ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 82

[EPA–HQ–OAR–2009–0286; FRL–9507–7]

RIN 2060–AP54

Protection of Stratospheric Ozone: Listing of Substitutes for Ozone-Depleting Substances—Hydrocarbon Refrigerants

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Pursuant to the U.S. Environmental Protection Agency (EPA)'s Significant New Alternatives Policy (SNAP) program, this action lists isobutane (R–600a) and R–441A as acceptable, subject to use conditions, as substitutes for chlorofluorocarbon (CFC)–12 and hydrochlorofluorocarbon (HCFC)–22 in household refrigerators, freezers, and combination refrigerators and freezers. This action also lists propane (R–290) as acceptable, subject to use conditions, as a substitute for CFC–12, HCFC–22, and R–502 in retail food refrigerators and freezers (stand-alone units only).

DATES: This final rule is effective on February 21, 2012. The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register as of February 21, 2012.

ADDRESSES: EPA has established a docket for this action under Docket ID No. EPA–HQ–OAR–2009–0286. All documents in the docket are listed on the *www.regulations.gov* Web site. Although listed in the index, some information is not publicly available, *i.e.,* confidential business information (CBI) or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not posted on the Web site and will be made publicly available only in hard copy form.

Publicly available docket materials can be found 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 at *www.epa.gov/ozone/snap/regs.*

SUPPLEMENTARY INFORMATION:

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I. General Information

A. Background

This rule pertains to three hydrocarbon refrigerants: Isobutane, propane, and R–441A. Hydrocarbon refrigerants have been in use for over 15 years in countries such as Germany, the United Kingdom, Australia, and Japan in the end-uses addressed by this final rule. In Europe and Asia, equipment manufacturers have designed and tested household and commercial refrigerators and freezers to account for flammability and safety concerns associated with hydrocarbon refrigerants.

The 2010 Report of the United Nations Environment Programme (UNEP)'s Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee (RTOC) estimates that approximately 100 million household refrigerators and freezers are manufactured annually worldwide. One-third of these now use either isobutane or an isobutane/propane blend, and this proportion is expected to increase to 75 percent by 2020. In the retail sector, the RTOC observes that hydrocarbon refrigerants continue to gain market share in Europe and Japan.[1]

Because hydrocarbon refrigerants have zero ozone depletion potential (ODP) and very low global warming potential (GWP) compared to other refrigerants, many companies are interested in using them in the United States (U.S.) as well. In this action, EPA addresses SNAP submissions for use of three hydrocarbon refrigerants in two end-uses: (1) Household refrigerators, freezers, and combination refrigerators and freezers; and (2) retail food refrigerators and freezers (stand-alone units only).

The submitter of R–441A—A.S. Trust and Holdings—has provided documentation to EPA, available in the docket for this rulemaking, that it has withdrawn its submission for the blend originally submitted as ''HCR–188C.'' Because the submission is no longer pending before EPA, we are not

[1] RTOC, 2010, pp. 50, 51, 64.

finalizing a SNAP listing for that blend. Any person wishing to introduce that blend into interstate commerce would be required to submit a new SNAP application under EPA regulations.[2]

1. What are isobutane, propane, and R–441A?

Isobutane and propane are hydrocarbons, and R–441A is a blend of hydrocarbons. Hydrocarbons are flammable organic compounds made up of hydrogen and carbon.

Isobutane, also called 2-methylpropane, has four carbon atoms, the chemical formula C_4H_{10}, and a branched structure. It is often written as $CH(CH_3)_2$-CH_3 to distinguish it from butane, a straight-chain hydrocarbon with the same chemical formula. Isobutane's Chemical Abstracts Service (CAS) Registry Number is 75–28–5. As a refrigerant, isobutane is designated as R–600a by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 34–2010 ''Designation and Safety Classification of Refrigerants'' (ASHRAE, 2010). It is also referred to as HC–600a and iso-C_4H_{10}.

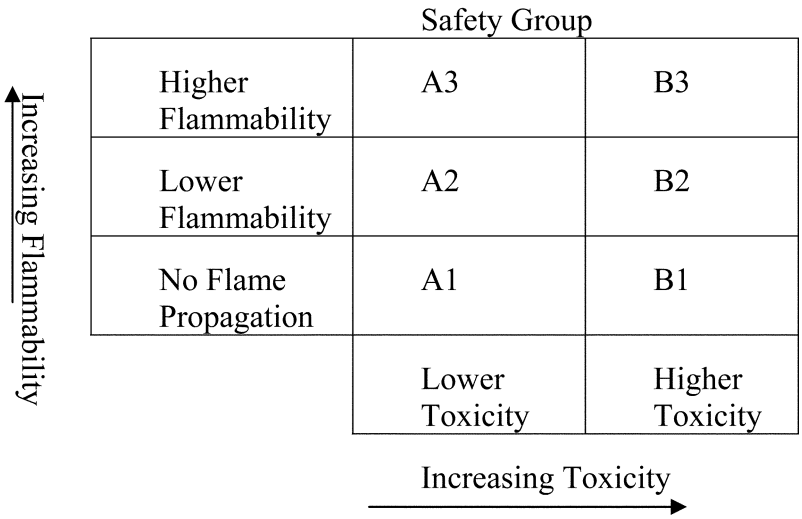
Propane has three carbon atoms, the chemical formula C_3H_8, and the CAS Number 74–98–6. As a refrigerant, propane has ASHRAE designation R–290. It is also referred to as HC–290 and $CH_3CH_2CH_3$.

R–441A is a blend of four hydrocarbons: Ethane (3.1 percent by mass), propane (54.8 percent by mass), isobutane (6.0 percent by mass), and butane (36.1 percent by mass). This blend was originally submitted to EPA under the trade name ''HCR–188C1,'' and EPA used that nomenclature in the proposed rule (75 FR 25799). In February 2011, this blend received the designation R–441A under ASHRAE Standard 34–2010.[3] Throughout this final rule, we refer to that blend as R–441A.

ASHRAE Standard 34–2010 categorizes isobutane, propane, and R–441A in the A3 safety group. ASHRAE's safety group classification consists of two alphanumeric characters (*e.g.,* A2 or B1). The capital letter indicates the toxicity, and the numeral denotes the flammability.

Figure 1 illustrates these safety group classifications.

Figure 1. Refrigerant Safety Group Classification



ASHRAE classifies Class A refrigerants as refrigerants for which toxicity has not been identified at concentrations less than 400 ppm by volume, based on data used to determine a workplace exposure limit for long-term exposure, such as a threshold limit value-time-weighted average (TLV–TWA) or consistent indices. Class B refrigerants show evidence of toxicity below 400 ppm on an 8-hour time-weighted average (TWA).

Refrigerants also receive one of three possible flammability classifications: 1 (no flame propagation), 2 (lower flammability), or 3 (higher flammability). Class 3 refrigerants exhibit flame propagation at 60 °C and 101.3 kPa, and have either a lower flammability limit (LFL) of less than or equal to 0.10 kg/m^3 or a heat of combustion greater than or equal to 19,000 kJ/kg.

2. Which end-uses are covered in our final decision?

a. Household Refrigerators, Freezers, and Combination Refrigerators and Freezers

This end-use, which we refer to as ''household refrigeration'' in this preamble, consists of appliances that are intended primarily for residential use, although they may be used outside the home. Household freezers offer storage space only at freezing temperatures. Products with both a refrigerator and freezer in a single unit are most common. This final rule includes a use condition that limits the refrigerant charge in this end-use to 57 grams (2.0 ounces) or less for each sealed refrigeration system (*i.e.,* compressor, condenser, evaporator, and refrigerant piping). EPA is also requiring other use conditions as described in Section III (''What did EPA propose, and what are we finalizing?'') below.

b. Retail Food Refrigerators and Freezers (Stand-Alone Units Only)

This end-use, which we refer to as ''retail food refrigeration'' in this preamble, includes the refrigeration systems, including cold storage cases, designed to chill food or keep it at a cold temperature for commercial sale. This final rule addresses the use of hydrocarbons in stand-alone units only.

[2] The submitter has informed EPA that that it is now marketing R–441A (the blend originally submitted as ''HCR–188C1'') under the trade name ''HCR–188C.''

[3] See Addendum g to Standard 34–2010.

A stand-alone appliance is one using a hermetically-sealed compressor and for which all refrigerant-containing components, including but not limited to at least one 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 addition or removal of refrigerant when placed into initial operation. Stand-alone equipment is used to store chilled beverages or frozen products. Examples include reach-in beverage coolers and stand-alone ice cream cabinets. Our acceptability determination does not apply to large refrigeration systems such as walk-in coolers or the direct expansion refrigeration systems typically found in retail food stores. It also does not apply to vending machines.

This final rule includes a use condition that limits the refrigerant charge in this end-use to 150 grams (5.3 ounces) or less. EPA is also requiring other use conditions as described in Section III (''What Did EPA Propose, and What are we finalizing?'') below.

B. Does this action apply to me?

This final rule lists the use of three alternative refrigerants in two end-uses: Household refrigerators, freezers, and combination refrigerators and freezers; and retail food refrigerators and freezers (stand-alone units only). Potentially regulated entities that may use isobutane (R–600a) or R–441A in household refrigeration or propane (R–290) in retail food refrigeration include:

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	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.
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	Electrical and Electronic Appliance, Television, and Radio Set Merchant Wholesalers.
Industry	423740	Refrigeration Equipment and Supplies Merchant Wholesalers.

This table is not intended to be exhaustive, but rather functions as a guide regarding entities that are likely to use the substitute whose use is regulated by this 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. Which acronyms and abbreviations are used in the preamble?

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

AEGL—Acute Exposure Guideline Level
ASHRAE—American Society of Heating, Refrigerating and Air-Conditioning Engineers
ANSI—American National Standards Institute
CAA—Clean Air Act
CAS—Chemical Abstracts Service
CBI—confidential business information
CFC—chlorofluorocarbon
CFR—Code of Federal Regulations
CO_2—carbon dioxide
EPA—United States Environmental Protection Agency
FR—Federal Register
FTA—Fault-Tree Analysis
GHG—greenhouse gas
GWP—global warming potential
HC—hydrocarbon
HCFC—hydrochlorofluorocarbon
HFC—hydrofluorocarbon
ICF—ICF International, Inc.
ICR—information collection request
IEC—International Electrotechnical Commission
kg—kilogram
LFL—lower flammability limit
NAICS—North American Industrial Classification System
NARA—National Archives and Records Administration
NOAEL—no observable 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
OMB—United States Office of Management and Budget
OSHA—United States Occupational Safety and Health Administration
PMS—Pantone® Matching System
ppm—parts per million
RFA—Regulatory Flexibility Act
RfC—reference concentration
RTOC—Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee
SNAP—Significant New Alternatives Policy
TEAP—Technology and Economic Assessment Panel
TLV—Threshold Limit Value
TSCA—Toxic Substances Control Act
TUV—Technischer Überwachungs-Verein (German Technical Inspection Agency)
TWA—time-weighted average
UL—Underwriters Laboratories Inc.
UMRA—Unfunded Mandates Reform Act
UNEP—United Nations Environment Programme
VOC—volatile organic compound
WGL—workplace guidance level
WMO—World Meteorological Organization

II. How does the 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 ozone-depleting substances (ODS). EPA refers to this program as the Significant New Alternatives Policy (SNAP) program. The major provisions of section 612 are:

1. Rulemaking

Section 612(c) requires EPA to promulgate rules making it unlawful to replace any class I substance (*i.e.,* chlorofluorocarbon, halon, carbon tetrachloride, methyl chloroform, methyl bromide, and hydrobromofluorocarbon) or class II substance (*i.e.,* 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 is found at *http://www.epa.gov/ozone/snap/lists/index.html,* and the lists of substitutes that are ''unacceptable,'' ''acceptable subject to use conditions,'' and ''acceptable subject to narrowed use limits'' are in subpart G of 40 CFR part 82.

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 are EPA's regulations 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 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 requires EPA to ensure that substitutes found acceptable do not present a significantly greater risk to human health and the environment than other substitutes that are currently or potentially available.

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

Under the SNAP regulations, anyone who plans to market or produce a substitute to replace a class I substance or class II substance in one of the eight major industrial use sectors 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. This requirement applies to the persons planning to introduce the substitute into interstate commerce,[4] which typically are chemical manufacturers but may include importers, formulators, equipment manufacturers, and end-users.[5] The regulations identify certain narrow exemptions from the notification requirement, such as research and development and test marketing (40 CFR 82.176(b)(4) and (5), respectively).

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 (40 CFR 82.180(b)). Use conditions and narrowed use limits are both considered ''use restrictions'' and are explained in the paragraphs below. Substitutes that are deemed acceptable with no use restrictions (no use conditions or narrowed use limits) can be used for all applications within the relevant end-uses in the sector.

After reviewing a substitute, the Agency may determine that a substitute is acceptable only if certain conditions in the way that the substitute is used are met 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 EPA's SNAP regulations.

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.'' The Agency requires the user of a narrowed-use substitute to demonstrate that no other acceptable substitutes are available for the specific application by conducting comprehensive studies. 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.

The Agency publishes its SNAP program decisions in the **Federal Register** (FR). EPA publishes 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 with an opportunity to comment, before publishing final decisions.

In contrast, EPA publishes decisions concerning substitutes that are deemed acceptable with no restrictions in ''notices of acceptability,'' rather than as proposed and final rules. As described in the March 18, 1994, rule initially implementing the SNAP program, 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 U.S. Occupational Safety and Health Administration (OSHA)). The ''Further Information'' classification does not necessarily include all other legal obligations pertaining to the use of the substitute. While the items listed are not

[4] 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.

[5] 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.

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 can I get 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 Layer Protection Web site at: *www.epa.gov/ozone/snap/index.html.* For more information on the Agency's process for administering the SNAP program or criteria for evaluation of substitutes, refer to the March 18, 1994, SNAP final rulemaking (59 FR 13044), codified at 40 CFR part 82, subpart G. A complete chronology of SNAP decisions and the appropriate citations is found at: *http://www.epa.gov/ozone/snap/chron.html.*

III. What did EPA propose, and what are we finalizing?

A. Proposed Rule

On May 10, 2010, EPA published a notice of proposed rulemaking (75 FR 25799) to list isobutane (R–600a) and the hydrocarbon blends HCR–188C and HCR–188C1 as ''acceptable, subject to use conditions,'' as substitutes for chlorofluorocarbon (CFC)–12 and hydrochlorofluorocarbon (HCFC)–22 [6] in household refrigerators, freezers, and combination refrigerators and freezers.[7] (This preamble refers to HCR–188C1 as R–441A.)

EPA also proposed to list propane (R–290) as ''acceptable, subject to use conditions,'' as a substitute for CFC–12, HCFC–22, and R–502 [8] in retail food refrigerators and freezers (stand-alone units only).

For each substitute, EPA proposed the following use conditions:

(1) 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).

(2) These refrigerants may be used only in refrigerators or freezers that meet all requirements listed in the 10th edition of Underwriters Laboratories (UL) Standard UL 250 (household refrigeration end-use) or the 9th edition (*sic*) of Standard UL 471 (retail food refrigeration end-use).

(3) The quantity of the substitute refrigerant (*i.e.,* ''charge size'') in a refrigerator or freezer shall not exceed 57 grams (2.0 ounces) in the household refrigeration end-use or 150 grams (5.3 ounces) in the retail food refrigeration end-use.

(4) Similar to clauses SA6.1.1 to SA6.1.2 of UL 250 and SB6.1.2 to SB6.1.5 of UL 471, the following markings, or the equivalent, shall be provided and shall 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.''

(b) ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. To Be Repaired Only By Trained Service Personnel. Do Not Use Mechanical Devices. Do Not Puncture Refrigerant Tubing.''

(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.''

(d) ''CAUTION—Risk of Fire or Explosion. Dispose of Properly In Accordance With Federal Or Local Regulations. Flammable Refrigerant Used.''

(e) ''CAUTION—Risk of Fire or Explosion Due To Puncture Of Refrigerant Tubing; Follow Handling Instructions Carefully. Flammable Refrigerant Used.''

The marking described in clause (a) above shall be permanently attached on or near any evaporators that can be contacted by the consumer. The markings described in clauses (b) and (c) above shall be located near the machine compartment. The marking described in clause (d) above shall be permanently attached on the exterior of the refrigerator. The marking described in clause (e) above shall be permanently attached near any and all exposed refrigerant tubing. All of these markings shall be in letters no less than 6.4 mm (1/4 inch) high.

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

(6) The refrigerator or freezer must have service aperture fittings that differ from fittings used in equipment or containers using non-flammable refrigerant. ''Differ'' means that either the diameter must differ by at least 1/16 inch or the thread direction must be reversed. The unique fittings must be permanently affixed to the unit and may not be accessed with an adaptor until the end-of-life of the unit.

(7) These refrigerants may not be sold for use as a refrigerant in containers designed to contain less than 5 pounds (2.3 kg) [9] of refrigerant.

The proposed rule also included several recommendations classified as ''Further Information.'' These addressed personal protective equipment, proximity to a Class B dry powder-type fire extinguisher, proper ventilation, use of spark-proof tools, recovery equipment, training, refrigerant storage, and evacuation.

Finally, in the proposed rule, EPA sought information and comment on several other issues:

- The availability of industry-wide training on flammable refrigerants for refrigerant technicians;
- Whether EPA should limit the use of hydrocarbon refrigerants only for use in the original equipment manufacturers' (OEMs') specific appliances, as described in the application;
- Whether the use conditions should require ''spark-proof'' circuits in the design of equipment using hydrocarbon refrigerants;
- The availability in the U.S. of recovery units that are designed specifically for hydrocarbons;
- Whether EPA should, in a future rulemaking, consider an exemption for hydrocarbon refrigerants from the venting prohibition under section 608 of the Clean Air Act;
- Whether EPA should require only one condition for each refrigerant: to meet the UL 250 or 471 standards; and

[6] CFC–12 is also referred to as R–12, CCl_2F_2 and dichlorodifluoromethane. HCFC–22 is also referred to as R–22, $CHClF_2$, chlorodifluoromethane, and difluorochloromethane.

[7] HCR–188C and HCR–188C1 submissions included window air conditioners as an end-use. EPA is acting on this end-use in a separate rulemaking. As discussed previously, ''HCR–188C'' is the name of a blend that has been withdrawn from review for the household food refrigeration end-use.

[8] R–502 is a blend of CFC–115 (51.2% by weight) and HCFC–22 (48.8%). CFC–115 is also referred to as R–115, C_2ClF_5, chloropentafluoroethane, and pentafluorochloroethane.

[9] The proposed rule inadvertently represented 5 pounds as 2.8 kilograms instead of 2.3 kg, which is accurate.

• Whether EPA should find hydrocarbon refrigerants unacceptable until an industry-wide standard exists for servicing refrigerators and freezers using hydrocarbon refrigerants.

B. Final Rule

After considering the comments received on the proposed rule, EPA is finalizing a listing for hydrocarbon refrigerants in the household refrigeration and retail food refrigeration end-uses.

EPA is taking action on the specific refrigerant/end-use combinations described in the proposed rule. We are: (1) Finding isobutane acceptable, subject to use conditions, in the household refrigeration end-use; (2) finding propane acceptable, subject to use conditions, in the retail food refrigeration end-use; and (3) finding R–441A (submitted as ''HCR–188C1,'' as discussed in Section I.A.1 above) acceptable, subject to use conditions, in the household refrigeration end-use. As discussed above, the submitter has withdrawn its application for the blend submitted as ''HCR–188C,'' and because that submission is no longer pending before the Agency, EPA is not finalizing a SNAP listing for that blend. The submitter has informed EPA that it is now marketing R–441A (the blend originally submitted as ''HCR–188C1'') under the trade name ''HCR–188C.''

For each of the listing decisions finalized in this action, we are establishing the following use conditions after considering comments on the proposed rule:

(1) EPA is finalizing the proposed requirement that these refrigerants 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 that is designed for other refrigerants). See Section V.B of this preamble (''New Equipment Only; Not Intended for Use as a Retrofit Alternative'').

(2) EPA is finalizing the proposed requirement that these refrigerants be used only in refrigerators or freezers that meet all requirements listed in Supplement SA to UL 250 (household refrigeration end-use) or Supplement SB to UL 471 (retail food refrigeration end-use). We clarify that the intent of this use condition is to require compliance with the provisions specifically for use with flammable refrigerants found in those supplements, rather than requiring compliance with other material in UL 250 and UL 471 that is not specific to use with flammable refrigerants. See Section V.C (''Compliance with UL Standards'').

(3) EPA is finalizing the proposed requirement for 57-gram and 150-gram charge size limitations for the household refrigeration and retail food refrigeration end-uses, respectively. We are also clarifying that the charge size limitations apply to each refrigerant circuit in a refrigerator or freezer, not necessarily the entire appliance. See Sections V.D (''Charge Size Limitation (Household Refrigeration)'') and V.E (''Charge Size Limitation (Retail Food Refrigeration)'').

(4) EPA is finalizing the marking (labeling) requirements as proposed, as discussed in Section V.F (''Labeling''), with two minor exceptions discussed in Section VI (''What Other Changes Is EPA Making in the Final Rule?''). First, we are correcting the wording of the label located at the machine compartment; second, we are clarifying the language of the requirement to more clearly link each label with its wording and location.

(5) EPA is finalizing the proposed requirement that the refrigerator or freezer have red PMS #185-marked pipes, hoses, or other devices through which the refrigerant passes. We are narrowing the applicability of this requirement by clarifying that the color must be present at all locations through which the refrigerant is serviced, and where service puncturing or otherwise creating an opening from the refrigerant circuit to the atmosphere might be expected (*e.g.,* process tubes), instead of all locations where the refrigerant passes. In addition, we are clarifying that the red coloring must be in place at all times and must be replaced if removed. See Section V.G (''Color-Coded Hoses and Piping'').

(6) Based on the comments received, EPA is not finalizing the proposed requirement for unique fittings at service apertures. Instead we are providing this as a recommendation in the ''Further Information'' column of Appendix R. See Section V.H (''Unique Fittings'').

(7) Based on the comments received, EPA is not finalizing the proposed requirement prohibiting the sale of hydrocarbon refrigerants in containers designed to contain less than 5 pounds (2.3 kg) of refrigerant. See Section V.I (''Small Containers'').

EPA is also making two other changes to the wording of the use conditions and ''Further Information'' provisions in Appendix R. First, we are clarifying that R–502 is one of the refrigerants for which propane is listed as a substitute in the retail food refrigeration end-use. Second, we are including in the ''Further Information'' column a cross-reference to relevant OSHA regulations.

IV. What is the basis for EPA's final action?

To determine whether these three substitutes present risks that are lower than or comparable to risks from other substitutes that are currently or potentially available in the end-uses under consideration, we examined the criteria in 40 CFR 82.180(a)(7), focusing in particular on the following areas of concern: Impacts on stratospheric ozone and climate; volatile organic compound (VOC) emissions; flammability; asphyxiation risks for consumers and end-users; and toxicity risks to workers, consumers, and the general population.

In support of the proposed rule, in 2009, EPA performed a risk screen analysis for each of the substitutes for the end-use proposed for listing: Isobutane in household refrigeration (ICF, 2009a), propane in retail food refrigeration (ICF, 2009b), HCR–188C in household refrigeration (ICF, 2009c), and HCR–188C1 (R–441A) in household refrigeration (ICF, 2009d). In developing this final rule, EPA reviewed these risk screens and made minor changes for greater consistency and clarity, but made no substantive changes to the assumptions or to the quantitative risk calculations. (EPA did not revise the risk screen for HCR–188C, since the manufacturer withdrew the application for that refrigerant, and EPA is not finalizing an acceptability determination for the refrigerant.) The 2009 risk screens and the 2011 revisions (ICF, 2011a; ICF, 2011b; ICF, 2011c) are included in the docket for this rulemaking.

Based on the information provided in the risk screens, EPA has concluded that the overall environmental risk posed by each of the three substitutes is lower than or comparable to the environmental risks posed by other substitutes in the reviewed end-uses. With respect to public health risks, EPA has concluded that without mitigation, the risks posed by these refrigerants would be higher than other 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 flammability risks. Therefore, EPA is finalizing use conditions to ensure that the overall risks to human health and the environment posed by these substitutes are lower than or comparable to the overall risk posed by other substitutes in the same end-use.

A. Environmental Impacts

EPA has concluded that, overall, the environmental risk posed by each of the three reviewed substitutes is lower than or comparable to the environmental risk posed by other substitutes in the reviewed end-uses. All three substitutes have zero ozone depletion potential (ODP) and very low global warming potential (GWP) compared to other refrigerants. Although the substitutes are VOCs, the emissions from the specific uses being found acceptable subject to use conditions would not significantly affect local air quality. Thus the environmental risks associated with ODP, GWP, and VOC effects for each reviewed substitute are lower than or comparable to other acceptable substitutes. These risks are discussed below.

A chemical's ODP is the ratio of its impact on stratospheric ozone compared to the impact of an identical mass of CFC–11.[10] The ODP of CFC–11 is defined as 1.0. Other CFCs and HCFCs have ODPs ranging from 0.01 to 1.0 (WMO, 2011). The ODP of HCFC–22 is 0.055, and the ODP of R–502 is 0.334. The three substitutes discussed in this rule have an ODP of zero, as do other common substitutes in the same end-uses, such as HFC–134a, R–404A, and R–410A.

The GWP of a greenhouse gas (GHG) quantifies its potential integrated climate forcing relative to carbon dioxide (CO_2) over a specified time horizon. The 100-year integrated GWPs of isobutane, propane, and R–441A are estimated to be 8 (GE, 2008), 3 (Ben and Jerry's, 2008), and less than 5 (A.S. Trust & Holdings, 2009),[11] respectively, relative to a value of 1.0 for CO_2. These are significantly lower than the 100-year integrated GWPs of the substances that they would be replacing: CFC–12 (GWP = 10,890); HCFC–22 (GWP = 1,810); and R–502 (GWP = 4,660) (WMO, 2011) and are significantly lower than those of other acceptable refrigerants in these end-uses (*e.g.,* GWPs of HFC–134a, R–404A, and R–410A are approximately 1,430, 3,920, and 2,090, respectively).

The overall climate impacts from the use of these refrigerants are also dependent upon the energy use by the appliances in which they are used, because the indirect climate impacts associated with electricity consumption typically exceed those from the refrigerants themselves over the full life cycle of refrigerant-containing products (ORNL, 1997). A hydrocarbon appliance that is more energy-efficient than the appliance it replaces would result in GHG emission reductions beyond those attributable to the substitute refrigerant alone. Conversely, the GHG benefits of a substitute refrigerant in a replacement hydrocarbon appliance would be offset if that appliance had lower energy efficiency than the appliance it replaces. EPA was unable to find any detailed life-cycle analysis addressing GHG emissions associated with substituting traditional ODS refrigerants with hydrocarbons. Information in the submissions indicates that energy efficiency of these refrigerants is likely to be comparable to or higher than that of ODS refrigerants and of HFC refrigerants sometimes used (*e.g.,* HFC–134a) (Ben & Jerry's, 2008; A.S. Trust & Holdings, 2007, 2009; GE, 2008). In the *2010 Assessment Report of the Technology and Economic Assessment Panel,* UNEP's Technology and Economic Assessment Panel (TEAP) discusses the energy efficiency of hydrocarbons compared to that of HFC–134a:

> When GWP of HFC–134a is considered prohibitive in relation to HFC emissions (country regulation or company policy), hydrocarbon refrigerants (isobutane and propane, *i.e.* HC–600a and HC–290) or CO_2 (R–744) are the current alternative solutions, presenting in most of the cases the same technical reliability and energy performance as HFC–134a. [p. 60]

Hydrocarbons are regulated as VOCs under sections of the CAA that address development of State Implementation Plans to attain and maintain National Ambient Air Quality Standards for ground-level ozone, which is a respiratory irritant (see 40 CFR 51.100(s)). EPA's 1994 risk screen document (EPA, 1994) describes the potential emissions of VOCs from all substitutes for all end-uses in the refrigeration and air-conditioning sector as likely to be insignificant relative to VOCs from all other sources (*i.e.,* other industries, mobile sources, and biogenic sources). Analysis performed for this rulemaking indicates that in the extremely unlikely event that all appliances manufactured by each submitter in these two end-uses were to leak their entire charge over the course of a year, the resulting increase in annual VOC emissions from each substitute as a percent of all annual VOC emissions in the U.S. would be negligible.[12]

Therefore, the use of these hydrocarbons in the household refrigeration and retail food refrigeration end-uses is sufficiently small that a switch from an ODS or from an HFC refrigerant would not have a noticeable impact on local air quality. International experts came to a similar conclusion in *Safeguarding the Ozone Layer and the Global Climate System: Special Report of the Intergovernmental Panel on Climate Change* (IPCC/TEAP, 2005).

Similarly, EPA expects that additional releases of hydrocarbons into the environment from use as refrigerant will have an insignificant impact on ecosystem risks. Because hydrocarbons are volatile and break down quickly in the atmosphere into naturally-occurring compounds such as carbon dioxide, EPA would not expect there to be any significant amount of deposition that might adversely affect aquatic or terrestrial ecosystems.

B. Flammability

Because they are flammable, isobutane, propane, and R–441A could pose a significant safety hazard for workers and consumers if handled incorrectly. Isobutane, propane, and R–441A have lower flammability limits (LFLs)[13] of 18,000 ppm, 21,000 ppm, and 16,000 ppm, respectively. The ODS for which these refrigerants are substitutes—CFC–12, HCFC–22, and R–502—and other substitutes available in this end-use are not flammable. When the concentration of a flammable refrigerant reaches or exceeds its LFL in the presence of an ignition source (*e.g.,* a static electricity spark resulting from closing a door, use of a torch during servicing, or a short circuit in wiring that controls the motor of a compressor), an explosion or fire could occur.

Flammability risks are of particular concern because household refrigeration appliances and retail food refrigeration appliances in the United States traditionally have used refrigerants that are not flammable. Without mitigation, the risks posed by flammable refrigerants would be higher than those posed by non-flammable refrigerants because individuals may not be aware that their actions could cause a fire, and

[10] CFC–11, CAS registry No. 75–69–4, is also referred to as R–11, CCl_3F and trichlorofluoromethane.

[11] The submission for HCR–188C1, now known as R–441A, reported that the GWP of the substitute is ''negligible or essentially zero.'' Because the main components of R–441A are the same as the main components of the HCR–188C formulation originally submitted, the GWP of R–441A is expected to be similar to that reported for the original formulation by A.S. Trust & Holdings, Inc. (2007).

[12] As a percent of annual VOC emissions in the U.S., this represents approximately 5×10^{-6} percent (for isobutane in the household food refrigeration end-use) (ICF, 2009a and ICF, 2011a), 5×10^{-6} percent (for propane in the retail food refrigeration end-use) (ICF, 2009b and ICF, 2011b), and 3×10^{-7} percent (for R–441A in the household food refrigeration end-use) (ICF, 2009d and ICF, 2011c).

[13] LFL is the minimum concentration in air at which flame propagation occurs.

existing appliances have not been designed specifically to minimize flammability risks.

Therefore, in order for these substitutes to be used safely, it is important to minimize the presence of potential ignition sources and to reduce the likelihood that the levels of these refrigerants will reach their LFLs. Production facilities, and other facilities where large quantities of the refrigerant are stored, should have proper safety precautions in place to minimize the risk of explosion. EPA recommends that these facilities be equipped with proper ventilation systems to minimize the risks of explosion and be designed to reduce risks from possible ignition sources.

To determine whether the three hydrocarbon refrigerants would present flammability concerns for service and manufacture personnel or for consumers, EPA reviewed the submitters' detailed assessments of the probability of events that might create a fire, as well as engineering approaches to avoid sparking from the refrigeration equipment. EPA also conducted risk screens, available in the docket for this rulemaking, evaluating reasonable worst-case scenarios to model the effects of the sudden release of the refrigerants. The worst-case scenario analysis for each of the three hydrocarbons revealed that even if the unit's full charge were emitted within one minute, the concentration would not reach the LFL for that hydrocarbon.

However, since hydrocarbon refrigerants are flammable, and manufacture personnel, service personnel, and consumers in the U.S. may not be widely familiar with refrigeration appliances containing flammable refrigerants, use conditions are necessary to create awareness of the presence of a flammable refrigerant and ensure safe handling. For this reason, this final rule includes use conditions in order to ensure that these substitutes present aggregate risks that are lower than or comparable to those of other substitutes that are currently or potentially available. This final rule also lists recommendations such as proper ventilation and storage practices, and use of appropriate tools and recovery equipment, to mitigate safety risks for manufacture and servicing personnel.

C. Asphyxiation

In evaluating potential human health impacts of isobutane, propane, and R–441A, EPA considered the risk of asphyxiation to workers (store employees and technicians) and consumers. The Agency evaluated a worst-case scenario that did not consider likely mitigating exposure conditions such as open doors or windows, fans, conditioned airflow, or infiltration between a door and its door frame. EPA calculated the maximum charge of each refrigerant that would result in a reduction of oxygen levels to 12 percent in air, which is the no observable adverse effect level (NOAEL) for hypoxia (ICF, 1997). Specifically, under the worst-case conditions evaluated, the charge sizes necessary to reduce the oxygen level in air to the 12-percent NOAEL in the household refrigeration end-use would be 625 grams and 535 grams (for isobutane and R–441A, respectively), which is much larger than the 57-gram charge size limitation required in the use conditions in this rule (ICF, 2011a and 2011c). Likewise, the charge size necessary to achieve the NOAEL in the retail food refrigeration end-use would be 904 grams for propane, which is six times greater than the 150-gram charge size limitations in this rule (ICF, 2011b). This risk is lower than or comparable to that of other available substitutes in these end-uses.

D. Toxicity

EPA evaluated the toxicity impacts of the three refrigerants to workers and consumers for the household refrigeration and retail food refrigeration end-uses. The Agency estimated the maximum time-weighted average (TWA) [14] exposures for the hydrocarbons under different exposure scenarios and compared them to relevant industry and government exposure limits for each of the three hydrocarbons (including potential impurities in the substitutes). The risk screens, provided in the docket, describe the toxicity impact assessments in more detail (ICF, 2009a; ICF, 2009b; ICF, 2009d; ICF, 2011a, ICF, 2011b, ICF, 2011c).

To assess occupational exposure for the household refrigeration and retail food refrigeration end-uses, EPA estimated the number of refrigerant releases during appliance manufacture and disposal and the refrigerant amounts released per event. For each refrigerant, EPA used those estimates to calculate the maximum 8-hour TWA exposure, which we then compared to the corresponding workplace guidance level (WGL). EPA found that occupational exposures to these hydrocarbons should not pose a toxicity threat in either end-use because the TWAs were well below the industry and government exposure limits.

To assess consumer and end-user exposure for the household refrigeration end-use, EPA modeled 15- and 30-minute TWAs for catastrophic refrigerant release in a consumer kitchen under a reasonable worst-case scenario. Even under the very conservative modeling assumptions used, EPA found that exposures to any of the three hydrocarbons would not pose a toxicity threat to end-users in the household refrigeration end-use because the TWAs were significantly lower than the NOAEL and/or acute exposure guideline level (AEGL).

To assess consumer and end-user exposure for the retail food refrigeration end-use, EPA estimated 15- and 30-minute TWAs as acute/short-term consumer exposures resulting from catastrophic leakage of refrigerant from retail food refrigerators and compared the TWAs to standard toxicity limits. EPA concluded that none of the three hydrocarbons posed a toxicity threat to consumers in the retail end-use because the TWAs were significantly lower than the NOAEL and/or AEGL.

Finally, EPA assessed the exposure risk to the general population for the three hydrocarbons in their respective end-uses. To do so, EPA estimated factory and on-site releases of each hydrocarbon and compared them to each hydrocarbon's reference concentration (RfC).[15] In all cases, the modeled exposure concentrations were significantly lower than the RfC, leading EPA to conclude that isobutane, propane, and R–441A are unlikely to pose a toxicity risk to the general population. These toxicity risks are lower than or comparable to those posed by the other acceptable substitutes in these end-uses.

V. What is EPA's response to comments on the May 2010 notice of proposed rulemaking?

In this section, EPA responds to comments on the May 10, 2010, notice of proposed rulemaking (NPRM).

A. EPA's Acceptability Determination

Comment: Ninety-nine commenters expressed unconditional support for EPA's proposal to find isobutane and R–441A acceptable (subject to use conditions) in the household refrigeration end-use and to find propane acceptable (subject to use conditions) in the retail food refrigeration end-use.

[14] Time-weighted average (TWA) = The average concentration of a specific substance in air over a specified time period—*e.g.,* during the course of an 8-hour work day.

[15] The RfC is a concentration designed to protect the general population against adverse systemic (*i.e.,* non-cancer) health effects.

Response: We appreciate the support for our proposed action, and we are taking final action consistent with that proposal.

Comment: One commenter observed that although hydrocarbon refrigerants provide some environmental benefit by reducing GHG emissions, they pose flammability risks that more than offset that benefit. The commenter stated that the global warming impacts of HFC refrigerants are currently small due to their low emissions (except in the case of catastrophic leaks), and practices are in place to recover refrigerant and destroy foam at an appliance's end-of-life. The commenter also observed that hydrocarbon refrigerants could enter the refrigerant recovery/recycle chain during servicing or at the end-of-life, necessitating costly upgrades to recycle/recovery equipment in order to mitigate potential flammability risks.

Response: EPA reviews substitutes according to regulatory criteria provided at 40 CFR 82.180(a)(7) and described above. EPA has evaluated the hydrocarbon refrigerants against these criteria and has concluded that they present overall environmental and human health risks that are lower than or comparable to other acceptable substitutes in the household refrigeration and retail food refrigeration end-uses. EPA agrees that flammability risks could be a concern for these refrigerants in these end-uses. But, for the two end-uses at issue in this rule, where charges are limited and there is a long history of safe use globally, EPA believes risks can be mitigated to ensure the substitutes can be used as safely as other available substitutes. We are establishing use conditions to ensure that these substitutes pose an overall risk to human health and the environment that is lower than or comparable to the overall risk posed by other substitutes in the same end-uses.

With respect to the comment regarding risks during servicing and at end-of-life, EPA agrees that flammability could pose a concern for the servicing and disposal of appliances containing hydrocarbon refrigerants. However, the use conditions in this final rule address this potential risk. For example, the labeling requirements and the requirement for coloring of tubing will serve as notification to servicing or disposal personnel that an appliance contains a flammable refrigerant.

Section V.L (below) also discusses recovery equipment. Based on comments received, EPA believes that recovery equipment designed specifically for flammable refrigerants is not yet widely manufactured or available in the U.S., although certain commenters observed that they have created their own equipment to meet this need in their own business practices.

Comment: Another commenter provided detailed comments on EPA's risk screen for the use of isobutane in the household refrigeration end-use and limited comments on EPA's risk screen for the use of propane in the retail food refrigeration end-use. The commenter stated that EPA has underestimated the safety risks associated with the use of hydrocarbon refrigerants. The comments covered the following:

1. A fault-tree analysis calculating the probability of failures that would lead to ignition of the refrigerant;
2. The results of an external leak test in a mockup kitchen to illustrate the consequences of an external leak;
3. The results of an internal leak test and a deflagration/explosion test to illustrate the consequences of an internal leak;
4. An observation about a manufacturer's major recall of certain models of isobutane refrigerators in 2009 as a result of safety incidents in Asia and Europe; and
5. A statement of similar concerns about the use of propane in small commercial refrigeration systems.

This section of the preamble summarizes these comments and EPA's response.

Comment 1: Fault tree analysis.

Comment: The commenter included a fault-tree analysis (FTA) that assessed the probability of household refrigerator ignition events due to the random coincidence of ignition sources and internal refrigerant leaks. An FTA considers how likely different events are and how resistant a system is to various faults. The commenter's FTA analyzed several potential scenarios in which ignition events could take place in household refrigerators. The commenter's FTA calculated that isobutane household refrigerators in the U.S. would experience: (a) 2.9 ignition events per year at full market penetration as a result of independent, random events, and (b) an additional 2.5 ignition events for every 10 million refrigerators that enter the market due to a specific coupled failure in which the malfunction of the defrost heater is both the cause of the leak and the ignition source. The commenter concluded that EPA potentially underestimated the risk of ignition-related failures in residential refrigerators for internal leak events. Details of the two calculations are presented below.

(a) Failure scenarios based on independent, random events. The commenter's FTA identified two events that, occurring simultaneously, could potentially lead to an ignition event: (1) An internal isobutane refrigerant leak and (2) the occurrence of an energy source with sufficient energy to cause ignition. The commenter's FTA identified and calculated probabilities for the different ways in which each of these events could happen.

To calculate the probability of an internal leak event, the commenter made assumptions regarding: The number of refrigerator repairs due to joint leakage and evaporator corrosion that might be related to a leak; the number of refrigerator repairs annually (based on the estimated amount of HFC–134a currently sold for use in servicing); and a multiplier accounting for the number of leaking refrigerators that would be thrown away instead of repaired. Based on these assumptions, the commenter estimated that isobutane refrigerators would experience approximately 260,000 internal leak failures per year in the U.S. at full market penetration (which the commenter estimated at approximately 150 million refrigerators).

To calculate the probability of an energy source with sufficient energy to cause ignition, the commenter's FTA estimated the probability of sparks from internal switches and controls, the defrost heater, and static electricity, asserting that any of these sparks would have sufficient energy to ignite a leak. The commenter's FTA calculated the likelihood of an ignition source as 11.2 in 1,000,000.

The commenter's FTA integrated the above assumptions and estimates to calculate an expected 2.9 ignition events per year at U.S. full market penetration.

(b) ''Coupled leak failure'' scenario. The commenter asserted that in addition to the random, independent events assessed above, the defrost heater presents a risk of a coupled failure because an electric short to the evaporator coil can be the cause of both the refrigerant leak and the ignition event. The commenter took three factors into account to determine the total number of ignition events from this coupled failure: (1) The probability that the defrost heater will short-circuit, (2) the probability that an arc from the defrost heater will cause a refrigerant leak, and (3) the probability that the refrigerant will be present in sufficient quantities to ignite (*i.e.,* whether the concentration will be at the LFL or higher). The commenter estimated that for every 10 million household refrigerators using isobutane that are produced, there would be an estimated 2.5 failure events in which an electrical short to the evaporator coil causes both

a refrigerant leak and an ignition over the lifetime of those units. The commenter clarified that this value is in addition to the ignition events calculated in the previous FTA, which would result from the coincidence of independent, random events.

Response: While EPA believes that the commenter has overestimated failure probabilities, we agree with the commenter that the risks associated with the use of isobutane in household refrigerators are greater than zero. EPA believes, however, that these risks are sufficiently small and should not preclude a determination that isobutane is acceptable for use subject to use conditions that are for the purpose of mitigating the potential risks.

EPA's interpretation of the risk of ignition-related failures in residential refrigerators for internal leak events is based on information presented in ''Risk Assessment of Flammable Refrigerants for Use in Home Appliances'' (A.D. Little, 1991). The A.D. Little report, available in the docket for this rulemaking, included an FTA in which leak rate calculations were based on historical leak rate data provided by three refrigerator manufacturers. As explained in more detail below, EPA believes that many elements of the commenter's FTA are undocumented, are at odds with the industry data used in the A.D. Little report, and present internal analytical inconsistencies.

(a) Failure scenarios based on independent, random events. Regarding the failure scenarios based on independent, random events, we note that the commenter's discussion of methodology, the equation used for the calculation, and the calculations in the commenter's FTA were inconsistent with each other, making it difficult to evaluate what had been done. Based on the commenter's discussion of methodology, EPA believes that the commenter's FTA applied assumptions that are either undocumented or unsupported by industry data. One such assumption is particularly problematic: The commenter's analysis appears to have considered all leaks as potential risks for ignition. However, in order for a leak to pose a potential risk for ignition, the refrigerant must be present in amounts that meet or exceed the LFL. The ability of a refrigerant to accumulate and reach its LFL is a function of both the rate at which the leak occurs and the presence of enclosed spaces that can trap the refrigerant and allow it to build up. Neither of these conditions was accounted for in the commenter's probability calculations.

As previously mentioned, the A.D. Little report calculated leak rates from historical leak rate data provided by three refrigerator manufacturers. A.D. Little distinguished ''catastrophic'' leaks (the loss of a significant portion of refrigerant charge over a few minutes) from ''slow'' leaks, observing that only catastrophic or ''fast'' leaks would allow refrigerant to accumulate to a level of concern. The report goes on to calculate the ''average'' risk that a leak is a fast leak as 0.1 percent and the ''worst-case'' risk that a leak is a fast leak as 1 percent. EPA believes that the commenter's failure to distinguish ''slow'' from ''fast'' leaks causes the commenter's analysis to overestimate the risk of an ignitable leak by at least two orders of magnitude.

Furthermore, today's rule finalizes use conditions that guard against the potential that refrigerant from a ''fast'' leak will be able to accumulate in amounts that reach the LFL, or that an ignition source would cause an ignition event in the case of a significant leak. The use conditions require any household refrigerator using isobutane to be designed specifically for use with flammable refrigerant in a manner that complies with the UL 250 Standard. UL 250, Supplement SA, ''Requirements for Refrigerators and Freezers Employing a Flammable Refrigerant in the Refrigerating System,'' is intended to protect against an ignition incident in the event of a refrigerant leak. Units that are in compliance with UL 250 (particularly Supplement SA) have passed appropriate ignition or leakage tests as stipulated in the standard. Passing the leakage test (at SA 5.1.2.7 and SA 5.1.3.6) ensures that refrigerant concentrations in the event of a leak do not reach or exceed 75 percent of the LFL inside any internal or external electrical component compartments.

(b) ''Coupled leak failure'' scenario. EPA's concerns about the independent variables underlying the coupled leak failure scenario are the same as those articulated above for randomized events. The commenter did not provide clear documentation or a rationale for how estimates were derived.

EPA believes that the commenter overestimated the probability that a defrost heater would cause a leak and cause ignition because the calculation neglected to account for an important factor: the probability of a defrost cycle coinciding with the time period during which concentrations in the compartment reach the LFL. Even if a refrigerant is present in sufficient quantity (*i.e.,* at LFL), it will not ignite if there is no ignition source. For example, if the door to a compartment that contains refrigerant at LFL is opened before a new defrost cycle begins and the refrigerant dissipates to concentrations below the LFL, then no ignition event will take place, when the next defrost heater cycle begins and an arc occurs. The commenter claimed that the defrost cycle is only active 2 percent of the time (for three 10-minute periods per day). Had the commenter incorporated this factor into the calculations, the number of coupled leak failures would be approximately 50 times lower, dropping from 2.5 per 10 million units to about 0.05 per 10 million units. Since this is the probability of a coupled leak failure over the lifetime of a unit, and the average lifetime of a unit is estimated to be a minimum of 10 years, this would correspond to at most 0.08 ignition events per year at full market penetration (approximately 150 million refrigerators, according to the commenter) due to a coupled leak failure. We consider this a reasonable risk level. Moreover, use conditions in this final rule should further decrease the likelihood of such an event occurring, and that these risks are sufficiently small and should not preclude a determination that isobutane is acceptable for use, subject to use conditions that are for the purpose of mitigating potential risks.

Comment 2: External leak test.

The commenter presented results from an experiment that mimicked a leak from an isobutane refrigerator using a bottom-freezer refrigerator located inside a controlled ambient chamber and performed test measurements of isobutane levels in a mockup kitchen. The commenter stated that the experiment followed the leak procedure in the UL 250 standard, including the following setup:

- A kitchen intended to closely resemble a typical U.S. kitchen;
- A bottom-freezer refrigerator located inside a control ambient chamber;
- A 57-gram charge of isobutane; and
- Eight calibrated Henze-Hauck concentration sensors near potential ignition sources.

After running the test, the commenter stated that five sensors showed isobutane concentrations exceeding the LFL for several minutes. The commenter used these results as the basis of an assertion that EPA underestimated the risks from external leaks.

Response: To assess the commenter's experiment fully, EPA would require values for the commenter's test parameters and supporting documentation. Based on the information provided, however, we have the following responses.

We note that the commenter's experiment was meant to simulate a worst-case scenario leak. Based on industry data in the A.D. Little report, the annual probability of a catastrophic leak outside a given refrigerator is typically 3.6×10^{-7}, with a worst-case probability of 9.0×10^{-6}.

The commenter did not provide the make and model of the refrigerator used, and did not describe whether it was designed specifically to use isobutane as a refrigerant. Since EPA is requiring any isobutane refrigerator to be designed specifically for use with flammable refrigerant and to comply with Supplement SA of UL 250 for use with flammable refrigerants, results from a test for a refrigerator not designed to meet the requirements of Supplement SA would not reflect the risks associated with an isobutane refrigerator that is compliant with the use conditions in this final rule. Even if the refrigerator were specifically designed for use with an isobutane refrigerant and fully compliant with all portions of the UL 250 Standard, EPA believes that the leaked refrigerant at the locations of the five sensors showing isobutane concentrations at or exceeding the LFL is not likely to ignite for the reasons discussed below.

The commenter's experiment leaked an unrealistically large amount of refrigerant, causing slightly higher measurements for isobutane concentrations than could be expected in the actual event of a leak. As described in Section V.D of this preamble (Charge Size Limitation—Household Refrigeration), the proposed and final rules limit the charge size for each sealed refrigerant system to 57 grams, with a use condition for compliance with the UL 250 Standard Supplement SA, which calls for a charge size that will not leak more than 50 grams of hydrocarbon refrigerant with properties similar to isobutane. Thus, a leak of 57 grams, such as the one described in the commenter's experiment, is not consistent with a possible leak from an isobutane refrigerator that is compliant with the use conditions in this final rule.

The first of the five sensors that showed isobutane concentrations above the LFL registered a maximum level of 1.9% for approximately 0.6 minutes (36 seconds). This was just barely above the LFL of 1.8% and had a duration of less than a minute. The sensor would have measured a concentration at or above the LFL for less than 0.6 minutes, if at all, if the test had leaked a realistic amount of refrigerant based on the use conditions in the proposed and final rules.

The concentrations measured at the four other sensors likely still would have been higher than the LFL, even if a realistic amount of refrigerant had been leaked. However, EPA does not believe that there are likely ignition sources present at those locations, which are near the compressor relay, on the floor behind the refrigerator, on the floor just in front of the refrigerator, and on the floor 2.5 meters in front of the refrigerator. If the refrigerator were designed in accordance with the UL 250 Standard as required by this rule, then there would be no ignition sources in either of the first two locations, or the refrigerator would be designed in such a way that the LFL would not be reached near an ignition source in those locations.[16] As for the last two sensors, EPA disagrees with the commenter's assertion that these locations are a likely source of sparks. While not impossible, we believe it is highly unlikely that a major external leak would occur and at the same time, someone would light a match or cigarette in their kitchen and then drop it on the floor. We note that the LFL was not reached at the sensor located near a more likely spark source—30 inches above the floor at an electrical outlet.

In response to the commenter's general observation that EPA's risk screen may underestimate risks, EPA revisited the assumptions made in the end-use modeling for both isobutane and R–441A in the household refrigeration end-use to identify opportunities for a more conservative analysis. The results of this analysis are provided in a memo, ''Additional end-use modeling for household refrigerators and freezers'' (ICF, 2011d), which is provided in the docket for this rulemaking. This exercise identified two parameters for which assumptions could be more conservative:

- Leak amounts were increased to 57 grams (representing the entire allowable charge size) rather than 50 grams (for isobutane) and 40 grams (for R–441A), which were the intended charge sizes submitted by the applicants. While a leak amount of 57 grams is greater than that allowed by the UL 250 Standard, this additional analysis conservatively accounts for the possibility of incorrect manufacturer testing of the product. (We note that a refrigerator that leaks more than 50 grams of isobutane or R–441A refrigerant would not be in compliance with UL 250, and therefore would be in violation of the use conditions of this rule.)
- Stratification was more conservatively modeled through the assumption that 95 percent of the leaked refrigerant mixes evenly into the bottom 0.2 meters (9 inches) of the room, rather than the bottom 0.4 meters as assumed in the risk screen.

Using these more conservative assumptions, EPA performed additional flammability and threshold analysis. EPA found that even with a higher leak amount and a greater degree of stratification, the LFL was not reached in the model for either refrigerant. Furthermore, it would take a 75-gram leak in an 18 m^3 kitchen or a 57-gram leak in a 13.8 m^3 kitchen to meet or exceed the LFL in the lower portion of the room for isobutane. Likewise, it would take a 59-gram leak in an 18 m^3 kitchen or a 57-gram leak in a 17.3 m^3 kitchen to meet or exceed the LFL in the lower compartment of the room for R–441A. It should be noted that a survey of kitchen sizes found the smallest kitchen volume to be 31 m^3, with 99 percent of kitchens having a volume of at least 53 m^3 (Murray, 1997 as cited in ICF, 2009a; ICF, 2009d; ICF, 2011a; and ICF, 2011c). Thus the results of this more conservative and protective modeling do not indicate a significant cause for concern that would cause us to change our determination that isobutane and R–441A are acceptable subject to use conditions for use in the household refrigeration end-use.

Depending on the mixing conditions, it is still possible that in certain locations at floor level, or in restricted areas such as the space between a refrigerator and a wall, the concentrations of isobutane or R–441A could reach their LFLs for a few minutes, posing a threat in the presence of a spark. However, in the worst case, the annual probability of a ''fast'' external leak occurring and an ignition source being present simultaneously is approximately 5.0×10^{-7}, or 0.5 in a million) (A.D. Little, 1991).

Comment 3: Internal leak test and explosion/deflagration experiment.

The commenter provided a cursory description of an internal leak test that measured isobutane concentrations inside the freezer compartment. The commenter concluded that refrigerant concentrations inside the freezer compartment reached 3.2 percent, which exceeds the LFL of 1.8 percent.

[16] Under SA5.1 of the Standard, a leakage test is required to ensure that refrigerant concentrations measured near any internal or external electrical component cannot exceed 75% of the LFL at any point in time and, furthermore, cannot exceed 50% of the LFL for more than 5 minutes at a time. (SA5.1.2.7, SA5.1.3.6). For any locations in which the LFL exceeds these amounts, the product would need to pass an ignition test (SA5.2) and a temperature test (SA 5.3) to ensure that electrical and heating components will not ignite the specific flammable refrigerant under consideration in order to comply with UL 250.

The commenter also described the results of a test to reproduce the deflagration/explosion when an internal leak is ignited. The commenter stated that it performed a leakage test according to UL 250 on a U.S. market refrigerator with original components, including the defrost heater, in outdoor ambient conditions. The test leaked 57 grams of refrigerant and used an unidentified sparking source to simulate a faulty defrost heater connection in the freezer compartment. The result was a violent explosion that sent heavy objects, such as the freezer door, flying up to 48 feet high. The commenter argued that this demonstrates that 57 grams of isobutane would produce enough energy to result in structural damage.

Response: As was the case for the external leak test, the commenter provided neither the make and model of the refrigerator used, nor a statement regarding whether the refrigerator was designed specifically to use isobutane. Since EPA is requiring all isobutane refrigerators to be designed specifically for use with flammable refrigerant and to comply with Supplement SA of UL 250 for use of flammable refrigerants, results from a test for a non-compliant refrigerator would not reflect the risks associated with an isobutane refrigerator that is in compliance with the use conditions in this rule. As previously noted, Supplement SA is intended to protect against an ignition incident in the event of a refrigerant leak. Units that are in compliance with Supplement SA of UL 250 have passed appropriate ignition or leakage tests as stipulated in the standard. Passing the leakage test (at SA 5.1.2.7 and SA 5.1.3.6) ensures that refrigerant concentrations in the event of a leak do not reach 75 percent of the LFL inside food compartments.

EPA also notes that the commenter's experiment was meant to simulate a worst-case scenario leak. Based on industry data in the A.D. Little report, the annual probability of a fire or explosion inside a given refrigerator is $2.7 - 10^{-13}$ on average, with a worst-case probability of $7.0 - 10^{-12}$. This latter value corresponds to roughly 0.001 ignition events per year (or 1 ignition event every 1,000 years) at full market penetration (approximately 150 million refrigerators, according to the commenter) under a worst-case scenario. We consider this a reasonable risk level. Again, we note that the use conditions in this final rule should further decrease the likelihood of such an event occurring, and that these risks are small enough not to preclude a determination that isobutane is acceptable for use subject to the use conditions required by this final rule.

Comment 4: Recall of isobutane refrigerators.

The commenter described a major recall of certain models of isobutane refrigerators. In 2009 a major consumer refrigerator manufacturer announced a recall of isobutane refrigerators as a result of safety incidents that occurred in Asia and Europe. These incidents occurred despite the fact that these units were specifically designed to operate with isobutane, and were designed to eliminate potential ignition sources. The electrical insulation in the defrost mechanism in these units carbonized, leading to partial short-circuiting and sparking. The sparking corroded the adjacent tubing, which resulted in a leak of hydrocarbon refrigerant. Isobutane concentrations accumulated enough to exceed the LFL in the closed refrigerator unit. During the next defrost cycle, the faulty electrical circuit resulted in ignition of the refrigerant and an explosion.

Response: The recall discussed in this comment occurred in October 2009 and involved approximately 400,000 refrigerators in South Korea and Europe that were manufactured between March 2005 and June 2006. According to the manufacturer, the recall was triggered by an October 29, 2009, explosion of an isobutane refrigerator in Gyeonggi, South Korea. Press accounts also discuss a small number of related incidents in the United Kingdom and Germany between 2006 and 2009. Addressing the problem under the recall involved home visits to install a safety device to prevent the defrost heater from overheating.

EPA notes that this final rule requires all isobutane refrigerators to comply with the provisions of Supplement SA to UL 250. These provisions include leakage, ignition, and temperature tests, as well as an accelerated aging test of heater terminal seals and an insulation resistance test of all defrost heaters. These tests are not included in the standards established by the International Electrotechnical Commission (IEC) that would have been applicable to the appliances under recall.

EPA also notes that more than 400 million hydrocarbon refrigerator units are in use worldwide; in China alone, 75 percent of new domestic refrigerators/freezers use isobutane. Refrigerator ignition incidents resulting from leaked isobutane appear to be rare considering the widespread use of hydrocarbon refrigerators worldwide.

Comment 5: Use of propane in small commercial refrigeration systems.

The commenter includes a brief observation that the use of propane in small commercial refrigeration systems poses risks similar to use of isobutane in residential refrigerators. The commenter also argues that larger hydrocarbon charges pose a higher risk of ignition events, and that small commercial refrigeration systems are known to have much higher leakage frequencies and failure rates than residential systems.

Response: As discussed above, EPA performed a risk screen on the use of propane in small commercial refrigeration systems (ICF, 2009b, revised as ICF, 2011b), which is available in the docket for this rulemaking. The risk screen indicates that propane's LFL is not reached in the retail food refrigeration end-use where the charge size does not exceed that established by the use conditions. As described in the risk screen, under a worst-case (catastrophic) release scenario the maximum instantaneous concentration of propane in the lowest stratum of the room would be approximately 66 percent of the LFL and the concentration in the upper part of the room would be lower. Further, the SNAP application for this end-use pointed out that no catastrophic (''fast'') leaks had been reported from among the 270,000 hydrocarbon refrigerators in operation belonging to the submitter.

The commenter did not provide information to refute EPA's risk screen for retail food refrigeration. EPA's flammability assessment indicates that the risk of explosion is extremely small in this end-use.

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

EPA received ten comments on its proposed requirement that hydrocarbon refrigerants ''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).'' Nine of the commenters supported restricting the use of hydrocarbon refrigerants to new equipment only.

Comment: One commenter requested that retrofitting old household refrigerators and freezers and retail food refrigerators (stand-alone equipment only) be allowed. The commenter suggested that safety concerns could be alleviated by allowing retrofitting only by personnel who are trained to handle flammable refrigerants.

Response: Under the SNAP program, an application for SNAP approval specifies whether the proposed refrigerant use is for new equipment,

retrofitted equipment, or both. None of the submissions applied for use in retrofitted equipment. The Agency did not conduct a risk analysis for use of the substitutes in retrofitted equipment, nor did any of the comments provide such an analysis. Therefore, EPA is not addressing such use at this time.

EPA would consider whether to find hydrocarbon refrigerants acceptable for use in retrofitted equipment in the future if sufficient evidence, including a risk assessment, is provided and shows that such use will present risks to human health and the environment that are lower than or comparable to risks from other available substitutes.

C. Compliance With UL Standards

EPA received ten sets of comments on its proposed requirement that the hydrocarbon refrigerants be used only in refrigerators or freezers that meet all requirements listed in the Underwriters Laboratories (UL) Standard for Household Refrigerators and Freezers, UL 250 (for the household refrigeration end-use) [17] and the UL Standard for Commercial Refrigerators and Freezers, UL 471 (for the retail food refrigeration end-use).[18] Most commenters supported adherence to applicable UL standards, although some offered the following additional comments.

Comment: One commenter recommended that a final rule be contingent upon the existence and acceptance of a comprehensive industry-wide safety standard. The commenter also suggested that EPA could add other standards to the list of references addressing the safety of hydrocarbon refrigerants. The commenter referred to ANSI Standard Z21.24,[19] ASHRAE Standard 15,[20] UL Standard 21,[21] EN 378,[22] ISO–5149,[23] the IOR Safety Code of Practice for Refrigerating Systems Utilising A2 & A3 Refrigerants,[24] and AS/NZS 1677.[25]

Response: It is unclear what was intended by either comment. Regarding the first comment, EPA notes that the UL standards are in fact industry-wide safety standards. UL has tested equipment for flammability risk in both household and retail food refrigeration. UL also has developed acceptable safety standards including requirements for construction, for marking, and for leakage, ignition, and temperature tests, as well as an accelerated aging test of heater terminal seals and an insulation resistance test of all defrost heaters.

With respect to the second comment, it is unclear whether the commenter is suggesting that the other standards be imposed as use conditions, whether they should be included in the ''Further Information'' column of the regulations, or whether they should simply be described in this preamble. The commenter provided no reasoning as to why the listed standards should be included either as use conditions or in the ''Further Information'' column of the regulation, and we are not aware that these standards provide any additional protections that are not provided by this rule. EPA believes that the use conditions established in this final rule will ensure that these substitutes will present risks that are lower than or comparable to the risks from other available alternatives.

D. Charge Size Limitation (Household Refrigeration)

EPA received ten comments on its proposed charge size limitation of 57 grams (2.0 ounces) for the household refrigeration end-use.

Comment: Five commenters recommended a limit of 150 grams (5.3 ounces) to correspond to standards established by the International Electrotechnical Commission (IEC 60335–2–24), including two non-governmental organizations, a manufacturer of refrigerator compressors, and two manufacturers of household refrigerators and freezers. One of these commenters, an environmental organization, observed that over 400 million refrigerators using propane and isobutane refrigerants are in use worldwide and that they generally are certified to the 150-gram international safety standard. The commenter stated that EPA has not provided a justification for a 57-gram charge size limit.

One commenter, a manufacturer of household refrigerators and freezers, stated that the 57-gram charge size limit in some cases would reduce the efficiency of the appliance and raise the indirect GHG emissions associated with the product's energy use. Two commenters, a manufacturer of household refrigerators and freezers and an environmental organization, observed that the UL 250 standard could change in the future and recommended that EPA should modify its charge size limitation to harmonize with UL 250 as it changes over time.

Three of the commenters supported the 57-gram limitation, including a manufacturer of household refrigerators and freezers that submitted to the SNAP program for hydrocarbon refrigerant in this end use; a manufacturer of commercial refrigerators and freezers that submitted to the SNAP program for hydrocarbon refrigerant in both household and commercial refrigerators and freezers; and a manufacturer of commercial refrigerators and freezers.

Response: EPA agrees with the comments supporting the proposed requirement that the charge size not exceed 57 grams for household refrigeration. UL 250 allows a maximum leak amount of 50 grams (1.8 ounces), and the submitter used procedures outlined in the UL 250 leakage test to conclude that up to 7 grams of additional refrigerant charge could be solubilized in the oil (and assumed not to leak or immediately vaporize with the refrigerant in the event of a leak). This information was reflected in EPA's risk screen for isobutane, which modeled a maximum refrigerant release of 50 grams (ICF, 2009a and ICF, 2011a).

It is true that hundreds of millions of refrigerators and freezers using propane and isobutane refrigerants in other countries are certified to the IEC 60335–2–24 standard, which allows for a charge of hydrocarbon refrigerant up to 150 g. However, available evidence suggests that most of these appliances actually have charges that are closer to 57 g than to 150 g. For comparison, a typical U.S. household refrigerator using HFC–134a has a charge of roughly 140 g,[26] and a charge of isobutane providing comparable cooling would be 40 to 50% of the charge of HFC–134a,[27] or 56 to 70 g. It is EPA's understanding that most European household refrigerators are smaller than the typical U.S. household refrigerator and that they use less charge; thus, we would expect that

[17] EPA is referencing Supplement SA (''Requirements for Refrigerators and Freezers Employing a Flammable Refrigerant in the Refrigerating System'') from UL Standard 250, ''Household Refrigerators and Freezers,'' 10th edition.

[18] EPA is referencing the UL Standard 471, 9th edition Supplement SB; ''Requirements for Refrigerators and Freezers.

[19] American National Standards Institute (ANSI) Z21.24: *Connectors for Gas Appliances.*

[20] ASHRAE Standard 15–2010: Safety Standard for Refrigeration Systems.

[21] UL 21: Standard for LP-Gas Hose.

[22] EN 378: *Refrigerating systems and heat pumps—Safety and environmental requirements.* Prepared by European Committee for Standardization/Technical Committee CEN/TC 182 (Refrigerating systems, safety and environmental requirements).

[23] International Organization for Standardization. ISO 5149: Mechanical refrigerating systems used for cooling and heating—Safety requirements.

[24] IOR (Institute of Refrigeration): Safety code of practice for refrigerating systems utilising A2 and A3 refrigerants.

[25] The Joint Australian Standard/New Zealand Standard (AS/NZS) 1677: Addresses safety, design, construction, installation, testing, inspection, operation and maintenance of refrigeration systems.

[26] A. D. Little, 2002.

[27] ACRIB, 2001.

European household refrigerators have charge sizes less than 70 g. The commenter's own Web site states, ''[T]oday's hydrocarbon refrigerators, with hermetically sealed compressor systems, use between 30 to 70 grams of refrigerant, depending on the size of the refrigerator.'' [28] Thus, the safety record of hydrocarbon refrigerators and freezers in Europe appears to reflect experience primarily with charge sizes much smaller than 150 g.

While EPA could assess various charge sizes on a theoretical basis, we do not have the resources to perform product testing and we rely primarily on industry, national safety standard organizations, and non-governmental organizations to conduct tests on appliances. UL has tested household refrigerators, freezers, and combination refrigerators and freezers for safety, especially with respect to flammability concerns, and the U.S. insurance industry and commercial sector rely on the results of those tests. Testing by manufacturers and UL addresses flammability in the manufacturing process as well as how the product functions with different charge sizes. UL developed the 50-gram allowable leak limit as the result of testing during development of the UL 250 standard for household refrigerators and freezers. The 50-gram allowable leak limit for household refrigerators in UL 250 differs from the 150-gram allowable leak limit for commercial refrigerators and freezers in UL 471 due to factors such as the difference in the room sizes modeled for household versus retail appliances. Therefore, building on the UL allowance of a 50-gram allowable leak limit and the tests performed by the submitter, we concluded that the maximum charge size should be 57 grams for the household refrigeration end-use.

EPA did not receive specific information concerning the potential energy efficiency effects of limiting the charge size to 57 g or less. Thus, we are not able to judge the technical merits of the commenter's statement.

EPA does not have sufficient information supported by safety testing data at this time from other commenters, industry, U.S. national safety organizations, or non-governmental organizations to support a charge size limit different from one based on UL 250, such as the 150-gram limit in IEC 60335–2–24. EPA understands that the limit in UL 250 may change in the future. If that occurs, and if the appropriate safety testing data is submitted to EPA supporting safe use of a larger charge, we would consider modifying the use conditions at a future date.

We acknowledge that a larger charge size may improve the energy efficiency of an appliance and simplify its construction. However, based on the analyses available at this time, we do not have sufficient information to demonstrate that a larger charge size would not create an unacceptable level of risk as compared to other available substitutes in the household refrigeration end-use. As noted above, EPA could modify the use conditions in the future if sufficient data were submitted to support safe use of a larger charge size.

Comment: One commenter requested a more precise definition of ''charge,'' recognizing that the exact value of the charge depends on the accuracy of the charging equipment.

Response: EPA regulations do not provide an accuracy specification or interpretation for ''charge'' or ''charge size.'' EPA believes that such a regulatory definition is not necessary for purposes of this use condition. EPA believes that the wording in the use condition (''the quantity of the substitute refrigerant'') provides sufficient guidance and that manufacturers and service technicians have the proper instrumentation and training to judge the quantity of refrigerant being charged to an appliance.

Comment: One commenter encouraged EPA to clarify or provide a test procedure for how manufacturers should measure the potential solubility of isobutane in the oil.

Response: Providing such a test procedure is beyond the scope of this final rule. The use conditions reflect the assumption that 7 grams of a 57-gram charge could be solubilized in the refrigerant oil while still allowing compliance with UL 250. The SNAP submittal for isobutane in the household refrigeration end-use contains information on the solubility of isobutane with refrigerant oils (GE, 2008). We typically defer to the technical standard-setting agency on this type of issue unless there is convincing evidence disputing such a calculation. Moreover, we note that manufacturers that choose to use isobutane are not obligated to measure its potential solubility in oil for purposes of complying with the use conditions, since any charge below 50 grams would be in compliance with UL 250 and the charge size limitations of this rule. Thus we see no reason to establish a test procedure for performing such an analysis.

Comment: Two commenters observed that an appliance in the household refrigeration end-use might incorporate more than one sealed system and requested that the charge size limitation apply to each sealed system in an appliance, not to the entire appliance.

Response: EPA agrees and is clarifying that the 57-gram charge size limit applies to each sealed system.[29] A household refrigeration appliance may incorporate multiple sealed systems. Having multiple sealed systems is less of a concern than having a single system with the same combined charge since the probability of two sealed systems leaking simultaneously is very low. In addition, hermetically sealed systems are less likely to leak, presenting a lower probability of fire or explosion. Hermetically sealed systems provide an increased level of safety in normal use.

E. Charge Size Limitation (Retail Food Refrigeration)

EPA received seven sets of comments on its proposed charge size limitation of 150 grams (5.3 ounces) for the retail food refrigeration end-use. Six commenters supported the 150-gram limitation, although some offered additional comments.

Comment: One commenter recommended increasing the limit to 170 grams for three reasons: first, that EPA's 150-gram limit was calculated based on a small European-sized kitchen and reflected a 20-percent reduction from the LFL; second, that the proposed limit was based on domestic refrigerator standards and misapplied to commercial applications; and third, that the UL standard reflects 150 grams of leakage and 20 grams that remains in the oil and does not leak.

Response: EPA is finalizing the 150-gram charge size limit as proposed for this end-use. This limit is more conservative than the UL 471 standard, which reflects a leak amount of 150 grams (*i.e.,* not counting refrigerant

[28] Greenpeace, 1997.

[29] A ''sealed system'' is an independently operated refrigeration system, including a compressor, evaporator, condenser, metering device, and refrigerant not shared for other purposes. For example, a refrigerator-freezer might employ one sealed system to chill food in the refrigerator section and a second sealed system to keep food frozen in the freezer compartment. ''Appliance'' is defined at 40 CFR 82.152 as ''any device which contains and uses a refrigerant and which is used for household or commercial purposes, including any air conditioner, refrigerator, chiller, or freezer.'' Thus a refrigerator, freezer, or combination refrigerator and freezer, for example, may consist of two appliances provided that the refrigerant in the first appliance (*i.e.,* the first compressor, condenser, evaporator, and metering device) does not mix with the refrigerant in the second appliance (*e.g.,* the second compressor, condenser, evaporator, and metering device).

solubilized in oil). Unlike the charge limit for the household refrigeration end-use, the charge limit for the retail food refrigeration end-use does not reflect an additional amount of refrigerant assumed to be solubilized in the oil because SNAP submitters did not include test data to support this information for propane. UL 471 limits the amount of refrigerant leaked to 150 grams, based on testing performed during the development of the UL 471 standard. The commenter provided no test data showing that 20 grams (or some alternative amount) would be captured in the oil if the UL 471 standard were applied. Nor was there evidence that the leak assumptions for the household refrigeration end-use (7 of 57 grams solubilized) might apply proportionately to other equipment or other refrigerants. Therefore, because EPA does not have a sufficient analytic basis to derive a 170-gram charge size limit, EPA has no basis to support a change to the 150-gram charge size limit we proposed for this end-use.

Comment: Two commenters also observed that the IEC standards may be revised upward in the future, and that EPA's limit should reflect such changes.

Response: The IEC charge size limit has not yet increased and EPA cannot anticipate the timing or extent of such an increase. Further, EPA has not received any information showing that a larger charge size would ensure that propane would present risks in this end-use that are lower than or comparable to risks from other potentially available substitutes. If the IEC or UL standards are revised in the future or if other information becomes available that would support a change in charge size, an interested party could petition EPA to revise this aspect of the use condition.

Comment: Another commenter stated that appliances manufactured for export should be allowed to have a larger charge size corresponding to the charge size requirements that apply at the point of installation. The commenter claims that prohibiting a larger charge size for export would be a disadvantage for U.S. companies selling appliances overseas.

Response: Under section 612 of the Clean Air Act, the SNAP program is applicable to any person introducing a substitute into interstate commerce. Interstate commerce is defined in 40 CFR 82.104(n) as:

> 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 the District of Columbia. The entry points for which the 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.

This definition applies to any appliances produced in the U.S., including appliances that will be exported. Therefore EPA cannot support the comment to apply different use conditions based on where an appliance is being exported.

Comment: One commenter observed that because an appliance might have two or more independent refrigeration systems, EPA's charge size limitation should apply to each refrigeration system in an appliance and not to each appliance.

Response: EPA received a similar comment with respect to the household refrigeration end-use, as described in Section V.D above. As was the case for the household refrigeration end-use, EPA agrees that the charge size limitation for the retail food refrigeration end-use should apply to each sealed system in an appliance. EPA is modifying the wording of the use condition to reflect this clarification.

F. Labeling

EPA received 11 sets of comments on its proposal to require that ''Danger'' and ''Caution'' labels be permanently attached at specified locations on household and retail appliances using hydrocarbon refrigerants. The proposed wording was identical to that of UL 250 Supplement SA (household refrigeration) and UL 471 Supplement SB (retail food refrigeration), except that EPA proposed that the lettering be ¼ inch (6.4 mm) rather than the ⅛ inch (3.2 mm) specified in the UL standards. Seven commenters expressed support for the proposed labeling use conditions, including the lettering size.

Comment: Two commenters stated that EPA and UL should require the same print color and size. Another commenter supported the proposal except for the language reflecting clause (a) in UL 471 (retail food refrigeration) for evaporators that can be contacted by a consumer; the comment stated that evaporators are never accessible to a customer in units that are ''cold wall design.'' Finally, one commenter specifically opposed use of the words ''Danger'' and ''Caution.'' The commenter stated that equipment is safe if it meets UL standards, that the words would scare consumers, and that service technicians know what they are dealing with.

Response: EPA is finalizing the labeling use condition as proposed (with the exception of a minor technical correction to the wording of one of the labels, described in Section VI below). EPA believes that notification is necessary to alert technicians and personnel who dispose of or recycle appliances that a refrigerant has the potential to ignite if a sparking source is nearby. This is particularly true during the years these products are first introduced into the market because most technicians in the U.S., as well as those involved in the disposal chain, are not yet familiar with flammable refrigerants.

EPA consults with UL and other national safety standards as often as possible, recognizing that the organizations differ in functions and goals. With the exception of the lettering size, EPA is adopting label wording and requirements that are identical to those in the UL 250 and UL 471 standards. The UL standards include a requirement to label evaporators in the retail end-use, and EPA is mirroring that requirement, noting that even if a customer does not have access to the labeled area, service technicians with such access still need to be made aware that a flammable refrigerant is present.

Regarding the lettering size, EPA continues to believe that it would be difficult to see warning labels with the ⅛-inch lettering stipulated by UL 250 and UL 471. Three commenters specifically endorsed the ¼-inch minimum height proposed, and EPA is finalizing that requirement, making it easier for technicians, consumers, retail store-owners, and emergency first responders to see the warning labels.

G. Color-Coded Hoses and Piping

EPA received 11 sets of comments on its proposed requirement that an appliance containing hydrocarbon refrigerants 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. The color would be required at all service ports and where service puncturing or otherwise creating an opening from the refrigerant circuit to the atmosphere would be expected to occur, and would extend a minimum of 1 inch in both directions from such locations. The proposed rule observed that no industry standard exists for color-coded hoses or pipe for flammable refrigerants, and sought comment on potential development of such a standard.

Three commenters supported the proposed requirement. One of the supporting commenters stated that EPA's use condition would also suffice in lieu of an industry standard. Other commenters opposed various aspects of the color-coding requirement.

Comment: One commenter stated that mandatory color-coding would impose a burdensome additional cost and is not a requirement under international standards. A second commenter stated that color-coding would be superfluous in light of the proposed labeling requirement. A third commenter stated that leak testing requirements obviate the need for color-coding. A fourth commenter identified several concerns: that hose materials could be potentially incompatible with the paint used, that the marking could be obscured by ice or insulation, and that paint on heat exchange surfaces could change the thermal resistance and water retention properties of the heat exchanger, affecting performance.

Other commenters recommended a more precise interpretation of the requirement to ensure that color-coding need only be provided where beneficial and not in locations where system performance could be hindered. One commenter observed that coloring all tubing would be costly and that locations should be selected that do not present problems for sealing of valves or for operational efficiency. Another commenter suggested that since UL 471 already requires labels near the compressor, coloring would only be necessary at discharge and charge locations. The commenter further stated that self-contained units with one compressor only need markings at two locations—at the filling tube and after the filter dryer (in the flow direction)—because such units only use one refrigerant and present no risk of mixing.

Several commenters observed that an equally effective and less costly option for some manufacturers might be to use a colored sleeve or cap that must be forcibly removed in order to access the service tube. If a manufacturer removed the sleeve or cap during service, a similar replacement would be required.

Response: EPA is finalizing a requirement to use red PMS #185 coloring on hoses and tubing. This is the same color specified in AHRI Guideline N–2008, ''Assignment of Refrigerant Container Colors,'' to identify containers of flammable refrigerant, such as propane, isobutane, and R–441A (AHRI, 2008). The purpose of the colored hoses and tubing in this case is to enable service technicians to identify the use of a flammable refrigerant and to take additional precautions (*e.g.,* reducing the use of sparking equipment) as appropriate to avert accidents, and particularly in the event that labels are no longer legible. The air-conditioning and refrigeration industry currently uses distinguishing colors to identify different refrigerants. Likewise, distinguishing coloring is used elsewhere to indicate an unusual and potentially dangerous situation, such as the use of orange-insulated wires in hybrid electric vehicles. In the U.S., household and retail appliances contain various refrigerants and it is not always clear what type of refrigerant an appliance uses.

Since red coloring is understood to represent ''hot,'' ''stop,'' or ''danger,'' red coloring will provide technicians, consumers, and emergency responders with an unambiguous signal that a potential hazard is present. The labeling requirement discussed in Section V.F will complement the color-coding requirement by providing a more precise warning of the potential hazards and necessary precautions. Further, it is possible that labels, particularly those on the outside of the appliance, may fall off or become illegible over time; adding red coloring on tubing inside the appliance provides additional assurance that technicians will be aware that a flammable refrigerant is present.

In response to concerns about the location of the color-coding, EPA is modifying the language for this use condition to reflect its intent more precisely. Instead of requiring PMS #185 coloration at all locations ''through which the refrigerant passes,'' this final rule requires coloration at locations ''through which the refrigerant is serviced,'' as well as areas where service puncturing or otherwise creating an opening from the refrigerant circuit to the atmosphere might be expected. EPA is also clarifying the location and extent of the coloring on the hose or process tube (if one exists).[30] This does not mean that the entire hose or process tube must be colored. Rather, for process tubes the tube must be colored for at least one inch with the red mark to extend from the compressor. This way, if the process tube is cut for service, the red marking still remains after the tube is welded back together. If further servicing would leave the colored portion of the process tube less than 2.5 centimeters (1 inch) long, a new process tube would be required, with the red marking as described above. For other locations—for example, if a service port or refrigerant access valve is added to the system[31]—the red mark must extend at least 1 inch in all directions from the port or valve.

To clarify that the red coloring must always be present (not just applied initially at installation), we are providing more specificity in the language of the use condition than proposed. We are changing ''must be applied'' to ''must be present'' to correct any misperceptions that once the coloring is initially placed (''applied'') at a location, it need not be replaced if damaged or removed. The word ''present'' conveys that the red coloring must always be at the specified location.

EPA does not believe that this requirement will impose a burdensome additional cost. The only commenter to raise this point did not provide any information about what such costs might be and why the commenter thought they would be burdensome. In this preamble we are clarifying one aspect of flexibility that could mitigate potential cost concerns. Specifically, EPA agrees with the commenters' observation that a colored sleeve or cap could be equally effective and may offer a less costly option for some manufacturers. The proposed rule specified the type, location, and dimensions of the coloration but did not specify the physical manner in which the tube should be colored. EPA believes that the use of a sleeve or cap is consistent with this use condition as long as the requirements of the use condition (use of PMS #185, location, and dimension) are met. However, in order to remain in compliance with the use condition, a technician who removes a sleeve during servicing is required to replace that sleeve on the serviced tube with another. Allowing the use of a sleeve instead of paint will also help alleviate the concern expressed by one commenter over the potential incompatibility of red paint with hose materials.

EPA recognizes that labeling is another way to provide warning of the presence of a flammable refrigerant, and—as discussed in Section V.F above—is finalizing a labeling requirement. However, since over time labels can come off or become illegible, labeling should not be the sole means of

[30] A process tube extends from the compressor and is used to add or remove refrigerant. After refrigerant is added or removed, the process tube is usually pinched to stop refrigerant flow and then could be soldered to provide a long-lasting seal. The tube is used as an access point for service technicians and does not serve any refrigerant-flow or heat transfer purposes.

[31] The UL Standards referenced in this rule do not allow the inclusion of service ports in finished products using flammable refrigerants; however, the coloring use condition would still apply if a service port or access valve were added after the product was sold.

alerting users and service technicians of the presence of a flammable refrigerant.

Comment: One commenter supported the proposed color-coding requirement but pointed out that the American Academy of Ophthalmology and the Centers for Disease Control and Prevention report that 8 percent of American males are color-blind, primarily in the colors green and red, making the need for labels even more important.

Response: The Agency recognizes that there is a color-blind population. This is one reason to use both labeling and coloring to signal that a flammable refrigerant is being used.

H. Unique Fittings

EPA received 13 sets of comments on its proposed requirement that appliances using isobutane or R–441A in household refrigeration and propane in retail food refrigeration end-uses have service aperture fittings that differ from fittings used in equipment or containers using non-flammable refrigerant. The proposed rule defined ''differ'' to mean that either the diameter must differ by at least 1/16 inch or the thread direction must be reversed (*i.e.,* right-handed vs. left-handed). The proposed rule specified that these different fittings must be permanently affixed to the unit and may not be accessed with an adaptor until the end-of-life of the unit.

Comments: Twelve commenters opposed the proposed requirement for various combinations of the following reasons: Adding fittings at the time of manufacture is not appropriate for certain appliance types; additional fittings presents an increased leak risk; the requirement could be easily circumvented; the risk of cross-contamination is overstated; international standards do not require unique fittings; and the requirement would be inconsistent with UL standards. One commenter, while neither supporting nor opposing the proposal, stated that if unique fittings are installed they should require the use of special tools to dissuade unauthorized personnel from opening the fittings.

Response: EPA is persuaded by the comments opposing a use condition to require unique fittings. The Agency is removing the requirement for unique fittings from the list of use conditions and is instead providing a recommendation for unique fittings in the ''Further Information'' column of Appendix R. The following paragraphs describe the comments and EPA's response in more detail.

Comments: Most commenters interpreted the language of the proposed requirement to mean that all appliances subject to this rule must be manufactured with unique fittings, even appliances that would not require servicing and thus would otherwise not need fittings. They observed that household and retail appliances, whether they use hydrocarbons or another type of refrigerant, typically are hermetically sealed and are manufactured without maintenance fittings or service valves. They pointed out that any service port with a mechanical connection (such as a lock ring) presents a leak risk and that requiring additional service ports for the purpose of installing unique fittings would add to that risk. One commenter also observed that equipment is highly sensitive to charge size and any leak could cause malfunction or failure. (The commenter stated that in its past experience, three-fourths of service calls were related to service ports.) One commenter observed that the presence of service ports could create incentives for untrained technicians to attempt servicing. Another commenter pointed out that UL 250 and UL 471 prohibit refrigerators or freezers that use a flammable refrigerant from employing quick-connect fittings, flare fittings, compression fittings, or packed stem valves.

Response: EPA agrees with statements that a service valve installed at the point of manufacture could increase the likelihood of leaks for these types of appliances. We recognize from the comments that the proposed requirement was worded in an overly broad manner. We intended the requirement to apply only in cases where a service port or other connection is installed subsequent to manufacture. EPA is aware that the UL 250 and UL 471 standards forbid such ports at the time of manufacture on units using flammable refrigerants. EPA recognizes that service ports (whether with standard or unique fittings) are not normally used in household refrigerators or stand-alone retail food refrigerators and freezers.

However, CAA 608(b)(2) requires all small appliances containing ODS refrigerants to be equipped with service ports that allow for the proper recovery of refrigerant during service or disposal of refrigerators and freezers because service ports act as an access point for recovery equipment. Under 40 CFR 82.154(a)(1), no refrigerant or substitute may be knowingly vented unless otherwise exempted. For this reason most hermetically sealed appliances are equipped with process tubes that are used only for end-of-life recovery and which typically do not leak.

EPA does believe, however, that some hermetically sealed systems eventually will be serviced and does not assume that such systems are always completely leak-proof. Therefore EPA continues to believe that if a service port or access valve is installed after manufacture, it should employ a unique fitting that is maintained until the end-of-life of the appliance.

One commenter specifically supported a requirement for unique fittings after the equipment is serviced and for the remainder of its life. EPA believes that such fittings, if installed, should be designed specifically for flammable refrigerants, such that those fittings would not connect to service equipment designed for non-flammable refrigerants.

Comment: Several commenters observed that cross-contamination was not a significant risk. Two commenters stated that requiring unique fittings would not necessarily protect against cross-contamination. One commenter stated that mixing of hydrocarbons and other refrigerants would not pose a safety concern unless air or oxygen were present. Another commenter asserted that since self-contained refrigerant systems use only one refrigerant, there is no possibility that an appliance would be refilled with an incorrect refrigerant. That commenter also stated that proper refrigerant practices are in place that require separate recovery cylinders for different refrigerants, that technicians need only use one more type of cylinder, and that economic incentives can foster proper recovery practices.

Response: Overall, EPA disagrees with the comment that cross-contamination is unlikely. Depending on the type of equipment being serviced, and its typical servicing patterns, it is quite possible that refrigerants could be mixed, particularly where best practices are not employed. Currently, many different refrigerants are used in refrigerators and freezers. Technicians are likely to encounter numerous refrigerants—now including hydrocarbons—raising the possibility that flammable refrigerants could be mixed with non-flammable refrigerants or that flammable refrigerants could be added to an appliance designed for non-flammable refrigerants. Not only does the mixing of refrigerants pose a risk for the cooling system of the appliance, it also can limit reclamation options. Whereas—as observed by two commenters—pure refrigerants have market value, contaminated refrigerants are costly to re-purify into their individual refrigerant components, and costly to discard properly, raising the

risk of illegal venting. Nevertheless, EPA agrees with the commenters that cross-contamination itself does not pose safety issues sufficient to warrant a mandatory requirement for unique fittings.

Comment: Several commenters observed that technicians could defeat the intent of the requirement by using other kinds of fittings after first service. One commenter stated that service technicians have the tools to bypass unique fittings and would do so rather than purchase additional gauges and line sets to service the small number of hydrocarbon refrigerators. Another stated that most small appliances do not have fittings (unique or otherwise) and that technicians and the public could use line-piercing fittings if needed.

Response: EPA understands that a requirement for unique fittings would not prevent illegal or improper efforts to service appliances if a technician were determined to do so. The ''Further Information'' section in the regulation recommends that only technicians specifically trained in handling flammable refrigerants service refrigerators and freezers containing these refrigerants, and that technicians gain an understanding of minimizing the risk of fire and the steps to use flammable refrigerants safely. We note that, in addition to preventing the mixing of refrigerants, the proposed use condition was intended to reduce the risk of fire by ensuring that flammable refrigerants are used only in appliances designed for flammable refrigerants. The proposed use condition was intended to prevent a technician from inadvertently attempting to service a refrigerator as if it contained non-flammable refrigerant when it actually contained highly flammable hydrocarbon refrigerant, or vice versa.

Comment: Four commenters stated that education is the best tool to prevent refrigerant contamination. One suggested creating a nationwide training program; the other, which specializes in training, observed that training had proven to be an effective option in lieu of a previous proposal to require unique fittings for high-pressure HFC refrigerants.

Response: EPA supports the concept of a national training program for flammable refrigerants and welcomes industry efforts to educate technicians on proper refrigerant use and proper service and disposal practices.

I. Small Containers

EPA received nine comments on the proposed use condition to limit the sale of the hydrocarbon refrigerants in containers designed to hold less than five pounds (2.3 kg).[32] This requirement was intended to prevent purchase by untrained people who lack the skills or equipment necessary to recover and charge refrigerant properly. Six commenters supported the proposed requirement. Other comments are discussed below.

Comment: Three commenters opposed this requirement, stating that a small-container sales restriction was not the appropriate vehicle to compel proper training. One observed that properly trained technicians know how to handle refrigerants safely; another noted that the proposed rule protections, such as labeling, would help mitigate the potential risk associated with technician error; and the third observed that untrained customers can already buy camping gas, which is a flammable gas like isobutane.

In addition, one of the commenters opposing the requirement stated that it would pose practicality and logistics problems for its service network for household refrigerators. The commenter stated that a five-pound minimum requirement would result in the transport of more combustibles in a service vehicle than needed and that it would be preferable to use ''right-sizing'' canisters containing the exact charge for the particular appliance to ensure efficient and accurate service, to minimize the load a technician needs to carry, and to prevent under- and over-charging.

Response: After considering the comments received, EPA is removing the small-container sales restriction from the use conditions. EPA agrees that requiring the sale of the three hydrocarbon refrigerants in containers of at least five pounds could cause the transport of an unnecessary amount of refrigerant and increase risks to service technicians and—in the event of a vehicular accident—to others on the road. EPA intended the proposed use condition to prevent or minimize the purchase of refrigerant by untrained people who would not have the appropriate skills or equipment to properly recover or charge the refrigerant. However, after considering the comments, EPA recognizes that an unintended consequence of restricting smaller-container sales is the prospect that appliance owners could purchase non-refrigerant-grade propane such as camping gas to service their equipment. Non-refrigerant-grade hydrocarbons could contain contaminants that might fail to be absorbed by a filter drier, mix with the oil and cause high wear on compressor bearings, or clog heat exchangers and capillary tubes. Such events could lead to equipment failure, increased servicing need, and more potential emissions of the refrigerant. These effects could increase risk to the appliance owner, service technicians, and those involved in appliance disposal.

As discussed in Section V.K of this preamble, EPA agrees with the importance of having hydrocarbon refrigerants handled only by trained technicians. The listing decisions for these three refrigerants in Appendix R to 40 CFR, part 82, subpart G, provide a recommendation that only technicians specifically trained in handling flammable refrigerants service refrigerators and freezers containing these refrigerants. We also include a recommendation that technicians gain an understanding of minimizing the risk of fire and the steps to use flammable refrigerants safely.

J. Use of Hydrocarbon Refrigerants in Other End-Uses

Comment: Three commenters requested that isobutane and propane be considered for use in both the household refrigeration and retail food refrigeration end-uses. Six other commenters specifically requested that isobutane be allowed for use in retail food refrigeration. All of these commenters reasoned that both refrigerants have similar physical characteristics (*e.g.,* flammability limits, toxicity profiles, handling practices, safety group classification) and that the UL 250 and UL 471 standards do not distinguish between them.

Response: EPA is finalizing acceptability determinations only for the substitutes and end-uses identified in submissions to the Agency and in the proposed rule: Isobutane and R–441A in the household refrigeration end-use, and propane in the retail food refrigeration end-use. The submitters did not request review of isobutane or R–441A in the retail food refrigeration end-use, or propane in the household refrigeration end-use, so EPA did not review those substitutes for those end-uses in this rulemaking.

The SNAP regulations at 40 CFR part 82, subpart G establish a process for the submission and review of SNAP applications and the finalization of acceptability determinations. EPA makes a listing determination after evaluation of the substitute. EPA follows a notice-and-comment rulemaking process to list substitutes that are proposed as acceptable subject to use conditions, acceptable subject to

[32] As mentioned previously, the proposed rule inadvertently represented 5 pounds as 2.8 kilograms instead of 2.3 kg, which is accurate.

narrowed use limits, or unacceptable. Although EPA can issue SNAP determinations for substitutes and end-uses that were not provided by an applicant, the Agency must perform the same detailed analysis, based on the criteria described in the SNAP regulations. EPA would need to make a risk screen available to the public through the notice-and-comment rulemaking process before making a listing decision. If EPA were to find those substitutes acceptable in those specific end-uses, use conditions would probably be necessary.

We recognize the stakeholders' interest in using isobutane in the retail food refrigeration end-use and propane in the household refrigeration end-use. Preliminary information supports the observations that the use profiles and handling practices for these chemicals in these end-uses are very similar to the combinations of substitutes and end-uses being finalized today. EPA may consider a subsequent rulemaking addressing the use of isobutane and R–441A in the retail food refrigeration end-use, and propane in the household refrigeration end-use.

Comment: One commenter noted that it did not have sufficient information on HCR–188C and HCR–188C1 (*i.e.,* R–441A) to recommend their approval for the retail food refrigeration end-use. The commenter stated, however, that if ASHRAE Standard 34 were to classify those hydrocarbon blends as A3 refrigerants then the argument could be made that they should be listed in both end-uses.

Response: In February 2011, ASHRAE issued Addendum g to Standard 34–2010, classifying R–441A as an A3 refrigerant. We agree that an applicant may be able to support a petition to find R–441A acceptable subject to use conditions in the retail food refrigeration end-use based on our current understanding that R–441A has characteristics that are similar to those of propane. However, we do not currently have the appropriate technical demonstrations before us to propose, much less finalize, such a determination. If in the future a person submits a petition supported by a technical demonstration, we could take rulemaking action on such a listing.

K. Training

EPA received eight comments in response to its discussion of training in the preamble of the proposed rule. All acknowledged the value of training.

Comment: One commenter recommended against a mandatory national training program, observing that in the European Union, where hydrocarbon refrigerants are more prevalent, there is no national training program and each manufacturer handles training on its own. Another commenter, a training organization for technicians, suggested that training be a required element of a federal certification of technicians. The commenter noted that EPA intends to update the ''test bank'' of test questions for technician certification under CAA section 608, and so the Agency should recognize the merits of incorporating hydrocarbon refrigerants into existing programs. This commenter stated that without a recertification program, hundreds of thousands of technicians will not see the new test questions. Therefore the commenter suggested that EPA either create another ''type'' category of certification under CAA section 608 addressing flammable refrigerants and/or require recertification of technicians every five years because of new refrigerants. One commenter stated that EPA should strongly consider delaying any SNAP acceptability listing for isobutane until such a program can be developed and deployed industry-wide. The commenter observed that this could take two years and increase costs to consumers.

Response: EPA agrees that training is an important way for technicians to learn about the safe handling of flammable refrigerants. We recognize that there are some long-standing training programs on flammable refrigerants in other countries where hydrocarbon refrigerants are currently in wide use. We also recognize that the use of hydrocarbon refrigerants, and training on such use, is in its infancy in the U.S., and is generally tied directly to specific products or applications, rather than generally to multiple types of products.

Since the inception of the SNAP program and the section 608 refrigerant management program, we have continued to list a variety of new refrigerants as acceptable. EPA has not previously required that certified technicians be recertified as a result of the listing of the additional refrigerants. Moreover, the goals of the section 608 technician certification program reflect the need to reduce emissions during servicing, maintenance, repair and disposal. They do not substitute for the proper training that is normally provided through trade schools, apprenticeships, or other industry mechanisms. Given the extent of technical knowledge available within the industry, we believe that industry is better equipped than EPA to define the specific contents of such training, and that it is not necessary for EPA to require training in order for newly listed refrigerants to be used as safely as other refrigerants currently available.

Although we have determined not to require training as a use condition for these substitutes to ensure that they can be used as safely as other available refrigerants, we recommend that technicians receive training on the safe handling of hydrocarbon refrigerants through avenues such as industry-sponsored national training programs.

L. Other Options Considered

EPA considered, and sought comment on, several other options or related issues in the proposed rule, although we did not propose them. This section describes comments the Agency received on those options.

1. Use only in appliances specific to OEMs. EPA sought comment on an option that would allow isobutane and propane as a refrigerant for use only in OEM-specific appliances, as described in a SNAP application. The reason for such a limitation would be the concern that appliances from other manufacturers would not be designed with spark-proof engineering; nor would the manufacturers be able to develop recovery equipment compatible with flammable refrigerants.

Comment: EPA received two comments supporting EPA's approach to not impose such a limitation. One observed that limiting use to SNAP-reviewed equipment would be time-consuming and costly for all parties involved, with little added health and safety benefit.

Response: EPA agrees that limiting refrigerant use to SNAP-reviewed equipment would be time-consuming and costly for all parties involved. We believe that adherence to the UL standards and the use conditions in this rule will help ensure that equipment is designed to use these refrigerants safely, and that use of these substitutes will present risks that are lower than or comparable to the risks from other potential substitutes. Thus we believe it is not necessary to include such a limitation.

2. Recovery equipment. EPA observed that it had considered proposing a use condition requiring that recovery equipment used to recapture flammable refrigerants be compatible with flammable refrigerants, and sought information on whether there currently is an industry standard for recovery units for flammable refrigerants and whether specific recovery units are available that are compatible with the refrigerants addressed in today's rule.

Comment: One commenter stated a belief that there are no known manufacturers of recovery equipment for hydrocarbon refrigerants. Another commenter stated that recovery equipment used to recover flammable refrigerants must be compatible with flammable refrigerants, and in the absence of an industry standard, it has developed its own service equipment designed to recapture a flammable refrigerant in accordance with federal and state regulations. A third commenter observed that recovery units are only used in countries like the U.S. where venting is not allowed. Finally, one commenter observed that it uses a recovery device in its U.S. test market that is specifically designed for use with flammable refrigerants.

Response: The availability of recovery equipment is not necessary to ensure that the refrigerant will not pose more risk than other available substitutes in this end-use. EPA will continue to assess the need for, and availability of, recovery equipment that is compatible with flammable refrigerants.

3. Venting prohibition. EPA sought comment on whether, in a future rulemaking, it should consider exempting hydrocarbon refrigerants from the section 608 venting prohibition.

Comment: Several commenters expressed varying levels of support for exempting hydrocarbon refrigerants from the venting prohibition. Two commenters expressed unequivocal support, and four stated that they would support such an exemption if EPA were to confirm there would be no health impact. Another commenter asserted that venting would pose little environmental impact, comparing the worst-case scenario release of 150 grams from retail food refrigeration end-uses, or 57 grams from household refrigeration end-uses, to one and one-third pound, respectively, of CO_2 equivalent. Another commenter stated that isobutane is not dangerous, but should not be vented in enclosed spaces. Another commenter supported a venting exemption during servicing, but advocated recovery at end-of-life due to environmental risks associated with the release of refrigerant and oil captured in the refrigerant. Finally, a commenter stated that the environmental impact from venting such small charges is minimal and that safety concerns could be better mitigated through a properly designed and executed educational program. One commenter expressed reservations about allowing venting, and recommended further assessment of flammability risks as well as the potential risk associated with the release of synthetic refrigerant oil during venting.

Response: EPA appreciates the information provided by commenters. Venting is addressed by section 608 of the CAA and EPA will develop a separate rule under that authority if we determine that hydrocarbon refrigerants in the household refrigeration and retail food refrigeration end-uses should be exempted from the venting prohibition. EPA exercised such authority to exempt hydrocarbons used in industrial process refrigeration systems from the venting prohibition (see 69 FR 11946), but has not made a similar determination for hydrocarbons used in household and retail food refrigerators and freezers. Currently, EPA's regulations implementing section 608 at subpart F to 40 CFR part 82 would prohibit venting of isobutane, propane, and R–441A refrigerants during service, maintenance, repair, and disposal from the end-uses considered in this rule.

4. Requiring only one use condition. EPA sought comment on an approach that it considered (but did not propose): to require that the only use condition for each hydrocarbon refrigerant be to meet applicable UL 250 and UL 471 standards.

Comment: EPA received one comment, which opposed such a provision.

Response: As described above, and consistent with the proposal, EPA has not limited the use conditions to compliance with the UL standards.

5. ''Unacceptable'' finding pending industry-wide servicing standards. EPA sought comment on (but did not propose) finding hydrocarbon refrigerants unacceptable until an industry-wide standard exists for servicing appliances using hydrocarbon refrigerants.

Comment: EPA received two comments on this issue, one opposing and one supporting. Neither commenter provided a rationale for its recommendation.

Response: As described elsewhere, and consistent with the proposal, EPA is finding the three hydrocarbon refrigerants acceptable subject to use conditions.

M. Other Comments on Proposed Rule

Comment: In a comment unrelated to the specifics of the proposed rule, one commenter recommended consideration of the type of automated system it uses on its production line. This system sounds a pre-warning alarm when 20 percent of the LFL is reached and shuts down the system if 40 percent of the LFL is reached. The commenter noted that this system conforms to the European standard and is approved by TUV (Technischer Überwachungs-Verein (Technical Inspection Association)), a German safety monitoring agency.

Response: EPA does not believe it is necessary to establish a use condition requiring the type of system suggested by the commenter. OSHA addresses the use of flammable substances in the workplace, including through its regulations at 29 CFR 1910.106, as discussed in response to other comments below. To the extent a manufacturer believes that additional precautions are appropriate, we believe the manufacturer is in the best position to determine how to address the risks of installing a hydrocarbon refrigerant considering the specific characteristics of its production facilities and personnel. We note that in addition to OSHA requirements, other forces such as concerns for liability; costs of fire and casualty insurance; and reputational interests may also dictate a firm's behavior with respect to worker health and safety protections.

This final rule includes, in the ''Further Information'' column of Appendix R, recommendations that OEMs institute safety precautions as needed in their facilities to address potential hazards in the production of appliances using hydrocarbon refrigerants. EPA notes that OSHA regulations are in place to address such hazards. The table in Appendix M references OSHA requirements at 29 CFR part 1910, including those at 29 CFR 1910.106 (flammable and combustible liquids), 1910.110 (storage and handling of liquefied petroleum gases), and 1910.1000 (toxic and hazardous substances). Nothing in these final listing decisions, including the ''Further Information'' column, supersedes other regulations such as these OSHA requirements.

Comment: Another commenter recommended that the use conditions in the final rule address the use of an odorant as a warning agent to alert manufacturing personnel or technicians of the presence of a leak. Without recommending how the issue should be addressed in this final rule, the commenter offered the following observations:

- Technicians or manufacturers may use mercaptan as an odor warning agent;
- Mercaptan is corrosive and is removed by filters and driers in refrigeration systems;
- Refrigerant classification standards for Australia and New Zealand require that Group A3 refrigerants be odorized

or subject to alternative safety provisions.

Response: EPA agrees that odorization is one way to alert manufacturing or servicing personnel of the presence of a hydrocarbon refrigerant. EPA's risk screen did not evaluate these refrigerants with the addition of an odorant, nor did our proposed rule address odorants in its discussion of refrigerant composition or in its proposed use conditions. Today's final rule does not prohibit the introduction of an odorant into isobutane, propane, or R–441A refrigerant as long as the refrigerant remains within purity specifications. The use conditions in today's final rule, such as red coloring and adherence to UL standards, provide ample safeguards to alert manufacturers, service personnel, and customers of the presence of a flammable refrigerant.

VI. What other changes is EPA making in the final rule?

In addition to changes made in response to comments, as described in Section V above, EPA is making the following minor changes:

A. Propane as Substitute for R–502

EPA is revising the wording in the Appendix R table to correct a typographical error. As discussed above, this final rule lists propane as acceptable subject to use conditions as a substitute for CFC–12, HCFC–22, and R–502 in the retail food refrigeration end-use. In the NPRM, the proposed Appendix R table erroneously omitted R–502 (a blend of HCFC–22 and CFC–115) from the listing, although it was included in the preamble discussion. This final rule corrects the error by including R–502 as one of the refrigerants for which propane is listed as a substitute in the retail food refrigeration end-use.

B. Wording of Use Conditions for Labeling

The use conditions in the proposed rule included requirements for marking (*e.g.,* labeling) of appliances using isobutane and HCR–188C1 (*i.e.,* R–441A) in the household refrigeration end-use, and propane in the retail food refrigeration end-use. EPA intended that language to mirror that of the UL standards. We are making two minor changes to this requirement.

First, we are restructuring the language for the requirement. The language of the proposed rule first listed the wording required for five different types of labels, and then described where each of the labels was to be placed. For the final rule, we have moved the location requirements, so they are specified immediately before the corresponding label wording. EPA believes this minor revision in the regulatory language provides more clarity and makes the use condition easier to implement.

Second, EPA is making a minor technical correction to the wording of one of the labels. In the proposed rule, one of the labels was to read as follows:

''(b) Near the machine compartment: ''DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. Do Not Use Mechanical Devices. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing.''

The phrase ''Do Not Use Mechanical Devices'' was included erroneously in the proposed requirement. EPA recognizes that trained personnel may need to use mechanical devices to service the machine compartment. We have removed that phrase from the use condition in the final listing decision, making the condition consistent with the UL 250 and UL 471 requirements.

C. ''Further Information'' Column in Listing Decisions

EPA is also modifying the recommendations listed under ''Further Information'' to more appropriately cross-reference existing OSHA regulations and to avoid confusion about the relationship between EPA and OSHA requirements.

The proposed rule contained, under ''Further Information,'' the following recommendations:

- Technicians and equipment manufacturers should wear appropriate personal protective equipment, including chemical goggles and protective gloves when handling isobutane, HCR–188C, and HCR–188C1. Special care should be taken to avoid contact with the skin since isobutane, HCR–188C, and HCR–188C1 like many refrigerants, can cause freeze burns on the skin.
- A class B dry powder type fire extinguisher should be kept nearby.
- Proper ventilation should be maintained at all times during the manufacture of appliances containing hydrocarbon refrigerant through adherence to good manufacturing practices as per 29 CFR 1910.110.[33] 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 only occur after the space has been properly ventilated.
- Technicians should only use spark-proof tools when working refrigerators and freezers with R–600a, HCR–188C, and HCR–188C1.
- Recovery equipment designed for flammable refrigerants should be used.
- 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.
- In production facilities or other facilities where large quantities of the refrigerant would be stored, proper safety precautions should be in place to minimize the risk of explosion. These facilities should be equipped with proper ventilation systems to minimize the risks of explosion and should be properly designed and operated to reduce possible ignition sources.
- Room occupants should evacuate the space immediately following the accidental release of this refrigerant.

The Agency did not receive any comments on these recommendations. EPA believes that they are appropriate and that they serve as useful reminders of safe practices for technicians and manufacturers. EPA recognizes that some of these recommendations are reflected in OSHA regulations for worker health and safety. For this reason, EPA is adding a cross-reference to OSHA regulations at 29 CFR part 1910 (Occupational Health and Safety Standards) in order to ensure that regulated entities are aware of these requirements. Specifically, Appendix R provides a cross-reference to 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).

VII. 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 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 Executive Orders 12866

[33] OSHA regulations at 29 CFR 1910.110 consider ventilation adequate ''when the concentration of the gas in a gas-air mixture does not exceed 25 percent of the lower flammable limit.''

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 final rule is an Agency determination. It contains no new requirements for reporting. 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 Small Business Administration 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 final 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 requirements of this final rule affect the manufacturers of household refrigerators and freezers and retail food refrigerators and freezers. Today's action allows users the additional options of using isobutane, propane, and R–441A, but does not mandate such use. Because isobutane, propane, and R–441A refrigeration systems are not yet manufactured in the U.S. (with the exception of limited test-marketing), and because the final rule actually imposes fewer requirements than the proposed rule (*i.e.,* removal of the unique fittings requirement), manufacturers would not be required to change business practices to meet the use conditions and thus the rule would not impose any new costs on small entities.

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 final rule related to integrating risk mitigation devices, markings, and procedures for maintaining the safety of household refrigerators and freezers and retail food refrigerators and freezers using hydrocarbon refrigerants affect only small number of manufacturers of these appliances and their technicians. This rule provides additional refrigerant options, allowing greater flexibility for industry in designing consumer products. Further, since appliances using hydrocarbon refrigerants are not yet widely produced in the U.S., we do not expect impacts on existing users. Thus this rule is not subject to the requirements of sections 202 or 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 directly to facilities that use these substances and not to governmental entities. The finding of ''acceptability subject to use conditions'' for isobutane, propane, and R–441A does not impact the private sector because manufacturers are not producing systems under the current regulation. This final 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.

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. Thus, Executive Order 13175 does not apply to this action.

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

This action is not subject to Executive Order 13045 (62 FR 19885, April 23, 1997) because it is not economically significant as defined in Executive Order 12866, and because the Agency does not believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. This final rule provides both regulatory restrictions and recommended guidelines based upon risk screens conducted in order to reduce risk of fire and explosion.

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 appliances using these hydrocarbon refrigerants may be more energy-efficient than currently available systems in some climates. Therefore, we have concluded that this rule is not likely to have any adverse energy effects.

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 final rule involves incorporation by reference of technical standards issued by Underwriters Laboratories (UL) concerning the safety and reliability of flammable refrigerants. UL standards are voluntary consensus standards. The use conditions in the rule require, for the household refrigeration end-use, adherence to the UL Standard for Household Refrigerators and Freezers, UL 250, 10th edition, 1993, updated August 2000. The use conditions also require, for the retail food refrigeration end-use, adherence to the UL Standard for Commercial Refrigerators and Freezers, UL 471, 10th edition, November 2010. Copies of UL 250 and UL 471 may be purchased at *http://ulstandardsinfonet.ul.com/.*

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

Executive Order 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 final 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 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 final rule would allow sale of appliances with refrigerant substitutes that have no ODP and low GWPs. The reduction in ODS and GHG emissions would assist in restoring the stratospheric ozone layer and provide climate benefits.

K. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 *et seq.,* as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register.** A major rule cannot take effect until 60 days after it is published in the **Federal Register**.

This action is not a ''major rule'' as defined by 5 U.S.C. 804(2). This rule will be effective February 21, 2012.

VIII. References

This preamble references the following documents, which are also in the Air and Radiation 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–2009–0286.

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List of Subjects in 40 CFR Part 82

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

Dated: December 9, 2011.

Lisa P. Jackson,

Administrator.

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

PART 82—PROTECTION OF STRATOSPHERIC OZONE

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

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

Subpart G—Significant New Alternatives Policy Program

■ 2. Subpart G is amended by adding Appendix R 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

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) as a substitute for CFC–12 and HCFC–22. R–441A as a substitute for CFC–12 and HCFC–22	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 1993 updated August 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'') shall not exceed 57 grams (2.0 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 isobutane and R–441A. Special care should be taken to avoid contact with the skin since these refrigerants, like many refrigerants, can cause freeze burns on the skin.

SUBSTITUTES THAT ARE ACCEPTABLE SUBJECT TO USE CONDITIONS—Continued

End-use	Substitute	Decision	Use conditions	Further information
				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 isobutane and R–441A. Recovery equipment designed for flammable refrigerants should be used. 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.
Household refrigerators, freezers, and combination refrigerators and freezers. (New equipment only)	Isobutane (R–600a) as a substitute for CFC–12 and HCFC–22. R–441A as a substitute for CFC–12 and HCFC–22	Acceptable Subject To Use Conditions.	As provided in clauses SA6.1.1 and SA6.1.2 of UL Standard 250, the following markings shall be attached at the locations provided and shall 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 shall 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.

SUBSTITUTES THAT ARE ACCEPTABLE SUBJECT TO USE CONDITIONS—Continued

End-use	Substitute	Decision	Use conditions	Further information
Retail food refrigerators and freezers (stand-alone units only). (New equipment only)	Propane (R–290) as a substitute for CFC–12, HCFC–22, and R–502.	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 SB to the 10th edition of the Underwriters Laboratories (UL) Standard for Commercial Refrigerators and Freezers, UL 471, dated November 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 shall not exceed 150 grams (5.3 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 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 refrigerators and freezers with propane. Recovery equipment designed for flammable refrigerants should be used. 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.
Retail food refrigerators and freezers (stand-alone units only). (New equipment only)	Propane (R–290) as a substitute for CFC–12, HCFC–22, and R–502.	Acceptable subject to use conditions.	As provided in clauses SB6.1.2 to SB6.1.5 of UL Standard 471, the following markings shall be attached at the locations provided and shall 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 shall be in letters no less than 6.4 mm (¼ inch) high.	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.

SUBSTITUTES THAT ARE ACCEPTABLE SUBJECT TO USE CONDITIONS—Continued

End-use	Substitute	Decision	Use conditions	Further information
			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.	

Note: In accordance with the limitations provided in section 310(a) of the Clean Air Act (42 U.S.C. 7610(a)), nothing in this table shall affect the Occupational Safety and Health Administrations' authority to promulgate and enforce standards and other requirements under the Occupational Safety and Health Act of 1970 (29 U.S.C. 651 *et seq.*).

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.

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 and 471 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.*

[FR Doc. 2011–32175 Filed 12–19–11; 8:45 am]

BILLING CODE 6560–50–P

DEPARTMENT OF DEFENSE

Defense Acquisition Regulations System

48 CFR Parts 212, 225, and 252

RIN 0750–AH43

Defense Federal Acquisition Regulation Supplement; Utilization of Domestic Photovoltaic Devices (DFARS Case 2011–D046)

AGENCY: Defense Acquisition Regulations System, Department of Defense (DoD).

ACTION: Interim rule.

SUMMARY: DoD is issuing an interim rule to implement a section of the National Defense Authorization Act for Fiscal Year 2011. The section provides that photovoltaic devices to be utilized in performance of any covered contract shall comply with the Buy American statute, subject to the exceptions provided in the Trade Agreements Act of 1979 or otherwise provided by law.

DATES: *Effective date:* December 20, 2011.

Comment date: Comments on the interim rule should be submitted in writing to the address shown below on or before February 21, 2012, to be considered in the formation of the final rule.

ADDRESSES: Submit comments identified by DFARS Case 2011–D046, using any of the following methods:

- *Regulations.gov: http://www.regulations.gov.*

Submit comments via the Federal eRulemaking portal by inserting ''DFARS Case 2011–D046'' under the heading ''Enter keyword or ID'' and selecting ''Search.'' Select the link ''Submit a Comment'' that corresponds with ''DFARS Case 2011–D046.'' Follow the instructions provided at the ''Submit a Comment'' screen. Please include your name, company name (if any), and ''DFARS Case 2011–D046'' on your attached document.

- *Email: dfars@osd.mil.* Include DFARS Case 2011–D046 in the subject line of the message.
- *Fax:* 703–602–0350.
- *Mail:* Defense Acquisition Regulations System, Attn: Amy G. Williams, OUSD (AT&L) DPAP/DARS, Room 3B855, 3060 Defense Pentagon, Washington, DC 20301–3060.

Comments received generally will be posted without change to *http://www.regulations.gov,* including any personal information provided. To confirm receipt of your comment(s), please check *www.regulations.gov* approximately two to three days after submission to verify posting (except allow 30 days for posting of comments submitted by mail).

FOR FURTHER INFORMATION CONTACT: Amy G. Williams, Defense Acquisition Regulations System, OUSD (AT&L) DPAP/DARS, Room 3B855, 3060 Defense Pentagon, Washington, DC 20301–3060. Telephone 703–602–0328; facsimile 703–602–0350.''

SUPPLEMENTARY INFORMATION:

I. Background

In order to implement section 846 of the National Defense Authorization Act for Fiscal Year 2011 (Pub. L. 111–383), this interim rule amends DFARS subpart 225.70 by adding a new section 225.7017, Utilization of domestic photovoltaic devices, as well as an associated provision and clause in DFARS part 252 and conforming changes to DFARS part 212.

Photovoltaic devices produce direct current electricity from sunlight, which can be used to provide power to things such as DoD-owned facilities or private housing.

As specified in section 846, a ''covered contract'' is defined in this interim rule as an energy savings performance contract, a utility service contract, or a private housing contract, if such contract will result in DoD ownership of photovoltaic devices, by means other than DoD purchase as end products. DoD is deemed to own a photovoltaic device if the device is—

(1) Installed on DoD property or in a facility owned by DoD; and

(2) Reserved for the exclusive use of DoD for the full economic life of the device.

Prior to this definition, ownership would have required transfer of title for the equipment to the Government. Under section 846, exclusive use of the