooling capacity (BTU/hr)													
	5,000	6,000	7,000	8,000	9,000	10,000	12,000	14,000	18,000	21,000	23,000	24,000	30,000	34,000
R–32	1.73	2.12	2.74	3.00	3.24	3.47	3.68	4.07	4.59	5.48	6.01	6.49	6.72	7.76
R–290	0.13	0.16	0.20	0.22	0.24	0.26	0.27	0.30	0.34	0.40	0.44	0.48	0.50	0.57
R–441A	0.14	0.17	0.22	0.24	0.26	0.28	0.30	0.33	0.37	0.44	0.49	0.53	0.54	0.63

* Assumes the evaporator is at least 1 m, but not more than 1.8 m, above the floor. Cooling capacities between those in the table are to be linearly interpolated between the next smaller and larger capacities listed in the table.

TABLE 4—MAXIMUM DESIGN CHARGE SIZES FOR PACKAGED TERMINAL AC UNITS AND HEAT PUMPS AND PORTABLE AC UNITS *

Refrigerant	Maximum design charge size (kg)													
	Associated cooling capacity (BTU/hr)													
	5,000	6,000	7,000	8,000	9,000	10,000	12,000	14,000	18,000	21,000	23,000	24,000	30,000	34,000
R–32	1.04	1.27	1.65	1.80	1.95	2.08	2.21	2.44	2.75	3.29	3.60	3.89	4.03	4.65
R–290	0.08	0.09	0.12	0.13	0.14	0.15	0.16	0.18	0.20	0.24	0.27	0.29	0.30	0.34
R–441A	0.08	0.10	0.13	0.15	0.16	0.17	0.18	0.20	0.22	0.27	0.29	0.32	0.33	0.38

* Assumes the evaporator is at least 0.6 m, but not more than 1.0 m, above the floor. Cooling capacities between those in the table are to be linearly interpolated between the next smaller and larger capacities listed in the table.

[20] Although the height of the room does not affect the calculation, typical heights are shown here for reference.

TABLE 5—MAXIMUM DESIGN CHARGE SIZES FOR WALL-MOUNTED AC UNITS *

Refrigerant	Maximum design charge size (kg)													
	Associated cooling capacity (BTU/hr)													
	5,000	6,000	7,000	8,000	9,000	10,000	12,000	14,000	18,000	21,000	23,000	24,000	30,000	34,000
R–32	3.12	3.82	4.94	5.41	5.84	6.24	6.62	7.32	7.96	7.96	7.96	7.96	7.96	7.96
R–290	0.23	0.28	0.36	0.40	0.43	0.46	0.49	0.54	0.61	0.73	0.80	0.86	0.89	1.00
R–441A	0.25	0.31	0.40	0.44	0.47	0.51	0.54	0.59	0.67	0.80	0.88	0.95	0.98	1.00

* Assumes the evaporator is at least 1.8 m, but not more than 2.2 m, above the floor. Cooling capacities between those in the table are to be linearly interpolated between the next smaller and larger capacities listed in the table.

TABLE 6—MAXIMUM DESIGN CHARGE SIZES FOR CEILING-MOUNTED AC UNITS *

Refrigerant	Maximum design charge size (kg)													
	Associated cooling capacity (BTU/hr)													
	5,000	6,000	7,000	8,000	9,000	10,000	12,000	14,000	18,000	21,000	23,000	24,000	30,000	34,000
R–32	3.82	4.67	6.03	6.61	7.14	7.63	7.96	7.96	7.96	7.96	7.96	7.96	7.96	7.96
R–290	0.28	0.34	0.44	0.49	0.53	0.56	0.60	0.66	0.74	0.89	0.97	1.00	1.00	1.00
R–441A	0.31	0.38	0.49	0.54	0.58	0.62	0.66	0.73	0.82	0.98	1.00	1.00	1.00	1.00

* Assumes the evaporator is at least 2.2 m above the floor. Cooling capacities between those in the table are to be linearly interpolated between the next smaller and larger capacities listed in the table.

In cases where the rated capacity exceeds the maximum shown on the table, the maximum charge size in the table for that refrigerant applies. In cases where the normal rated capacity lies between two values listed next to each other in the table, the maximum charge size would be determined based on a linear interpolation between the two respective charge sizes. We assume that room air conditioners will be at least 5,000 BTU/hr in capacity; this corresponds to cooling a floor area of roughly 100 square feet or 9.3 m^2 and it is the lowest value observed at a popular retailer's Web site (*www.homedepot.com*). We request comment on whether there should be lower, higher, or additional intermediate capacity values added to these tables.

EPA is requesting comment on the approach of adding a requirement for manufacturers to design with a maximum charge size consistent with the design cooling capacity. We also request comment on other potential methods for supplementing the formulas for calculating charge size in the UL 484 standard in order to reduce potential risks of a consumer using a room air conditioner with an inappropriately high charge that could result in a higher risk of fire.

D. Color-Coded Hoses and Piping

EPA proposes that equipment must have distinguishing color-coded hoses and piping to indicate use of a flammable refrigerant. This will help technicians immediately identify the use of a flammable refrigerant, thereby potentially reducing the risk of using sparking equipment or otherwise having an ignition source nearby. The AC and refrigeration industry currently uses distinguishing colors as means for identifying different refrigerants. Likewise, distinguishing coloring has been used elsewhere to indicate an unusual and potentially dangerous situation, for example in the use of orange-insulated wires in hybrid electric vehicles. Currently, no industry standard exists for color-coded hoses or pipes for ethane, HFC–32, isobutane, propane, or R–441A. EPA is proposing that all such refrigerator tubing be colored red Pantone Matching System (PMS) #185 to match the red band displayed on the container of flammable refrigerants under the Air Conditioning, Heating and Refrigeration Institute (AHRI) Guideline ''N'' 2012, ''2012 Guideline for Assignment of Refrigerant Container Colors.'' This proposal mirrors the existing requirement for the use of hydrocarbons in residential and commercial refrigerator-freezers (December 20, 2011, at 76 FR 78832). EPA wants to ensure that there is adequate notice that a flammable refrigerant is being used within a particular piece of equipment or appliance. One mechanism to distinguish hoses and pipes is to add a colored plastic sleeve or cap to the service tube. The colored plastic sleeve or cap would have to be forcibly removed in order to access the service tube. This would signal to the technician that the refrigeration circuit that she/he was about to access contained a flammable refrigerant, even if all warning labels were somehow removed. This sleeve would be of the same red color (PMS #185) and could also be boldly marked with a graphic to indicate the refrigerant was flammable. This could be a cost-effective alternative to painting or dying the hose or pipe. EPA is taking comment on this mechanism of distinguishing the pipe and hose by adding a colored plastic sleeve or cap to the pipe or hose.

EPA is particularly concerned with ensuring adequate and proper notification for servicing and disposal of appliances containing flammable refrigerants. EPA believes the use of color-coded hoses, as well as the use of warning labels discussed below, would be reasonable and would be consistent with other general industry practices. This proposed approach is the same as that adopted in our previous rule on flammable refrigerants (December 20, 2011, at 76 FR 78832). EPA is interested in receiving information on how this requirement has been implemented for those end-uses that are already subject to the earlier rule, codified in Appendix R to Subpart G of 40 CFR Part 82.

E. Labeling

As a use condition, EPA is proposing to require labeling of household and retail refrigerators and freezers, vending machines, non-mechanical heat transfer equipment, very low temperature refrigeration equipment, and room air conditioners. EPA is proposing the warning labels on the equipment contain letters at least ¼ inch high. The label must be permanently affixed to the equipment. Warning label language requirements are found in Section III.A of this proposal, ''What listings is EPA proposing in this action?'' The warning label language is similar to or exactly the same as that required in UL standards: for household refrigerators

and freezers in UL 250 in section SA6.1, for vending machines in UL 541 in section SA6.1, for commercial refrigerators and freezers in UL 471 in section SB6.1, and for room AC units in UL 484 in section SA6.1.

EPA believes that it would be difficult to see warning labels with the minimum lettering height requirement of ⅛ inch in these UL standards. Therefore, as in the requirements in our previous hydrocarbon refrigerants rule (December 20, 2011, at 76 FR 78832), EPA is proposing the minimum height for lettering must be ¼ inch as opposed to ⅛ inch, which will make it easier for technicians, consumers, retail storeowners, and first responders to view the warning labels. We also understand that UL is considering revising its standards to be consistent with this requirement, which already applies to equipment using propane in commercial stand-alone refrigerators and freezers and equipment using isobutane or R–441A in household refrigerators, freezers, and combination refrigerator/freezers.

F. Other Options Not Included

EPA considered requiring separate servicing fittings for use with flammable refrigerants to avoid mixing flammable and non-flammable refrigerants. We previously considered this option and proposed this as a use condition in a separate rulemaking in the **Federal Register** at 75 FR 25799 on May 10, 2010. In the associated final rule at 76 FR 78848 on December 20, 2011, the Agency did not require separate servicing fittings but did include this option as a recommendation rather than a use condition. The types of equipment addressed in this rule are self-contained pieces of equipment with a hermetically sealed refrigerant circuit that is only rarely serviced. These are the same as or similar to the equipment addressed in the December 20, 2011, rule, and thus with regards to separate servicing fittings we are proposing to again list this as a recommendation rather than as a use condition. We have heard some concern about mixing of refrigerant during servicing of appliances, particularly for AC equipment that is not self-contained. However, this rule is proposing to address only equipment that is self-contained. Moreover, we do not have new information that would lead us to a different decision than in the December 20, 2011, final rule for hydrocarbon refrigerants in household and stand-alone commercial refrigerators and freezers.

We also considered requiring only one use condition for each refrigerant and end-use—to meet the appropriate standard from Underwriters Laboratories. We understand that UL may incorporate certain elements of this proposal, particularly the proposed charge limit and the type font height for labels, into the UL 250 standard for household refrigerators and freezers. If those provisions were the only changes incorporated in a revised version of Supplement A of the UL 250 standard, EPA could remove the use conditions for charge size and for labeling requirements, as they would already be incorporated by reference through the use condition to follow the UL 250 standard. However, at this time, those changes have not been incorporated into UL 250. Therefore, EPA is proposing those use conditions as well as compliance with other aspects of UL 250.

VI. How is EPA proposing to address venting, release, or disposal of the refrigerant substitutes proposed to be listed under section 608 of the Clean Air Act?

A. What are the statutory requirements concerning venting, release, or disposal of refrigerants and refrigerant substitutes under section 608 of the Clean Air Act?

Section 608 of the Act as amended, titled *National Recycling and Emission Reduction Program,* requires EPA to establish regulations governing the use and disposal of ODS used as refrigerants, such as certain CFCs and HCFCs, during the service, repair, or disposal of appliances and industrial process refrigeration (IPR), including AC and refrigeration equipment. EPA's authority to propose the actions in this NPRM is based in part on section 608 of the Clean Air Act. Section 608(c)(1) provides that, effective July 1, 1992, it is:

> unlawful for any person, in the course of maintaining, servicing, repairing, or disposing of an appliance or industrial process refrigeration, to knowingly vent or otherwise knowingly release or dispose of 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.

Section 608(c)(1) further exempts from this self-effectuating prohibition ''*[d]e minimis* releases associated with good faith attempts to recapture and recycle or safely dispose'' of such a substance. EPA interprets releases to meet the criteria for exempted *de minimis* releases if they occur when the recycling and recovery requirements of regulations promulgated under sections 608 and 609 are followed. 40 CFR 82.154(a)(2).

Effective November 15, 1995, section 608(c)(2) of the Act extends the prohibition in section 608(c)(1) to knowingly venting or otherwise knowingly releasing or disposing of any refrigerant substitute for class I or class II substances by any person maintaining, servicing, repairing, or disposing of appliances or IPR. This prohibition applies to any substitute unless the Administrator determines that such venting, releasing, or disposing ''does not pose a threat to the environment.'' Thus, section 608(c) provides EPA authority to promulgate regulations to interpret, implement, and enforce this prohibition on venting, releasing, or disposing of class I or class II substances and their refrigerant substitutes, which we refer to as the ''venting prohibition'' in this NPRM.

B. What are EPA's regulations concerning venting, releasing or disposing of refrigerant substitutes?

Regulations promulgated under Section 608 of the Act, published on May 14, 1993 (58 FR 28660), established a recycling program for ozone-depleting refrigerants recovered during the servicing and maintenance of AC and refrigeration appliances. In the same 1993 rule, EPA also promulgated regulations implementing the section 608(c) prohibition on knowingly venting, releasing, or disposing of class I or class II controlled substances. These regulations were designed to substantially reduce the use and emissions of ozone-depleting refrigerants.

EPA issued a final rule on March 12, 2004, at 69 FR 11946 and a second rule on April 13, 2005, at 70 FR 19273 clarifying how the venting prohibition in section 608(c) applies to substitutes for CFC and HCFC refrigerants (e.g., hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) in part or whole) during the maintenance, service, repair, or disposal of appliances. These regulations are codified at 40 CFR Part 82, Subpart F. The regulation at 40 CFR 82.154(a) now states in part that:

> (1) ''Effective June 13, 2005, no person maintaining, servicing, repairing, or disposing of appliances may knowingly vent or otherwise release into the environment any refrigerant or substitute from such appliances, with the exception of the following substitutes in the following end-uses:
>
> i. Ammonia in commercial refrigeration, or in [IPR] or in absorption units;
>
> ii. Hydrocarbons in [IPR] (processing of hydrocarbons);
>
> iii. Chlorine in [IPR] (processing of chlorine and chlorine compounds);

iv. Carbon dioxide in any application;
v. Nitrogen in any application; or
vi. Water in any application.

(2) The knowing release of a refrigerant or non-exempt substitute subsequent to its recovery from an appliance shall be considered a violation of this prohibition. *De minimis* releases associated with good faith attempts to recycle or recover refrigerants or non-exempt substitutes are not subject to this prohibition. . . .''

As explained in EPA's earlier rulemaking concerning refrigerant substitutes, EPA has not promulgated regulations requiring certification of refrigerant recycling/recovery equipment intended for use with substitutes to date (70 FR 19275; April 13, 2005). However, as EPA noted, the lack of a current regulatory provision should not be considered as an exemption from the venting prohibition for substitutes that are not expressly exempted in Section 82.154(a). EPA has also noted that, in accordance with section 608(c) of the Act, the regulatory prohibition at Section 82.154(a) reflects the statutory references to *de minimis* releases of substitutes as they pertain to good faith attempts to recover and recycle or safely dispose of non-exempted substitutes (70 FR 19275; April 13, 2005).

C. What revision to the venting prohibition has EPA recently issued?

On May 23, 2014 at 79 FR 29682, EPA revised the venting prohibition for refrigerant substitutes.[21] Those changes exempt from that prohibition three hydrocarbon refrigerant substitutes listed as acceptable subject to use conditions in the specified end-uses under the SNAP program: isobutane (R–600a) and R–441A, which were listed as acceptable, subject to use conditions, as refrigerant substitutes in household refrigerators, freezers, and combination refrigerators and freezers, and propane (R–290), which was listed as acceptable, subject to use conditions, as a refrigerant substitute in retail food refrigerators and freezers (stand-alone units only). That final rule does not apply to blends of hydrocarbons with other refrigerants or containing any amount of any CFC, HCFC, HFC, or PFC.

EPA determined that for the purposes of CAA section 608(c)(2), the venting, release or disposal of such hydrocarbon refrigerant substitutes in the specified end-uses does not pose a threat to the environment, considering both the inherent characteristics of these substances and the limited quantities used in the relevant applications. EPA additionally concluded that other authorities, controls and practices that apply to such refrigerants help to mitigate environmental risk from the release of those three hydrocarbon refrigerant substitutes. For example, state and local air quality agencies may include VOC emissions reduction strategies in state implementation plans developed to meet and maintain the NAAQS that would apply to hydrocarbon refrigerants.

D. What is EPA's proposed determination regarding whether venting of hydrocarbons to be listed as acceptable subject to use conditions in the end-uses proposed in this NPRM poses a threat to the environment?

For purposes of section 608(c)(2) of the CAA, EPA considers two factors in determining whether or not venting, release, or disposal of a substitute refrigerant during the maintenance, servicing, repairing, or disposing of appliances poses a threat to the environment. See 69 FR 11948 (March 12, 2004). First, EPA determines whether venting, release, or disposal of the substitute refrigerant poses a threat to the environment because of the inherent characteristics of the refrigerant, such as global warming potential. Second, EPA determines whether and to what extent such venting, release, or disposal actually takes place during the maintenance, servicing, repairing, or disposing of appliances, and to what extent such venting, release, or disposal is controlled by other authorities, regulations, or practices. To the extent that such releases are adequately controlled by other authorities, EPA defers to those authorities.

1. Potential Environmental Impacts

EPA has evaluated the potential environmental impacts of releasing into the environment the hydrocarbon refrigerant substitutes that we are proposing to list under the SNAP program as acceptable subject to use conditions in the end-uses proposed—i.e., ethane in very low temperature refrigeration and non-mechanical heat transfer; isobutane in retail food refrigeration (stand-alone equipment only) and vending machines; propane in household refrigerators and freezers, vending machines and room AC units; and R–441A in retail food refrigeration (stand-alone equipment only), vending machines and room AC units. In particular, we assessed the potential impact of the release of additional hydrocarbons on local air quality and their ability to decompose in the atmosphere, their ODP and their GWPs, as well as potential impacts on ecosystems (see Section IV above, ''What criteria did EPA consider in determining whether to list the substitutes as acceptable and in determining appropriate use conditions and how does EPA consider those factors?''). As explained in that section, the ODP of these hydrocarbons is zero, the GWPs are less than 10, and effects on aquatic life from these hydrocarbons are expected to be small. As to potential effects on local air quality, based on the analysis and modeling results described above, EPA concludes that the four saturated hydrocarbon refrigerant substitutes proposed to be listed as acceptable subject to use conditions in specific end-uses—ethane, isobutane, propane, and R–441A—are expected to have little impact on local air quality. In addition, when examining all hydrocarbon substitute refrigerants in those uses for which UL currently has standards in place, for which the SNAP program has already listed the uses as acceptable subject to use conditions, or for which the SNAP program is reviewing a submission, including those in this rule, we found that even if all the refrigerant in appliances in end-uses addressed in this proposed rule were to be emitted, there would be a worst-case impact of less than 0.2% of the NAAQS for ground-level ozone in the Los Angeles area. In light of its evaluation of potential environmental impacts, EPA concludes that the four hydrocarbon refrigerant substitutes in the end-uses at issue in this proposal are not expected to pose a threat to the environment on the basis of the limited quantities used in the relevant end-uses and applications and on the basis of the inherent characteristics of these substances (ICF, 2014a).

2. Toxicity and Flammability

As discussed above in sections IV.B., ''Flammability and fire safety'' and IV.C., ''Toxicity,'' EPA's SNAP program evaluated the potential for fire risk from flammability and toxicity risks from exposure to the substitute refrigerants in this proposal. EPA is providing some of that information in this section as well.

Hydrocarbons, including ethane, propane, isobutane and the hydrocarbon blend R–441A, are classified as A3 refrigerants by ASHRAE Standard 34–2010, indicating that they have low toxicity and high flammability. Hydrocarbons considered in this proposal have lower flammability limits (LFLs) ranging from 1.8% to 3.0% (18,000 ppm to 30,000 ppm). To address flammability risks, EPA is issuing

[21] EPA is describing that final rule in this NPRM simply for ease of reference and as a reminder of EPA's most recent rule on this subject; EPA is not here changing any aspect of that final rule or reopening the opportunity for comments on that final rule.

recommendations for their safe use (see section VII, ''What recommendations does EPA have for safe use of the proposed flammable substitute refrigerants?'' below) and specified use conditions. The SNAP program's analysis suggests that the use conditions proposed in this rule mitigate flammability risks.

Like most refrigerants, hydrocarbons can displace oxygen at high concentrations and cause asphyxiation. Various industry and regulatory standards exist to address asphyxiation and toxicity risks. The SNAP program's analysis of asphyxiation and toxicity risks suggests that the use conditions proposed in this rule mitigate potential asphyxiation and toxicity risks. Furthermore, the Agency believes that the flammability risks and occupational exposures to hydrocarbons are adequately regulated by OSHA, building, and fire codes at a local and national level.

3. Authorities, Controls, and Practices

EPA believes that existing authorities, controls, and practices would help mitigate environmental risk from the release of these hydrocarbon refrigerants. Analyses performed for both this proposed rule and the SNAP rules issued in 1994 and 2011 (March 17, 1994, at 59 FR 13044 and December 20, 2011, at 76 FR 38832, respectively) indicate that existing regulatory requirements and industry practices designed to limit and control these substances adequately control the emission of the hydrocarbon refrigerants proposed to be listed in this action. As explained below, EPA concludes that the limits and controls under other authorities, regulations or practices adequately control the release of and exposure to the four hydrocarbon substitute refrigerants and mitigate risks from any possible release.

This conclusion is relevant to the second factor mentioned above in the overall determination of whether venting, release, or disposal of a substitute refrigerant poses a threat to the environment—that is, a consideration of the extent that such venting, release, or disposal is adequately controlled by other authorities, regulations, or practices. As such, this conclusion is another part of the determination that the venting, release, or disposal of these four hydrocarbon refrigerants would not pose a threat to the environment.

Industry service practices and OSHA standards and guidelines address hydrocarbon refrigeration equipment, include monitoring efforts, engineering controls, and operating procedures. OSHA requirements that apply during servicing include continuous monitoring of explosive gas concentrations and oxygen levels. In general, hydrocarbon emissions from refrigeration systems are likely to be significantly smaller than those emanating from the industrial process and storage systems, which are controlled for safety reasons. Further, the SNAP rule listing hydrocarbons as acceptable subject to use conditions for use in household and commercial stand-alone refrigerators and freezers (December 20, 2011, at 76 FR 78832), we noted that the amount of refrigerant from a refrigerant loop is limited (57 g for household refrigerators and freezers, and 150 g for commercial stand-alone refrigerators and freezers), indicating that hydrocarbon emissions from such uses are likely to be relatively small. Similar charge limits are proposed to apply to very low temperature refrigeration equipment, non-mechanical heat transfer equipment, and vending machines, with larger but still limited charges for room air conditioners (1000 g for hydrocarbon refrigerants).

Hydrocarbons that are also VOC may be regulated as VOC under sections of the Clean Air Act that address nonattainment, attainment and maintenance of the National Ambient Air Quality Standards for ground level ozone, including those sections addressing development of State Implementation Plans and those addressing permitting of VOC sources.

The release and/or disposal of many refrigerant substitutes, including hydrocarbons, are controlled by other authorities including those established by OSHA and NIOSH guidelines, various standards, and state and local building codes. To the extent that release during maintaining, repairing, servicing or disposing of appliances is controlled by regulations and standards of other authorities, EPA believes these practices and controls for the use of hydrocarbons are sufficiently protective. These practices and controls could help mitigate the risk to the environment that may be posed by the venting, release or disposal of these four hydrocarbon refrigerants during the maintaining, servicing, repairing, or disposing of appliances. This conclusion addresses the second factor in the analysis described above and is thus part of the determination that the venting, release, or disposal of these hydrocarbon refrigerant substitutes does not pose a threat to the environment.

4. Conclusion

EPA has reviewed the potential environmental impacts of four hydrocarbon refrigerant substitutes in the end-uses that we are proposing to list subject to use conditions under SNAP, as well as the authorities, controls and practices in place for those hydrocarbon refrigerant substitutes. Specifically, EPA concludes that these four hydrocarbon refrigerant substitutes in the proposed end-uses and subject to the proposed use conditions are not expected to pose a threat to the environment based on the inherent characteristics of these substances and the limited quantities used in the relevant applications. EPA additionally concludes that existing authorities, controls, and practices help mitigate environmental risk from the release of those four hydrocarbons in the proposed end-uses and subject to the proposed use conditions. In light of these conclusions and those described or identified above in this section, we are proposing to determine, in accordance with 608(c)(2), that based on current evidence and risk analyses, the venting, release or disposal of these four hydrocarbon refrigerant substitutes in the end-uses proposed does not pose a threat to the environment. Furthermore, EPA is proposing to exempt from the venting prohibition at 40 CFR 82.154(a)(1) these additional uses for which hydrocarbons are being proposed to be found acceptable subject to use conditions under the SNAP program.

EPA seeks information or data on whether there currently is an industry standard for recovery units for flammable refrigerants and whether there are commercially available recovery units that are specifically designed to be compatible with ethane, isobutane, propane, and R–441A. At this time, EPA is unaware of any recovery units that are designed specifically for recovering hydrocarbons and which are readily available in the U.S. Further, we are not aware of relevant U.S. standards for such recovery units. However, to the extent that these hydrocarbons are recovered rather than vented as would be allowed in the specified end-uses if this proposal became final, EPA recommends the use of recovery equipment designed for flammable refrigerants, when such equipment and relevant U.S. standards for it become available, in accordance with applicable safe handling practices.

E. What is EPA proposing regarding venting, release, or disposal of refrigerant substitutes, other than hydrocarbons, included in our proposed decision?

Today's proposed rulemaking would regulate the use of HFC–32 in room AC units. All HFCs are currently subject to the venting prohibition. EPA is not proposing to extend the exemption to HFC–32 or any refrigerant blends that contain HFC–32 or any other HFC. Further, the exemption to the venting prohibition proposed in this NPRM does not extend to blends of hydrocarbons and other types of compounds, e.g., blends of HFCs and hydrocarbons. Such refrigerant substitutes would still be subject to the statutory and regulatory venting prohibition.

VII. What recommendations does EPA have for safe use of the proposed flammable substitute refrigerants?

EPA recommends that only technicians specifically trained in handling flammable refrigerant substitutes service or dispose of refrigeration and AC equipment containing these substances. Technicians should know how to minimize the risk of fire and the procedures for using flammable refrigerant substitutes safely. Releases of large quantities of refrigerant substitutes during servicing and manufacturing, especially in enclosed, poorly ventilated spaces or in areas where large amounts of refrigerant are stored, could cause an explosion if an ignition source exists nearby. For these reasons, it is important that only properly trained technicians handle flammable refrigerant substitutes when maintaining, servicing, repairing, or disposing of household and retail food refrigerators and freezers, very low temperature freezers, non-mechanical heat transfer equipment (e.g., thermosiphons), and room air conditioners. In addition, EPA recommends that if hydrocarbon refrigerant substitutes were vented, released, or disposed of (rather than recovered), as would be allowed in the specified end-uses if this proposal became final, the release should be in a well-ventilated area, such as outside of a building.

We are aware that at least one organization, Refrigeration Service Engineers Society (RSES), has developed a technician training program in collaboration with refrigeration equipment manufacturers and users that addresses safe use of flammable refrigerant substitutes. In addition, EPA has reviewed several training programs provided as part of SNAP submissions from persons interested in flammable refrigerant substitutes. EPA intends to update the CAA Section 608 technician certification test bank provided to approved organizations that administer the certification exams in accordance with 40 CFR 82.161 to specifically include questions concerning flammable refrigerant substitutes.

EPA considered proposing a use condition requiring training in handling flammable refrigerant substitutes for technicians who service or dispose of refrigeration and AC equipment containing these substitutes. However, we do not have sufficient information on the core elements that should be part of such a training program to ensure that a training requirement would improve safety. Some examples of potential core elements that EPA might consider include:

- EPA's relevant use conditions for flammable refrigerants;
- relevant OSHA requirements for flammable gases; relevant industry standards (e.g., UL, ASHRAE, NFPA);
- MSDS information, including first aid and physical and chemical characteristics of flammable refrigerants; and
- requirements and procedures for safe storage and handling of flammable refrigerants.

EPA requests comment on whether we should establish a use condition requiring training in handling flammable refrigerant substitutes for technicians servicing or disposing of equipment containing such substitutes, and if so, what should be the mandatory elements of such training.

VIII. Statutory and Executive Order Reviews

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

Under Executive Order (EO) 12866 (58 FR 51735, October 4, 1993), this action is a ''significant regulatory action.'' It raises novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order. Accordingly, EPA submitted this action to the Office of Management and Budget (OMB) for review under EO 12866 and 13563 (76 FR 3821, January 21, 2011) and any changes made in response to OMB recommendations have been documented in the docket for this action.

B. Paperwork Reduction Act

This action does not impose any new information collection burden. This proposed rule is an Agency determination. It contains no new requirements for reporting or recordkeeping. The Office of Management and Budget (OMB) has previously approved the information collection requirements contained in the existing regulations in Subpart G of 40 CFR Part 82 under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. and has assigned OMB control number 2060–0226. This Information Collection Request (ICR) included five types of respondent reporting and recordkeeping activities pursuant to SNAP regulations: Submission of a SNAP petition, filing a SNAP/TSCA Addendum, notification for test marketing activity, recordkeeping for substitutes acceptable subject to use restrictions, and recordkeeping for small volume uses. The OMB control numbers for EPA's regulations are listed in 40 CFR part 9 and 48 CFR Chapter 15.C.

C. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions. For purposes of assessing the impacts of this rule on small entities, small entity is defined as: (1) A small business as defined by the Small Business Administration's (SBA) regulations at 13 CFR 121.201; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of this proposed rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities. In determining whether a rule has a significant economic impact on a substantial number of small entities, the impact of concern is any significant adverse economic impact on small entities, since the primary purpose of the regulatory flexibility analyses is to identify and address regulatory alternatives ''which minimize any significant economic impact of the rule on small entities.'' 5 U.S.C. 603 and 604.

Thus, an agency may certify that a rule will not have a significant economic impact on a substantial number of small entities if the rule relieves regulatory burden, or otherwise has a positive economic effect on all of the small entities subject to the rule. The use conditions of this proposed rule, if finalized, would apply to manufacturers of household and commercial refrigerators and freezers, vending machines, non-mechanical heat transfer equipment, very low temperature refrigeration equipment for laboratories and room air conditioners that choose to use these refrigerants. Today's action, if finalized, would allow equipment manufacturers the additional options of using ethane, HFC–32, isobutane, propane, and R–441A in the specified end-uses but does not mandate such use. Because refrigeration and AC equipment for these refrigerants are not manufactured yet in the U.S. for the proposed end-uses (with the exception of limited test-marketing), no change in business practice would be required to meet the use conditions, resulting in no adverse impact compared to the absence of this rule. Proposed provisions that would allow venting of hydrocarbon refrigerants in the uses addressed by this rule would reduce regulatory burden. Thus, the rule would not impose any new costs on small entities if finalized as proposed. EPA continues to be interested in the potential impacts of the proposed rule on small entities and welcomes comments on issues related to such impacts.

D. Unfunded Mandates Reform Act

This action contains no Federal mandates under the provisions of Title II of the Unfunded Mandate Reform Act of 1995 (UMRA), 2 U.S.C. 1531–1538 for State, local, or tribal governments or the private sector. This action imposes no enforceable duty on any State, local, or tribal governments or the private sector. The enforceable requirements of this proposed rule related to integrating risk mitigation devices, markings, and procedures for maintaining safety of refrigeration and AC equipment using flammable refrigerants affect only a small number of manufacturers of refrigeration and AC equipment and their technicians. Therefore, this rule is not subject to the requirements of sections 202 and 205 of the UMRA. This action is also not subject to the requirements of section 203 of UMRA because it contains no regulatory requirements that might significantly or uniquely affect small governments. This regulation applies equipment manufacturers and not to governmental entities. Today's action, if finalized, would allow equipment manufacturers the additional options of using ethane, HFC–32, isobutane, propane, and R–441A in the specified end-uses. Because refrigeration and AC equipment for these refrigerants are not manufactured yet in the U.S. for the proposed end-uses, no change in business practice would be required to meet the use conditions. This proposed rule does not mandate a switch to these substitutes; consequently, there is no direct economic impact on entities from this rulemaking.

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, as specified in Executive Order 13132. This regulation applies directly to facilities that use these substances and not to governmental entities. Thus, Executive Order 13132 does not apply to this action. In the spirit of Executive Order 13132, and consistent with EPA policy to promote communications between EPA and State and local governments, EPA specifically solicits comments on this proposed action from State and local officials.

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

This action does not have tribal implications, as specified in Executive Order 13175 (65 FR 67249, November 9, 2000). It will not have substantial direct effects on tribal governments, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes, as specified in Executive Order 13175. EPA specifically solicits additional comment on this proposed action from tribal officials.

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 E.O. 12866, and because the Agency does not believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. This proposed rule provides both regulatory restrictions and recommended guidelines based upon risk screens conducted in order to reduce risk of fire and explosion. This proposed rule, if finalized, would provide refrigerant substitutes that have no ODP and lower GWP than other substitutes currently listed as acceptable. The reduction in ODS and GHG emissions would assist in restoring the stratospheric ozone layer and provide climate benefits. The public is invited to submit comments or identify peer-reviewed studies and data that assess effects of early life exposure to the refrigerant substitutes addressed in this action.

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

This action is not a ''significant energy action'' as defined in Executive Order 13211, (66 FR 28355 (May 22, 2001)) because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. Preliminary information indicates that these new systems may be more energy efficient than currently available systems in some climates.

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law 104–113, (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards. This proposed rule involves technical standards. EPA proposes to use current editions of the Underwriters Laboratories (UL) standards 250, 471, 541 and 484, which include requirements for safety and reliability for flammable refrigerants. This proposed rule regulates the safety and deployment of new substitutes for household and commercial refrigerators and freezers, vending machines, non-mechanical heat transfer equipment, very low temperature refrigeration equipment, and room air conditioners.

EPA welcomes comment on this aspect of the proposed rulemaking and, specifically invites the public to identify potentially applicable voluntary consensus standards and to explain why

such standards should be used in this regulation.

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

Executive Order (E.O.) 12898 (59 FR 7629 (Feb. 16, 1994)) establishes Federal executive policy on environmental justice. Its main provision directs Federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States.

EPA has determined that this proposed rule will not have disproportionately high and adverse human health or environmental effects on minority or low-income populations because it increases the level of human health and environmental protection 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 proposed rule, if finalized, would provide refrigerant substitutes that have no ODP and lower GWP than other substitutes currently listed as acceptable. The reduction in ODS and GHG emissions would assist in restoring the stratospheric ozone layer and provide climate benefits.

IX. References

This preamble references the following documents, which are also in the Air Docket at the address listed in Section I.B.1. Unless specified otherwise, all documents are available electronically through the Federal Docket Management System, Docket # EPA–HQ–OAR–2013–0748.

Air-Conditioning, Heating, and Refrigeration Institute (AHRI), 2012. AHRI Guideline N–2012: Assignment of Refrigerant Container Colors. 2012.

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A.S. Trust & Holdings, 2012. Significant New Alternatives Policy Program Submission to the United States Environmental Protection Agency for R–441A in retail food refrigeration.

A/S Vestfrost, 2012. Significant New Alternatives Policy Program Submission to the United States Environmental Protection Agency for isobutane in retail food refrigeration.

Climate Action Plan, 2013. The President's Climate Action Plan. Executive Office of the President. June, 2013. Available online at *www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf.*

Chinese Household Electrical Appliance Association (CHEAA), 2013. Significant New Alternatives Policy Program Submission to the United States Environmental Protection Agency for Propane (R–290) in residential and light commercial air conditioning and dehumidifiers.

Daikin, 2011. Significant New Alternatives Policy Program Submission to the United States Environmental Protection Agency for HFC–32 in residential and light commercial air conditioning.

EPA, 2014. Derivation of Charge Limits for Room Air Conditioners. Staff memo to Air Docket. 2014.

ICF, 2014a. Assessment of the Potential Impact of Hydrocarbon Refrigerants on Ground-Level Ozone Concentrations.

ICF, 2014b. Risk Screen on Substitutes for CFC–12, HCFC–22 and R–502 in Retail Food Refrigeration; Substitute: Isobutane (R–600a)

ICF, 2014c. Risk Screen on Substitutes for CFC–12, HCFC–22 and R–502 in Retail Food Refrigeration; Substitute: R–441A.

ICF, 2014d. Risk Screen on Substitute for CFC–12, CFC–13, R–13B1, and R–503 in Very Low Temperature Refrigeration and Non-Mechanical Heat Transfer; Substitute: Ethane (R–170).

ICF, 2014e. Risk Screen on Substitutes for CFC–12 and R–502 in Vending Machines; Substitute: R–441A.

ICF, 2014f. Risk Screen on Substitutes for CFC–12 and R–502 in Vending Machines; Substitute: Isobutane (R–600a).

ICF, 2014g. Risk Screen on Substitutes for CFC–12 and R–502 in Vending Machines; Substitute: Propane (R–290).

ICF, 2014h. Risk Screen on Substitutes for CFC–12 and HCFC–22 in Household Refrigerators and Household Freezers.; Substitute: Propane (R–290).

ICF, 2014i. Risk Screen on Substitutes for HCFC–22 in Residential and Light Commercial Air Conditioning and Heat Pumps; Substitute: Propane (R–290).

ICF, 2014j. Risk Screen on Substitutes for HCFC–22 in Residential and Light Commercial Air Conditioning and Heat Pumps; Substitute: HFC–32 (Difluoromethane).

ICF, 2014k. Risk Screen on Substitutes for HCFC–22 in Residential and Light Commercial Air Conditioning and Heat Pumps; Substitute: R–441A.

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.*

Montzka, S.A., 2012. HFCs in the Atmosphere: Concentrations, Emissions and Impacts, ASHRAE/NIST Conference 2012.

NOAA, 2013. NOAA emissions data on HFCs. Available online at *ftp://ftp.cmdl.noaa.gov/hats/hfcs/.*

ORNL, 1997. J. Sand, S. Fischer, and V. Baxter, ''Energy and Global Warming Impacts of HFC Refrigerants and Emerging Technologies,'' 1997, Oak Ridge National Lab.

Sheldon, 1989. Sheldon, L.S., et al. 1989. ''An Investigation of Infiltration and Indoor Air Quality.'' New York State Energy Research & Development Authority, Report 90–11. As cited in ICF, 2014h, Risk screen for propane in household refrigerators and freezers.

Underwriters Laboratories (UL) 250. UL 250: Household Refrigerators and Freezers. 10th edition. Supplement SA: Requirements for Refrigerators and Freezers Employing a Flammable Refrigerant in the Refrigerating System. August 2000.

UL 471. Commercial Refrigerators and Freezers. 10th edition. Supplement SB: Requirements for Refrigerators and Freezers Employing a Flammable Refrigerant in the Refrigerating System. November 2010.

UL 484. Room Air Conditioners. 8th edition. Supplement SA: Requirements for Refrigerated Venders Employing a Flammable Refrigerant in the Refrigerating System. August 2012.

UL 541. Refrigerated Vending Machines. 7th edition. Supplement SA: Requirements for Room Air Conditioners Employing a Flammable Refrigerant in the Refrigerating System. December 2011.

List of Subjects in 40 CFR Part 82

Environmental protection, Administrative practice and procedure, Air pollution control, Incorporation by reference, Recycling, Reporting and recordkeeping requirements, Stratospheric ozone layer.

Dated: June 26, 2014.

Gina McCarthy,

Administrator.

For the reasons stated in the preamble, 40 CFR part 82 is proposed to be amended as follows:

PART 82—[AMENDED]

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

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

■ 2. In § 82.154, add paragraph (a)(1)(iii) to read as follows:

§ 82.154 Prohibitions.

(a) * * *

(1) * * *

(iii) Effective [DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE IN THE **FEDERAL REGISTER**], isobutane (R–600a) and R–441A as substitutes in retail food refrigerators and freezers (stand-alone units only); propane (R–290) as a substitute in household refrigerators, freezers, and combination refrigerators and freezers; ethane (R–170) as a substitute in very low temperature refrigeration equipment and equipment for non-mechanical heat transfer; R–441A, propane, and isobutane as substitutes in vending machines; and propane and R–441A in self-contained room air conditioners for residential and light commercial air conditioning and heat pumps.

* * * * *

Appendix R to Subpart G of Part 82—[Amended]

■ 3. Revise Appendix R to subpart G of part 82 to read as follows:

Appendix R to Subpart G of Part 82—Substitutes Subject to Use Restrictions Listed in the December 20, 2011, Final Rule, Effective February 21, 2012, and in the [DATE OF PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER] Final Rule, Effective [DATE 60 DAYS AFTER DATE OF PUBLICATION OF FINAL RULE IN THE FEDERAL REGISTER]

SUBSTITUTES THAT ARE ACCEPTABLE SUBJECT TO USE CONDITIONS

End-use	Substitute	Decision	Use conditions	Further information
Household refrigerators, freezers, and combination refrigerators and freezers (New equipment only).	Isobutane (R–600a). Propane (R–290) R–441A	Acceptable subject to use conditions.	These refrigerants may be used only in new equipment designed specifically and clearly identified for the refrigerant (i.e., none of these substitutes may be used as a conversion or ''retrofit'' refrigerant for existing equipment designed for a different refrigerant). These refrigerants may be used only in a refrigerator or freezer, or combination refrigerator and freezer, that meets all requirements listed in Supplement SA to the 10th edition of the Underwriters Laboratories (UL) Standard for Household Refrigerators and Freezers, UL 250, dated August 25, 2000. In cases where the final rule includes requirements more stringent than those of the 10th edition of UL 250, the appliance must meet the requirements of the final rule in place of the requirements in the UL Standard. The quantity of the substitute refrigerant (i.e., ''charge size'') must not exceed 57 grams (2.01 ounces) in any refrigerator, freezer, or combination refrigerator and freezer for each circuit.	Applicable OSHA requirements at 29 CFR part 1910 must be followed, including those at 29 CFR 1910.106 (flammable and combustible liquids), 1910.110 (storage and handling of liquefied petroleum gases), 1910.157 (portable fire extinguishers), and 1910.1000 (toxic and hazardous substances). Proper ventilation should be maintained at all times during the manufacture and storage of equipment containing hydrocarbon refrigerants through adherence to good manufacturing practices as per 29 CFR 1910.106. If refrigerant levels in the air surrounding the equipment rise above one-fourth of the lower flammability limit, the space should be evacuated and re-entry should occur only after the space has been properly ventilated. Technicians and equipment manufacturers should wear appropriate personal protective equipment, including chemical goggles and protective gloves, when handling these refrigerants. Special care should be taken to avoid contact with the skin since these refrigerants, like many refrigerants, can cause freeze burns on the skin. A class B dry powder type fire extinguisher should be kept nearby. Technicians should only use spark-proof tools when working on refrigerators and freezers with these refrigerants. Any recovery equipment used should be designed for flammable refrigerants. Any refrigerant releases should be in a well-ventilated area, such as outside of a building. Only technicians specifically trained in handling flammable refrigerants should service refrigerators and freezers containing these refrigerants. Technicians should gain an understanding of minimizing the risk of fire and the steps to use flammable refrigerants safely.

SUBSTITUTES THAT ARE ACCEPTABLE SUBJECT TO USE CONDITIONS—Continued

End-use	Substitute	Decision	Use conditions	Further information
Household refrigerators, freezers, and combination refrigerators and freezers (New equipment only).	Isobutane (R–600a). Propane (R–290) R–441A	Acceptable subject to use conditions.	As provided in clauses SA6.1.1 and SA6.1.2 of UL Standard 250, 10th edition, the following markings must be attached at the locations provided and must be permanent: (a) On or near any evaporators that can be contacted by the consumer: ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. Do Not Use Mechanical Devices To Defrost Refrigerator. Do Not Puncture Refrigerant Tubing.''. (b) Near the machine compartment: ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing.''. (c) Near the machine compartment: ''CAUTION—Risk of Fire or Explosion. Flammable Refrigerant Used. Consult Repair Manual/Owner's Guide Before Attempting To Service This Product. All Safety Precautions Must Be Followed.''. (d) On the exterior of the refrigerator: ''CAUTION—Risk of Fire or Explosion. Dispose of Properly In Accordance With Federal Or Local Regulations. Flammable Refrigerant Used.'' (e) Near any and all exposed refrigerant tubing: ''CAUTION—Risk of Fire or Explosion Due To Puncture Of Refrigerant Tubing; Follow Handling Instructions Carefully. Flammable Refrigerant Used.'' All of these markings must be in letters no less than 6.4 mm (¼ inch) high. The refrigerator, freezer, or combination refrigerator and freezer must have red, Pantone® Matching System (PMS) #185 marked pipes, hoses, or other devices through which the refrigerant is serviced (typically known as the service port) to indicate the use of a flammable refrigerant. This color must be present at all service ports and where service puncturing or otherwise creating an opening from the refrigerant circuit to the atmosphere might be expected (e.g., process tubes). The color mark must extend at least 2.5 centimeters (1 inch) from the compressor and must be replaced if removed.	Room occupants should evacuate the space immediately following the accidental release of this refrigerant. If a service port is added then household refrigerators, freezers, and combination refrigerator and freezers using these refrigerants should have service aperture fittings that differ from fittings used in equipment or containers using non-flammable refrigerant. ''Differ'' means that either the diameter differs by at least 1/16 inch or the thread direction is reversed (i.e., right-handed vs. left-handed). These different fittings should be permanently affixed to the unit at the point of service and maintained until the end-of-life of the unit, and should not be accessed with an adaptor.
Retail food refrigerators and freezers (stand-alone units only) (New equipment only).	Isobutane (R–600a). Propane (R–290) R–441A	Acceptable subject to use conditions.	As provided in clauses SB6.1.2 to SB6.1.5 of UL Standard 471, 10th edition, the following markings must be attached at the locations provided and must be permanent: (a) Attach on or near any evaporators that can be contacted by the consumer: ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. Do Not Use Mechanical Devices To Defrost Refrigerator. Do Not Puncture Refrigerant Tubing.''. (b) Attach near the machine compartment: ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing.''.	Room occupants should evacuate the space immediately following the accidental release of this refrigerant. If a service port is added then retail food refrigerators and freezers using these refrigerants should have service aperture fittings that differ from fittings used in equipment or containers using non-flammable refrigerant. ''Differ'' means that either the diameter differs by at least 1/16 inch or the thread direction is reversed (i.e., right-handed vs. left-handed). These different fittings should be permanently affixed to the unit at the point of service and maintained until the end-of-life of the unit, and should not be accessed with an adaptor.

SUBSTITUTES THAT ARE ACCEPTABLE SUBJECT TO USE CONDITIONS—Continued

End-use	Substitute	Decision	Use conditions	Further information
			(c) Attach near the machine compartment: ''CAUTION—Risk of Fire or Explosion. Flammable Refrigerant Used. Consult Repair Manual/Owner's Guide Before Attempting To Service This Product. All Safety Precautions Must be Followed.'' (d) Attach on the exterior of the refrigerator: ''CAUTION—Risk of Fire or Explosion. Dispose of Properly In Accordance With Federal Or Local Regulations. Flammable Refrigerant Used.'' (e) Attach near any and all exposed refrigerant tubing: ''CAUTION—Risk of Fire or Explosion Due To Puncture Of Refrigerant Tubing; Follow Handling Instructions Carefully. Flammable Refrigerant Used.'' All of these markings must be in letters no less than 6.4 mm (¼ inch) high. The refrigerator or freezer must have red, Pantone® Matching System (PMS) #185 marked pipes, hoses, and other devices through which the refrigerant is serviced, typically known as the service port, to indicate the use of a flammable refrigerant. This color must be present at all service ports and where service puncturing or otherwise creating an opening from the refrigerant circuit to the atmosphere might be expected (e.g., process tubes). The color mark must extend at least 2.5 centimeters (1 inch) from the compressor and must be replaced if removed.	
Very low temperature refrigeration Non-mechanical heat transfer (New equipment only).	Ethane (R–170).	Acceptable subject to use conditions.	This refrigerant may be used only in new equipment specifically designed and clearly identified for the refrigerant (i.e., the substitute may not be used as a conversion or ''retrofit'' refrigerant for existing equipment designed for other refrigerants). These substitutes may only be used in equipment that meets all requirements in Supplement SB to the 10th edition of the Underwriters Laboratories (UL) Standard for Commercial Refrigerators and Freezers, UL 471, dated November 24, 2010. In cases where the final rule includes requirements more stringent than those of the 10th edition of UL 471, the appliance must meet the requirements of the final rule in place of the requirements in the UL Standard.. The charge size for the retail food refrigerator or freezer must not exceed 150 grams (5.29 ounces) in each circuit.	Applicable OSHA requirements at 29 CFR part 1910 must be followed, including those at 29 CFR 1910.94 (ventilation) and 1910.106 (flammable and combustible liquids), 1910.110 (storage and handling of liquefied petroleum gases), and 1910.1000 (toxic and hazardous substances). Proper ventilation should be maintained at all times during the manufacture and storage of equipment containing hydrocarbon refrigerants through adherence to good manufacturing practices as per 29 CFR 1910.106. If refrigerant levels in the air surrounding the equipment rise above one-fourth of the lower flammability limit, the space should be evacuated and reentry should occur only after the space has been properly ventilated. Technicians and equipment manufacturers should wear appropriate personal protective equipment, including chemical goggles and protective gloves, when handling ethane. Special care should be taken to avoid contact with the skin since ethane, like many refrigerants, can cause freeze burns on the skin. A class B dry powder type fire extinguisher should be kept nearby. Technicians should only use spark-proof tools when working on refrigerators and freezers with flammable refrigerants. Any recovery equipment used should be designed for flammable refrigerants. Any refrigerant releases should be in a well-ventilated area, such as outside of a building.

SUBSTITUTES THAT ARE ACCEPTABLE SUBJECT TO USE CONDITIONS—Continued

End-use	Substitute	Decision	Use conditions	Further information
				Only technicians specifically trained in handling flammable refrigerants should service refrigerators and freezers containing these refrigerants. Technicians should gain an understanding of minimizing the risk of fire and the steps to use flammable refrigerants safely.
Very low temperature refrigeration Non-mechanical heat transfer (New equipment only).	Ethane (R–170).	Acceptable subject to use conditions.	As provided in clauses SB6.1.2 to SB6.1.5 of UL Standard 471, 10th edition, the following markings must be attached at the locations provided and must be permanent: (a) Attach on or near any evaporators that can be contacted by the consumer: ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. Do Not Use Mechanical Devices To Defrost Refrigerator. Do Not Puncture Refrigerant Tubing.''. (b) Attach near the machine compartment: ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing.'' (c) Attach near the machine compartment: ''CAUTION—Risk of Fire or Explosion. Flammable Refrigerant Used. Consult Repair Manual/Owner's Guide Before Attempting To Service This Product. All Safety Precautions Must be Followed.'' (d) Attach on the exterior of the refrigerator: ''CAUTION—Risk of Fire or Explosion. Dispose of Properly In Accordance With Federal or Local Regulations. Flammable Refrigerant Used.''. (e) Attach near any and all exposed refrigerant tubing: ''CAUTION—Risk of Fire or Explosion Due To Puncture Of Refrigerant Tubing; Follow Handling Instructions Carefully. Flammable Refrigerant Used.'' All of these markings must be in letters no less than 6.4 mm (¼ inch) high. The refrigeration equipment must have red, Pantone® Matching System (PMS) #185 marked pipes, hoses, and other devices through which the refrigerant is serviced, typically known as the service port, to indicate the use of a flammable refrigerant. This color must be present at all service ports and where service puncturing or otherwise creating an opening from the refrigerant circuit to the atmosphere might be expected (e.g., process tubes). The color mark must extend at least 2.5 centimeters (1 inch) from the compressor and must be replaced if removed.	Room occupants should evacuate the space immediately following the accidental release of this refrigerant. If a service port is added then refrigeration equipment using this refrigerant should have service aperture fittings that differ from fittings used in equipment or containers using non-flammable refrigerant. ''Differ'' means that either the diameter differs by at least 1/16 inch or the thread direction is reversed (i.e., right-handed vs. left-handed). These different fittings should be permanently affixed to the unit at the point of service and maintained until the end-of-life of the unit, and should not be accessed with an adaptor. Example of non-mechanical heat transfer using this refrigerant would be use in a secondary loop of a thermosiphon.
Vending Machines (New equipment only).	Isobutane (R–600a). Propane (R–290) R–441A	Acceptable subject to use conditions.	These refrigerants may be used only in new equipment specifically designed and clearly identified for the refrigerants (i.e., none of these substitutes may be used as a conversion or ''retrofit'' refrigerant for existing equipment designed for other refrigerants).	Applicable OSHA requirements at 29 CFR part 1910 must be followed, including those at 29 CFR 1910.94 (ventilation) and 1910.106 (flammable and combustible liquids), 1910.110 (storage and handling of liquefied petroleum gases), and 1910.1000 (toxic and hazardous substances).

SUBSTITUTES THAT ARE ACCEPTABLE SUBJECT TO USE CONDITIONS—Continued

End-use	Substitute	Decision	Use conditions	Further information
			Where it is possible to easily detach and replace the old refrigeration circuit from the outer casing of the equipment. with a new one containing a new evaporator, condenser and refrigerant tubing within the old casing, this is considered ''new'' equipment and not a retrofit of the old, existing equipment. These substitutes may only be used in equipment that meets all requirements in Supplement SA to the 7th edition of the Underwriters Laboratories (UL) Standard for Refrigerated Vending Machines, UL 541, dated December, 2011. In cases where the final rule includes requirements more stringent than those of the 7th edition of UL 541, the appliance must meet the requirements of the final rule in place of the requirements in the UL Standard. The charge size for the refrigeration equipment must not exceed 150 grams (5.29 ounces) in each circuit. .	Proper ventilation should be maintained at all times during the manufacture and storage of equipment containing hydrocarbon refrigerants through adherence to good manufacturing practices as per 29 CFR 1910.106. If refrigerant levels in the air surrounding the equipment rise above one-fourth of the lower flammability limit, the space should be evacuated and reentry should occur only after the space has been properly ventilated. Technicians and equipment manufacturers should wear appropriate personal protective equipment, including chemical goggles and protective gloves, when handling propane. Special care should be taken to avoid contact with the skin since ethane, like many refrigerants, can cause freeze burns on the skin. Technicians should only use spark-proof tools when working on refrigeration equipment with flammable refrigerants. Any recovery equipment used should be designed for flammable refrigerants. Any refrigerant releases should be in a well-ventilated area, such as outside of a building. Only technicians specifically trained in handling flammable refrigerants should service refrigeration equipment containing this refrigerant. Technicians should gain an understanding of minimizing the risk of fire and the steps to use flammable refrigerants safely.
Vending Machines (New equipment only).	Isobutane (R–600a). Propane (R–290) R–441A	Acceptable subject to use conditions.	As provided in clauses SA6.1.2 to SA6.1.5 of UL Standard 541, 7th edition, the following markings must be attached at the locations provided and must be permanent: (a) Attach on or near any evaporators that can be contacted by the consumer: ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. Do Not Use Mechanical Devices To Defrost Refrigerator. Do Not Puncture Refrigerant Tubing.''. (b) Attach near the machine compartment: ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing.''. (c) Attach near the machine compartment: ''CAUTION—Risk of Fire or Explosion. Flammable Refrigerant Used. Consult Repair Manual/Owner's Guide Before Attempting To Service This Product. All Safety Precautions Must be Followed.''.	Room occupants should evacuate the space immediately following the accidental release of this refrigerant. If a service port is added then refrigeration equipment using this refrigerant should have service aperture fittings that differ from fittings used in equipment or containers using non-flammable refrigerant. ''Differ'' means that either the diameter differs by at least 1/16 inch or the thread direction is reversed (i.e., right-handed vs. left-handed). These different fittings should be permanently affixed to the unit at the point of service and maintained until the end-of-life of the unit, and should not be accessed with an adaptor.

SUBSTITUTES THAT ARE ACCEPTABLE SUBJECT TO USE CONDITIONS—Continued

End-use	Substitute	Decision	Use conditions	Further information
			(d) Attach on the exterior of the refrigerator: ''CAUTION—Risk of Fire or Explosion. Dispose of Properly In Accordance With Federal or Local Regulations. Flammable Refrigerant Used.'' (e) Attach near any and all exposed refrigerant tubing: ''CAUTION—Risk of Fire or Explosion Due To Puncture Of Refrigerant Tubing; Follow Handling Instructions Carefully. Flammable Refrigerant Used.'' All of these markings must be in letters no less than 6.4 mm (¼ inch) high. The refrigeration equipment must have red, Pantone® Matching System (PMS) #185 marked pipes, hoses, and other devices through which the refrigerant is serviced, typically known as the service port, to indicate the use of a flammable refrigerant. This color must be present at all service ports and where service puncturing or otherwise creating an opening from the refrigerant circuit to the atmosphere might be expected (e.g., process tubes). The color mark must extend at least 2.5 centimeters (1 inch) from the compressor and must be replaced if removed.	
Residential and light-commercial air conditioning and heat pumps—self-contained room air conditioners only (New equipment only).	HFC–32 ..... Propane (R–290) R–441A	Acceptable subject to use conditions.	These refrigerants may be used only in new equipment specifically designed and clearly identified for the refrigerants (i.e., none of these substitutes may be used as a conversion or ''retrofit'' refrigerant for existing equipment designed for other refrigerants). These substitutes may only be used in equipment that meets all requirements in Supplement SA and Appendixes B through F of the 8th edition of the Underwriters Laboratories (UL) Standard for Room Air Conditioners, UL 484, dated August 3, 2012. In cases where the final rule includes requirements more stringent than those of the 8th edition of UL 484, the appliance must meet the requirements of the final rule in place of the requirements in the UL Standard. The charge size for the entire air conditioner must not exceed the maximum refrigerant mass determined according to Appendix F of UL 484, 8th edition for the room size where the air conditioner is used. The charge size for these three refrigerants must in no case exceed 7960 g (280.8 oz or 17.55 lb) of HFC–32; 1000 g (35.3 oz or 2.21 lbs) of propane; or 1000 g (35.3 oz or 2.21 lb) of R–441A. The manufacturer must design a charge size for the entire air conditioner that does not exceed the amount specified for the unit's cooling capacity, as specified in Table A, B, C, or D of this appendix.	Applicable OSHA requirements at 29 CFR part 1910 must be followed, including those at 29 CFR 1910.94 (ventilation) and 1910.106 (flammable and combustible liquids), 1910.110 (storage and handling of liquefied petroleum gases), and 1910.1000 (toxic and hazardous substances). Proper ventilation should be maintained at all times during the manufacture and storage of equipment containing hydrocarbon refrigerants through adherence to good manufacturing practices as per 29 CFR 1910.106. If refrigerant levels in the air surrounding the equipment rise above one-fourth of the lower flammability limit, the space should be evacuated and reentry should occur only after the space has been properly ventilated. Technicians and equipment manufacturers should wear appropriate personal protective equipment, including chemical goggles and protective gloves, when handling propane. Special care should be taken to avoid contact with the skin since propane, like many refrigerants, can cause freeze burns on the skin. A class B dry powder type fire extinguisher should be kept nearby. Technicians should only use spark-proof tools when working on air conditioning equipment with flammable refrigerants. Any recovery equipment used should be designed for flammable refrigerants. Any refrigerant releases should be in a well-ventilated area, such as outside of a building. Only technicians specifically trained in handling flammable refrigerants should service refrigeration equipment containing this refrigerant. Technicians should gain an understanding of minimizing the risk of fire and the steps to use flammable refrigerants safely.

SUBSTITUTES THAT ARE ACCEPTABLE SUBJECT TO USE CONDITIONS—Continued

End-use	Substitute	Decision	Use conditions	Further information
Residential and light-commercial air conditioning and heat pumps—self-contained room air conditioners only (New equipment only).	HFC–32 ..... Propane (R–290) R–441A	Acceptable subject to use conditions.	As provided in clauses SA6.1.2 to SA6.1.5 of UL 484, 8th edition, the following markings must be attached at the locations provided and must be permanent: (a) On the outside of the air conditioner: ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing.'' (b) On the outside of the air conditioner: ''CAUTION—Risk of Fire or Explosion. Dispose of Properly In Accordance With Federal Or Local Regulations. Flammable Refrigerant Used.'' (c) On the inside of the air conditioner near the compressor: ''CAUTION—Risk of Fire or Explosion. Flammable Refrigerant Used. Consult Repair Manual/Owner's Guide Before Attempting To Service This Product. All Safety Precautions Must be Followed.'' (d) On the outside of each portable air conditioner: ''WARNING: Appliance shall be installed, operated and stored in a room with a floor area larger the ''X'' m^2 (Y ft^2).'' The value ''X'' on the label must be determined using the minimum room size in m^2 calculated using Appendix F of UL 484, 8th edition. For R–441A, use a lower flammability limit of 0.041 kg/m^3 in calculations in Appendix F of UL 484, 8th edition. (e) All of these markings must be in letters no less than 6.4 mm (¼ inch) high. The air conditioning equipment must have red, Pantone® Matching System (PMS) #185 marked pipes, hoses, and other devices through which the refrigerant is serviced, typically known as the service port, to indicate the use of a flammable refrigerant. This color must be present at all service ports and where service puncturing or otherwise creating an opening from the refrigerant circuit to the atmosphere might be expected (e.g., process tubes). The color mark must extend at least 2.5 centimeters (1 inch) from the compressor and must be replaced if removed.	Room occupants should evacuate the space immediately following the accidental release of this refrigerant. If a service port is added then air conditioning equipment using this refrigerant should have service aperture fittings that differ from fittings used in equipment or containers using non-flammable refrigerant. ''Differ'' means that either the diameter differs by at least 1/16 inch or the thread direction is reversed (i.e., right-handed vs. left-handed). These different fittings should be permanently affixed to the unit at the point of service and maintained until the end-of-life of the unit, and should not be accessed with an adaptor. Air conditioning equipment in this category includes: Window air conditioning units. Portable room air conditioners. Packaged terminal air conditioners and heat pumps.

Note: The use conditions in this appendix contain references to certain standards from Underwriters Laboratories Inc. (UL). The standards are incorporated by reference, and the referenced sections are made part of the regulations in part 82:

1. UL 250: Household Refrigerators and Freezers. 10th edition. Supplement SA: Requirements for Refrigerators and Freezers Employing a Flammable Refrigerant in the Refrigerating System. Underwriters Laboratories, Inc. August 25, 2000.

2. UL 471. Commercial Refrigerators and Freezers. 10th edition. Supplement SB: Requirements for Refrigerators and Freezers Employing a Flammable Refrigerant in the Refrigerating System. Underwriters Laboratories, Inc. November 24, 2010.

3. UL 541. Refrigerated Vending Machines. 7th edition. Supplement SA: Requirements for Room Air Conditioners Employing a Flammable Refrigerant in the Refrigerating System. December 30, 2011

4. UL 484. Room Air Conditioners. 8th edition. Supplement SA: Requirements for Refrigerated Venders Employing a Flammable Refrigerant in the Refrigerating System and Appendixes B through F. August 3, 2012.

The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of UL Standards 250, 471, 484 and 541 may be purchased by mail at: COMM 2000; 151 Eastern Avenue; Bensenville, IL 60106; Email: *orders@comm-2000.com;* Telephone: 1–888–853–3503 in the U.S. or Canada (other countries dial +1–415–352–2168); Internet address: *http://ulstandardsinfonet.ul.com/* or *www.comm-2000.com.*

You may inspect a copy at U.S. EPA's Air and Radiation Docket; EPA West Building, Room 3334, 1301 Constitution Ave. NW., Washington, DC or at the National Archives and Records Administration (NARA). For questions regarding access to these standards, the telephone number of EPA's Air and Radiation Docket is 202–566–1742. For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

TABLE A—MAXIMUM DESIGN CHARGE SIZES FOR WINDOW AIR CONDITIONERS

Refrigerant	Maximum design charge size (kg)										
	Associated cooling capacity (BTU/hr)										
	5,000	6,000	7,000	8,000	9,000	10,000	12,000	14,000	18,000	21,000	23,000
R–32	1.73	2.12	2.74	3.00	3.24	3.47	3.68	4.07	4.59	5.48	6.01
R–290	0.13	0.16	0.20	0.22	0.24	0.26	0.27	0.30	0.34	0.40	0.44
R–441A	0.14	0.17	0.22	0.24	0.26	0.28	0.30	0.33	0.37	0.44	0.49

Note: For use with self-contained air conditioning units or heat pumps with an evaporator at least 0.6 and no more than 1.0 m above the floor. Cooling capacities between those in the table are to be linearly interpolated between the next smaller and larger capacities listed in the table.

TABLE B—MAXIMUM DESIGN CHARGE SIZES FOR PACKAGED TERMINAL AIR CONDITIONERS, PACKAGED TERMINAL HEAT PUMPS, AND PORTABLE AIR CONDITIONING UNITS

Refrigerant	Maximum design charge size (kg)										
	Associated cooling capacity (BTU/hr)										
	5,000	6,000	7,000	8,000	9,000	10,000	12,000	14,000	18,000	21,000	23,000
R–32	1.04	1.27	1.65	1.80	1.95	2.08	2.21	2.44	2.75	3.29	3.60
R–290	0.08	0.09	0.12	0.13	0.14	0.15	0.16	0.18	0.20	0.24	0.27
R–441A	0.08	0.10	0.13	0.15	0.16	0.17	0.18	0.20	0.22	0.27	0.29

Note: For use with self-contained air conditioning units or heat pumps with an evaporator no more than 0.6 m above the floor. Cooling capacities between those in the table are to be linearly interpolated between the next smaller and larger capacities listed in the table.

TABLE C—MAXIMUM DESIGN CHARGE SIZES FOR WALL-MOUNTED AC UNITS

Refrigerant	Maximum design charge size (kg)										
	Associated cooling capacity (BTU/hr)										
	5,000	6,000	7,000	8,000	9,000	10,000	12,000	14,000	18,000	21,000	23,000
R–32	3.12	3.82	4.94	5.41	5.84	6.24	6.62	7.32	7.96	7.96	7.96
R–290	0.23	0.28	0.36	0.40	0.43	0.46	0.49	0.54	0.61	0.73	0.80
R–441A	0.25	0.31	0.40	0.44	0.47	0.51	0.54	0.59	0.67	0.80	0.88

Note: For use with self-contained air conditioners or heat pumps with an evaporator at least 1.0 and no more than 1.8 m above the floor. Cooling capacities between those in the table are to be linearly interpolated between the next smaller and larger capacities listed in the table.

TABLE D—MAXIMUM DESIGN CHARGE SIZES FOR CEILING-MOUNTED AC UNITS

Refrigerant	Maximum design charge size (kg)										
	Associated cooling capacity (BTU/hr)										
	5,000	6,000	7,000	8,000	9,000	10,000	12,000	14,000	18,000	21,000	23,000
R–32	3.82	4.67	6.03	6.61	7.14	7.63	7.96	7.96	7.96	7.96	7.96
R–290	0.28	0.34	0.44	0.49	0.53	0.56	0.60	0.66	0.74	0.89	0.97
R–441A	0.31	0.38	0.49	0.54	0.58	0.62	0.66	0.73	0.82	0.98	1.00

Note: For use with self-contained air conditioners or heat pumps with an evaporator more than 1.8 m above the floor. Cooling capacities between those in the table are to be linearly interpolated between the next smaller and larger capacities listed in the table.

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