POSTAL SERVICE

39 CFR Part 20

International Mail Manual; Incorporation by Reference

AGENCY: Postal Service™.

ACTION: Final rule.

SUMMARY: The Postal Service announces the issuance of Issue 36 of the *Mailing Standards of the United States Postal Service,* International Mail Manual (IMM®) and its incorporation by reference in the Code of Federal Regulations.

DATES: *Effective Date:* This final rule is effective on June 16, 2010. The incorporation by reference of Issue 36 of the IMM is approved by the Director of the Federal Register as of June 16, 2010.

FOR FURTHER INFORMATION CONTACT: Lizbeth Dobbins, (202) 268–3789.

SUPPLEMENTARY INFORMATION: Issue 36 of the International Mail Manual was issued on May 11, 2009. It replaced all previous editions. Issue 36 of the IMM continues to serve the objectives of the Postal Service's Transformation Plans, the 2004–2008 Five-Year Strategic Plan, the Strategic Transformation Plan 2006–2010, and Vision 2013, Plan for 2009–2013 to enable the Postal Service to fulfill its long-standing mission of providing affordable, universal mail service. The Plans' key strategies include improving operational efficiency, supporting growth through added value to customers, and enhancing the Postal Service's performance-based culture.

In addition, Issue 36 sets forth specific changes such as: new mailing standards for authorized shipments of small packets to Cuba to align USPS® with U.S. Department of Commerce regulations; to expand the use of Priority Mail International® Flat Rate Envelopes and Boxes to Ascension and the Falkland Islands; reorganization of sections 260, 290, and 310 to clarify eligibility for M-bags; and, to codify the Postal Service Sure Money® (DineroSeguro®) service as one of its international money transfer services. Issue 36 also corrects various printing and format errors and omissions in the previous Issue.

The International Mail Manual is available to the public on a subscription basis only from: U.S. Government Printing Office, P.O. Box 979050, St. Louis, MO 63197–9000. The subscription price for one issue is currently $50 to addresses in the United States, and $70 to all foreign addresses. The IMM is also published and available to all users on the Internet at *http://pe.usps.com.*

List of Subjects in 39 CFR Part 20

Foreign relations, Incorporation by reference.

■ In view of the considerations discussed above, the Postal Service hereby amends 39 CFR part 20 as follows:

PART 20—INTERNATIONAL POSTAL SERVICE

■ 1. The authority citation for part 20 is revised to read as follows:

Authority: 5 U.S.C. 552(a); 13 U.S.C. 301–307; 18 U.S.C. 1692–1737; 39 U.S.C. 101, 401, 403, 404, 407, 414, 416, 3001–3011, 3201–3219, 3403–3406, 3621, 3622, 3626, 3632, 3633, and 5001.

■ 2. Section 20.1 is revised to read as follows:

§ 20.1 International Mail Manual; incorporation by reference.

(a) Section 552(a) of Title 5, U.S.C., relating to the public information requirements of the Administrative Procedure Act, provides in pertinent part that matter reasonably available to the class of persons affected thereby is deemed published in the **Federal Register** when incorporated by reference therein with the approval of the Director of the Federal Register. In conformity with that provision, with 39 U.S.C. 410(b)(1), and as provided in this part, the U.S. Postal Service hereby incorporates by reference its International Mail Manual (IMM), Issue 36, dated May 11, 2009. 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.

(b) The current Issue of the IMM is incorporated by reference in paragraph (a) of this section. Successive Issues of the IMM are listed in the following table:

International mail manual	Date of issuance
Issue 1	November 13, 1981.
Issue 2	March 1, 1983.
Issue 3	July 4, 1985.
Issue 4	September 18, 1986.
Issue 5	April 21, 1988.
Issue 6	October 5, 1988.
Issue 7	July 20, 1989.
Issue 8	June 28, 1990.
Issue 9	February 3, 1991.
Issue 10	June 25, 1992.
Issue 11	December 24, 1992.
Issue 12	July 8, 1993.
Issue 13	February 3, 1994.
Issue 14	August 4, 1994.
Issue 15	July 9, 1995.
Issue 16	January 4, 1996.
Issue 17	September 12, 1996.
Issue 18	June 9, 1997.
Issue 19	October 9, 1997.
Issue 20	July 2, 1998.
Issue 21	May 3, 1999.
Issue 22	January 1, 2000.
Issue 23	July 1, 2000.
Issue 24	January 1, 2001.
Issue 25	July 1, 2001.
Issue 26	January 1, 2002.
Issue 27	June 30, 2002.
Issue 28	January 1, 2003.
Issue 29	July 1, 2003.
Issue 30	August 1, 2004.
Issue 31	May 31, 2005.
Issue 35	May 12, 2008.
Issue 36	May 11, 2009.

■ 3. Section 20.2 is revised to read as follows:

§ 20.2 Effective date of the International Mail Manual.

The provisions of the International Mail Manual Issue 36, effective May 11, 2009, are applicable with respect to the international mail services of the Postal Service.

Neva R. Watson,

Attorney, Legislative.

[FR Doc. 2010–14493 Filed 6–15–10; 8:45 am]

BILLING CODE 7710–12–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 82

[FRL–9163–5]

RIN 2060–AG12

Protection of Stratospheric Ozone: Notice 25 for Significant New Alternatives Policy Program

AGENCY: Environmental Protection Agency (EPA).

ACTION: Determination of Acceptability.

SUMMARY: This Determination of Acceptability expands the list of acceptable substitutes for ozone-depleting substances under the U.S. Environmental Protection Agency's Significant New Alternatives Policy program. The substitutes are for use in the following sectors: Refrigeration and air-conditioning, foam blowing, aerosols, and sterilants. The majority of the acceptability decisions find substitutes acceptable as alternatives to the class II ozone depleting substances hydrochlorofluorocarbon (HCFC)–22, HCFC–142b and blends containing one or both of these substances. EPA is also finding one of the alternatives, HFO–

1234ze, acceptable as a substitute for CFC–113 in the heat transfer end use and as a substitute for CFC–11 in the aerosol propellant end use. The listing of additional refrigerant alternatives as acceptable will provide users in the refrigeration and air-conditioning sector with more options for replacing HCFC–22 and HCFC–142b, which, pursuant to EPA's phaseout regulations, may generally be used only as a refrigerant to service equipment manufactured before January 1, 2010.

DATES: *Effective Date:* June 16, 2010.

ADDRESSES: EPA has established a docket for this action under Docket ID No. EPA–HQ–OAR–2003–0118 (continuation of Air Docket A–91–42). All electronic documents in the docket are listed in the index at *http://www.regulations.gov.* 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. Publicly available docket materials are available either electronically at *http://www.regulations.gov* or in hard copy at the EPA Air Docket (No. A–91–42), 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 Docket is (202) 566–1742.

FOR FURTHER INFORMATION CONTACT: Melissa Fiffer by telephone at (202) 343–9464, by facsimile at (202) 343–2338, by e-mail at *fiffer.melissa@epa.gov,* or by mail at U.S. Environmental Protection Agency, Mail Code 6205J, Washington, DC 20460. Overnight or courier deliveries should be sent to the office location at 1310 L Street, NW., 10th floor, Washington, DC 20005.

For more information on the Agency's process for administering the Significant New Alternatives Policy (SNAP) program or criteria for evaluation of substitutes, refer to the original SNAP rulemaking published in the **Federal Register** on March 18, 1994 (59 FR 13044). Notices and rulemakings under the SNAP program, as well as other EPA publications on protection of stratospheric ozone, are available from EPA's Ozone Depletion Web site at *http://www.epa.gov/ozone/* including the SNAP portion at *http://www.epa.gov/ozone/snap/.*

SUPPLEMENTARY INFORMATION:

I. What acronyms and abbreviations are used in this document?

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

ACGIH American Conference of Governmental Industrial Hygienists
AEGL Acute Exposure Guideline Limit
AEL Acceptable Exposure Limit
AIHA American Industrial Hygiene Association
ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers
CAA Clean Air Act
CAS ID # Chemical Abstract Service Registry Number
CFC Chlorofluorocarbon
CBI Confidential Business Information
CEGL Continuous Exposure Guidance Level
EPA United States Environmental Protection Agency
FIFRA Federal Insecticide, Fungicide, and Rodenticide Act
GWP Global Warming Potential
HAP Hazardous Air Pollutant
HCFC Hydrochlorofluorocarbon
HFC Hydrofluorocarbon
IDLH Immediately Dangerous to Life and Health
IPCC International Panel on Climate Change
NIOSH National Institutes for Occupational Safety and Health
NRC National Research Council
ODP Ozone Depletion Potential
ODS Ozone-Depleting Substance
OSHA Occupational Safety and Health Administration
PEL Permissible Exposure Limit
REL Recommended Exposure Limit
PMN Pre-Manufacture Notice
RCRA Resource Conservation and Recovery Act
SIP State Implementation Plan
SNAP Significant New Alternatives Policy
TLV Threshold Limit Value
TSCA Toxic Substances Control Act
VOC Volatile Organic Compound
WEEL Workplace Environmental Exposure Limit

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 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 (e.g., chlorofluorocarbon, halon, carbon tetrachloride, methyl chloroform, methyl bromide, and hydrobromofluorocarbon) or class II (e.g., hydrochlorofluorocarbon) substance 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 unacceptable substitutes, substitutes acceptable subject to use conditions and substitutes acceptable subject to narrowed use limits are found at 40 CFR part 82 subpart G.

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 rule (59 FR 13044) establishing the process for administering the SNAP program and issued EPA's first lists identifying acceptable and unacceptable substitutes in the major industrial use sectors (40 CFR part 82, subpart G). These major industrial use sectors are: Refrigeration and air-conditioning; foam blowing; solvents cleaning; fire suppression and explosion protection; sterilants; aerosols; adhesives, coatings and inks; and tobacco expansion. These sectors comprise the principal industrial sectors that historically consumed the largest volumes of ODS.

Section 612 of the CAA requires EPA to list as acceptable only those substitutes that do not present a significantly greater risk to human health and the environment as compared with 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 or II ODS 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.[1] This requirement applies to the person planning to introduce the substitute into interstate commerce, typically chemical manufacturers, but may also include importers, formulators, equipment manufacturers, or end-users [2] when they are responsible for introducing a substitute into commerce.

The Agency has identified four possible decision categories for substitutes: Acceptable; acceptable subject to use conditions; acceptable subject to narrowed use limits; and unacceptable. Use conditions and narrowed use limits are both considered "use restrictions" and are explained below. Substitutes that are deemed acceptable with no use restrictions (no use conditions or narrowed use limits) can be used for all applications within the relevant end-uses within the sector. Substitutes that are acceptable subject to use restrictions may be used only in accordance with those restrictions. It is a violation of the CAA and EPA's regulations to replace an ODS with a substitute listed as unacceptable, except for certain exceptions (e.g., test marketing, research and development) specified by the regulation.

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 section 612 of the CAA and 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. The Agency requires a user of a narrowed use substitute to demonstrate that no other acceptable substitutes are available for their specific application by conducting comprehensive studies. EPA describes these substitutes as "acceptable subject to narrowed use limits." A person using a substitute that is acceptable subject to narrowed use limits in applications and end-uses that are not consistent with the narrowed use limit, are using these substitutes in an unacceptable manner and are 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 first proposes decisions concerning substitutes that are deemed acceptable subject to use restrictions (use conditions and/or narrowed use limits), or for substitutes deemed unacceptable, to allow the public opportunity to comment. After consideration of the public comments, EPA publishes a final decision.

In contrast, EPA publishes decisions that substitutes are acceptable with no restrictions in "notices of acceptability" without first issuing a proposed decision. As described in the rule initially implementing the SNAP program (59 FR 13044), EPA does not believe that notice-and-comment 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. 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 legally binding under the SNAP program, EPA encourages users of substitutes to apply all statements in the "comments" or "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.

[1] 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.

[2] As defined at 40 CFR 82.17 "end-use" means processes or classes of specific applications within major industrial sectors where a substitute is used to replace an ozone-depleting substance.

III. How does today's SNAP listing relate to the HCFC phaseout?

A. Why is EPA issuing a SNAP listing of alternatives to HCFC–22, HCFC–142b, and blends thereof?

To date, EPA has listed many HCFCs as acceptable substitutes for class I ODS thus allowing their use as substitutes for CFCs and for halons under SNAP. As production and importation of HCFCs becomes more limited, availability of these substances for use in current end uses may be limited.[3] In addition, EPA's phaseout regulations contain some use restrictions for specific substances. In particular, per the most recent milestone in the HCFC phaseout, as of January 1, 2010, virgin HCFC–22 and HCFC–142b, and blends containing one or both of these compounds, may only be used as refrigerants to service existing equipment (minor exceptions apply: Please see details in B, below).

In previous SNAP notices, EPA has listed a number of acceptable substitutes for HCFC–22, HCFC–142b, and blends containing one or both of these chemical compounds ("blends thereof"). In today's SNAP listing, EPA is providing a comprehensive list of acceptable substitutes for HCFC–22, HCFC–142b, and blends thereof, generally those that have been previously found acceptable as substitutes, as well as HFO–1234ze in several additional end uses. This notice only addresses the refrigeration and air-conditioning, foam blowing, aerosols, and sterilants sectors. Because HCFC–22, HCFC–142b, and blends thereof have not traditionally been used to any significant extent in the fire suppression and explosion protection, solvent cleaning, tobacco expansion, and adhesives, coatings and inks sectors, we are not making listing decisions for substitutes in these sectors in this notice.

B. What happened during the most recent milestone in the HCFC phaseout?

Under the *Montreal Protocol on Substances that Deplete the Ozone Layer* (Montreal Protocol) and the CAA, HCFCs are considered transitional alternatives in the phaseout of CFCs and other class I ODS. HCFCs are less potent ozone depleters than are CFCs and other class I substances; however, they are still subject to both a global and domestic phaseout under the Montreal Protocol and the CAA. HCFCs will no longer be produced in or imported into the United States in accordance with a tiered phaseout that will culminate in the United States in 2030. Under CAA Section 610, the sale and distribution of, or offer for sale and distribution of certain uses of HCFCs in foam blowing and in aerosols or other pressurized dispensers is prohibited. Further, under CAA Section 605(a) and EPA's implementing regulations, use and introduction into interstate commerce (including sale of HCFCs) is or will be prohibited according to the schedule available in the rules cited below and at 40 CFR 82.16, with exceptions for: (1) HCFCs that have been used, recovered, and recycled; (2) HCFCs completely used up in a reaction to create other chemicals; and (3) HCFCs used in refrigeration equipment manufactured before specified dates.

In a December 10, 1993, rule (58 FR 65018), EPA established a 'worst-first' approach for the HCFC phaseout; thus the HCFCs with higher ODPs were scheduled for phaseout earlier than those with lower ODPs. That rule announced an accelerated schedule for the phaseout of HCFC–22 and HCFC–142b, such that the production and import of HCFC–22 and HCFC–142b for use in new equipment would be banned as of January 1, 2010. Since 2003 (68 FR 2819), producers or importers of HCFC–22 and HCFC–142b have been required to hold allowances and importers of used HCFCs have been required to obtain prior approval of import on a per shipment basis. In a December 15, 2009, rule (74 FR 66412), EPA reduced the number of HCFC–22 and HCFC–142b allowances to meet and exceed the 2010 reduction step under the Montreal Protocol. That rule also clarified the use ban described in the 1993 rule and generally limited virgin HCFC–22 and HCFC–142b to use as refrigerants in the servicing of existing equipment. It established an exception for the use of HCFC–22 as a refrigerant in newly manufactured equipment where the components were manufactured prior to January 1, 2010, and are specified in a pre-2010 building permit or contract for use on a particular project, as well as temporary exceptions for the use of HCFC–22 in medical equipment and thermostatic expansion valves. For additional information on the HCFC phaseout, please see the rules promulgated on December 10, 1993 (58 FR 65018), January 21, 2003 (68 FR 2819), and December 15, 2009 (74 FR 66412).

C. How does today's SNAP listing affect alternatives to HCFCs other than HCFC–22, HCFC–142b, and blends thereof?

This notice does not affect previous SNAP listings of acceptable alternatives to HCFC–141b, which was phased out of production in 2003, nor does it list alternatives to the remainder of HCFCs, such as HCFC–123, HCFC–124, HCFC–225ca, and HCFC–225cb, which will be phased out on a later schedule. EPA anticipates updating the lists of acceptable substitutes under SNAP before the production phaseout of other HCFCs.

We note that EPA recently received a petition concerning the listing of HFC–134a in various end uses.[4] We are still reviewing that petition and nothing in this notice should be construed as prejudging EPA's response to that petition.

D. In servicing existing refrigeration or air-conditioning equipment, may I continue to use refrigerants, previously found acceptable by SNAP, that contain HCFC–22, HCFC–142b, and blends thereof?

HCFC–22, as well as some refrigerant blends containing HCFC–22 and/or HCFC–142b, have previously been found acceptable under SNAP for specified end uses. As noted above, these refrigerant blends, which appear in Table 1, below, may continue to be used in servicing existing equipment, i.e., equipment manufactured before January 1, 2010, in those end uses per the regulations at 40 CFR 82.15(g)(2)(i). (EPA defines the term "manufactured" for appliances at 40 CFR 82.3.)

TABLE 1—SUMMARY OF REFRIGERANTS CONTAINING HCFC–22, HCFC–142b, AND BLENDS THEREOF PREVIOUSLY DETERMINED ACCEPTABLE UNDER SNAP

Refrigerant blend	Further identification information for blend (alternative names and composition)
Freeze 12	R–134a/142b.
FreeZone	HCFC Blend Delta; RB–276; R–134a/142b/lubricant.

[3] A SNAP listing is not equivalent to an allocation, i.e., SNAP acceptability does not equate to authorization to produce or import ODS. EPA lists companies that have been allocated production and consumption allowances of HCFCs in 40 CFR 82.17 and 82.19.

[4] The petition is available at *http://www.regulations.gov* as item EPA–HQ–OAR–2003–0118–0249.

TABLE 1—SUMMARY OF REFRIGERANTS CONTAINING HCFC–22, HCFC–142b, AND BLENDS THEREOF PREVIOUSLY DETERMINED ACCEPTABLE UNDER SNAP—Continued

Refrigerant blend	Further identification information for blend (alternative names and composition)
GHG–HP	HCFC Blend Lambda; R–22/600a/142b.
GHG–X5	Autofrost X5; R–22/227ea/600a/142b.
Greencool (Gu) or China Sun G2018C	R–1270/22/152a.
ICOR	R–22/142b.
NARM–502	HCFC Blend Iota; R–23/22/152a.
PFC–330ST, PFC–550HC, PFC–660HC, PFC–1100HC, PFC–1100LT, PGC–100, PGC–150.	Compositions are Confidential Business Information (CBI).
R–401A	SUVA MP 39; R–22/152a/124 (53.0/13.0/34.0).
R–401B	SUVA MP 66; R–22/152a/124 (61.0/11.0/28.0).
R–401C	SUVA MP 52; R–22/152a/124 (33.0/15.0/52.0).
R–402A	SUVA HP80; R–125/290/22 (60.0/2.0/38.0).
R–402B	SUVA HP81; R–125/290/22 (38.0/2.0/60.0).
R–403B	ISCEON 69–L; R–290/22/218 (5.0/56.0/39.0).
R–406A	GHG–12; GHG–X3; McMullen Oil McCool; Monroe Air Tech Autofrost–X3; R–22/600a/142b (55.0/4.0/41.0).
R–408A	HCFC Blend Epsilon; FX–10; R–125/143a/22 (7.0/46.0/47.0).
R–409A	HCFC Blend Gamma; FX–56; R–22/124/142b (60.0/25.0/15.0).
R–411A	Greencool (Gu) or China Sun G2018A; R–1270/22/152a (1.5/87.5/11.0).
R–411B	Greencool (Gu) or China Sun G2018B; R–1270/22/152a (3.0/94.0/3.0).
R–414A	HCFC Blend Xi; GHG–X4; McMullen Oil Chill-It; McCool Chill-It; Monroe Air Tech Autofrost–X4; R–22/124/600a/142b (51.0/28.5/4.0/16.5).
R–414B	HCFC Blend Omicron; Hot Shot; Kar Kool; R–22/124/600a/142b (50.0/39.0/1.5/9.5).
R–420A	Choice R–420A; R–134a/142b (88.0/12.0).
THR–04	Composition is CBI.

While HCFC–22 and blends containing HCFC–22 and/or HCFC–142b may currently continue to be used to service existing refrigeration and air-conditioning equipment, EPA reiterates that HCFCs and HCFC blends are not long-term substitutes for ODS. EPA is considering whether current or potential substitutes are available that pose lower risk than these blends.

IV. What are my existing and new options for alternative refrigerants?

In the refrigeration and air-conditioning sector, EPA has previously found acceptable HCFC–22 and HCFC blends, including those containing HCFC–22 and HCFC–142b. To aid end users in the refrigeration and air-conditioning sector as they transition from use of these refrigerants, this section lists, by end use: (1) Refrigerants that EPA previously found acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b; and (2) refrigerants that EPA is newly finding acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. Where possible, refrigerants listed as acceptable in the refrigeration and air-conditioning section are identified by their designation per American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 34.

At the end of the decision for each end use, there is narrative comparing environmental, flammability, and toxicity information of the newly acceptable alternatives with other currently or potentially available alternatives. Flammable refrigerants are hazardous waste and must be disposed of consistent with regulations under the Resource Conservation and Recovery Act (RCRA). More environmental and health information is also available in the original SNAP rule of March 18, 1994, the notice of acceptability in which each substitute was first listed, or the sector table, which provides identification information, environmental information, flammability information, and toxicity and exposure data for each of the acceptable alternatives to HCFC–22 and blends containing HCFC–22 and/or HCFC–142b, in the refrigeration and air-conditioning sector. The sector table is available at *http://www.epa.gov/ozone/snap/refrigerants/index.html*.

A. Household and Light Commercial Air-Conditioning and Heat Pumps

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in household and light commercial air-conditioning and heat pumps:

- R–404A (new and retrofit equipment)
- R–407A (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–507A (new and retrofit equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in household and light commercial air-conditioning and heat pumps:

- Ammonia absorption system (new equipment)
- Desiccant cooling (new equipment)
- Evaporative cooling (new equipment)
- HFC–134a (new equipment)
- R–125/134a/600a (28.1%/70.0%/1.9% by weight) (new and retrofit equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) [5] (new and retrofit equipment)
- R–410B (new equipment)
- R–417A (new and retrofit equipment)
- R–421A (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)

[5] Throughout the decisions, available trade names for refrigerants without ASHRAE designations are provided in parentheses.

- R–424A (new and retrofit equipment)
- R–427A (retrofit equipment)
- R–434A (new and retrofit equipment)
- R–437A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- RS–44 (2003 formulation) (new and retrofit equipment)

Comparison to other refrigerants in the household and light commercial air-conditioning and heat pumps end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section A.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have 100-year integrated (100-yr) global warming potentials (GWPs) [6] relative to CO_2 ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407A is about 2110, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, and the GWP of R–507A is about 3990. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as hazardous air pollutants (HAPs) under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered volatile organic compounds (VOCs) under CAA regulations (*see* 40 CFR 51.100(s)) addressing the development of state implementation plans (SIPs) to attain and maintain the national ambient air quality standards. None of the substitutes previously found acceptable in IV.A.1, above, contain VOCs. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.[7]

With the exception of ammonia, none of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. EPA believes that flammability risks posed by ammonia can be addressed by existing standards from the Occupational Safety and Health Administration (OSHA) and ASHRAE and other safety precautions common in the refrigeration and air-conditioning industry.

The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8-hours, such as Workplace Environmental Exposure Limits (WEELs) from the American Industrial Hygiene Association (AIHA) or Threshold Limit Values (TLVs) from the American Conference of Government Industrial Hygienists (ACGIH). Ammonia has a Permissible Exposure Limit (PEL) of 50 ppm over 8 hours from OSHA. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, and PELs) and will address potential health risks by following requirements and recommendations in the Material Safety Data Sheets (MSDSs) and other safety precautions common in the refrigeration and air-conditioning industry.

Therefore, we find the newly listed substitutes (in IV.A.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the household and light commercial air-conditioning and heat pumps end use.

B. Residential Dehumidifiers

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in residential dehumidifiers:

- R–404A (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–507A (new and retrofit equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in residential dehumidifiers:

- HFC–134a (new and retrofit equipment)
- R–125/134a/600a (28.1%/70.0%/1.9% by weight) (new and retrofit equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5%by weight) (ICOR AT–22) (new and retrofit equipment)
- R–410B (new equipment)
- R–421A (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–426A (new and retrofit equipment)
- R–434A (new and retrofit equipment)
- R–437A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- RS–24 (2002 formulation) (new and retrofit equipment)
- RS–44 (2003 formulation) (new and retrofit equipment)

Comparison to other refrigerants in the residential dehumidifiers end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section B.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, and the GWP of R–507A is about 3990. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (*see* 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. None of the substitutes previously found acceptable in IV.B.1, above, contain VOCs. However, emissions of VOCs

[6] These values are based upon mass-weighted averages of the component chemicals, using the 100-yr GWPs listed in the International Panel on Climate Change's [IPCC] Fourth Assessment Report, *Climate Change 2007: The Physical Science Basis.* Another available source for GWPs is the IPCC's Second Assessment Report, *Climate Change 1995: Working Group I—The Science of Climate Change,* accessible from *http://www.ipcc.ch/ipccreports/sar/wg_I/ipcc_sar_wg_I_full_report.pdf.*

[7] EPA 1994. Significant New Alternatives Policy Technical Background Document: Risk Screen on the Use of Substitutes for Class I Ozone-depleting Substances: Refrigeration and Air Conditioning.

from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

With the exception of ammonia, none of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. EPA believes that the flammability risks posed by ammonia can be addressed by existing standards from OSHA and ASHRAE and other safety precautions common in the refrigeration and air-conditioning industry.

The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. Ammonia has a PEL of 50 ppm over 8 hours from OSHA. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, and PELs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry.

Therefore, we find the newly listed substitutes (in IV.B.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the residential dehumidifiers end use.

C. Reciprocating and Screw Chillers

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in reciprocating and screw chillers:

- R–404A (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–507A (new and retrofit equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in reciprocating and screw chillers:

- Ammonia absorption chillers or vapor compression with secondary loop (new equipment)
- Desiccant cooling (new equipment)
- Evaporative cooling (new equipment)
- HFC–134a (new and retrofit equipment)
- HFC–227ea (new equipment)
- R–125/134a/600a (28.1%/70.0%/1.9% by weight) (new and retrofit equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
- R–410B (new equipment)
- R–417A (new and retrofit equipment)
- R–421A (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–427A (retrofit equipment)
- R–434A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- RS–44 (2003 formulation) (new and retrofit equipment)
- SP34E (new and retrofit equipment)
- Stirling cycle (new equipment)

Comparison to other refrigerants in the reciprocating and screw chillers end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section C.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, and the GWP of R–507A is about 3990. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (*see* 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. None of the substitutes previously found acceptable in IV.C.1, above, contain VOCs. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

With the exception of ammonia, none of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. EPA believes that the flammability risks posed by ammonia can be addressed by existing standards from OSHA and ASHRAE and other safety precautions common in the refrigeration and air-conditioning industry.

The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. Ammonia has a PEL of 50 ppm over 8 hours from OSHA. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, and PELs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry.

Therefore, we find the newly listed substitutes (in IV.C.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the reciprocating and screw chillers end use.

D. Centrifugal Chillers

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in centrifugal chillers:

- R–404A (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–507A (new and retrofit equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in centrifugal chillers:

- Ammonia absorption chillers or vapor compression with secondary loop (new equipment)
- Desiccant cooling (new equipment)
- Evaporative cooling (new equipment)
- HFC–134a (new and retrofit equipment)
- HFC–227ea (new equipment)
- HFC–245fa (new and retrofit equipment)
- R–125/134a/600a (28.1%/70.0%/1.9% by weight) (new and retrofit equipment)

- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
- R–410B (new equipment)
- R–417A (new and retrofit equipment)
- R–421A (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)
- R–423A (ISCEON 39TC) (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–434A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- RS–44 (2003 formulation) (new and retrofit equipment)
- Stirling cycle (new equipment)
- Water/lithium bromide (new equipment)

Comparison to other refrigerants in the centrifugal chillers end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section D.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, and the GWP of R–507A is about 3990. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. None of the substitutes previously found acceptable in IV.D.1, above, contain VOCs. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

With the exception of ammonia, none of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. EPA believes that the flammability risks posed by ammonia can be addressed by existing standards from OSHA and ASHRAE and other safety precautions common in the refrigeration and air-conditioning industry.

The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8-hours, such as WEELs from the AIHA or TLVs from the ACGIH. Ammonia has a PEL of 50 ppm over 8 hours from OSHA. HFC–245fa exhibits moderate to low toxicity and has an 8-hour WEEL of 300 ppm. Water/lithium bromide absorption exhibits low toxicity. Lithium bromide (LiBr) has a 24-hour/day, 90 day Continuous Exposure Guidance Level (CEGL) value of 1 mg/m^3 from the National Research Council (NRC). Based on this CEGL, EPA recommends an 8-hour preliminary workplace exposure limit of 3 mg/m^3.[8] EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, PELs and CEGL) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry. Therefore, we find the newly listed substitutes (in IV.D.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the centrifugal chillers end use.

E. Industrial Process Air-Conditioning

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in industrial process air-conditioning:

- R–404A (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–507A (new and retrofit equipment)

[8] EPA's analysis of the NRC CEGL and rationale for preliminary workplace exposure limit are available at *http://www.regulations.gov* as item EPA–HQ–OAR–2003–0118–0243 EPA anticipates that lithium bromide powder will be used consistent with the personal protective equipment recommendations specified by OSHA (*http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910#1910_Subpart_I*).

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in industrial process air-conditioning:

- Ammonia vapor compression or absorption systems (new equipment)
- Desiccant cooling (new equipment)
- Evaporative cooling (new equipment)
- HFC–134a (new and retrofit equipment)
- R–125/134a/600a (28.1%/70.0%/1.9% by weight) (new and retrofit equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
- R–410B (new equipment)
- R–417A (new and retrofit equipment)
- R–421A (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)
- R–423A (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–426A (new and retrofit equipment)
- R–427A (retrofit equipment)
- R–434A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- RS–24 (2002 formulation) (new and retrofit equipment)
- RS–44 (2003 formulation) (new and retrofit equipment)

Comparison to other refrigerants in the industrial process air-conditioning end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section E.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, and the GWP of R–507A is about 3990. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. None of the substitutes previously found acceptable in IV.E.1, above, contain VOCs. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

With the exception of ammonia, none of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. EPA believes that the flammability risks posed by ammonia can be addressed by existing standards from OSHA and ASHRAE and other safety precautions common in the refrigeration and air-conditioning industry.

The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8-hours, such as WEELs from the AIHA or TLVs from the ACGIH. Ammonia has a PEL of 50 ppm over 8 hours from OSHA. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, and PELs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry.

Therefore, we find the newly listed substitutes (in IV.E.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the industrial process air-conditioning end use.

F. Industrial Process Refrigeration

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in industrial process refrigeration:

- R–404A (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–422A (ISCEON 79) (new and retrofit equipment)
- R–507A (new and retrofit equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in industrial process refrigeration:

- Ammonia vapor compression or absorption-systems (new equipment)
- Desiccant cooling (new equipment)
- Evaporative cooling (new equipment)
- HC Blend A (OZ–12) (new and retrofit equipment)
- HC Blend B (original formulation of HC–12a) (new and retrofit equipment)
- HFC–134a (new and retrofit equipment)
- HFC–227ea (new equipment)
- HFE–7000 [9] (new and retrofit equipment)
- HFE–7100 [10] and HFE–7200 [11] as secondary heat transfer fluid in not-in-kind systems (new equipment)
- Nitrogen direct gas expansion (new equipment)
- R–125/134a/600a (28.1%/70.0%/1.9% by weight) (new and retrofit equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
- R–290 (Propane) (new and retrofit equipment)
- R–407A and R–407B (new and retrofit equipment)
- R–410B (new equipment)
- R–417A (new and retrofit equipment)
- R–421A and R–421B (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)
- R–423A (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–426A (new and retrofit equipment)
- R–428A (new equipment)
- R–434A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- R–600 (Butane) (new and retrofit equipment)
- R–744 (Carbon dioxide, CO_2) (new equipment)
- R–1270 (Propylene) (new and retrofit equipment)
- RS–24 (2002 formulation) (new and retrofit equipment)
- RS–44 (2003 formulation) (new and retrofit equipment)
- Stirling cycle (new equipment)

[9] 1,1,1,2,2,3,3-heptafluoro-3-methoxypropane; HFE–347mcc3; CAS ID #375–03–1.

[10] Methoxynonafluorobutane, iso and normal; HFE–449s1; CAS ID #163702–07–6.

[11] Ethoxynonafluorobutane, iso and normal; HFE–569sf2; CAS ID #163702–05–4.

Comparison to other refrigerants in the industrial process refrigeration end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section F.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3610, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. The hydrocarbon substitutes that we are finding acceptable are at the low end of this range. Specifically, R–290, R–600, R–1270, and HC Blends A and B each have a GWP of about 5 or less. This in contrast with the GWPs of the previously listed substitutes, including the GWP of R–404A which is about 3920, the GWP of R–407C which is about 1770, the GWP of R–410A which is about 2090, the GWP of R–422A which is about 3140, and the GWP of R–507A which is about 3990. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. The hydrocarbons R–290, R–600, and R–1270, as well as all components of HC Blends A and B, are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under these regulations. In comparison, one of the substitutes previously found acceptable in IV.F.1, above, (R–422A) contains a VOC component. Emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

Ammonia has an ASHRAE class 2 flammability classification or moderate flammability risk. EPA believes that the moderate flammability risks of ammonia can be addressed by existing standards from OSHA and ASHRAE and other safety precautions common in the refrigeration and air-conditioning industry. Each of the newly listed hydrocarbons and hydrocarbon blends

has an ASHRAE class 3 flammability classification. As early as the 1994 original SNAP rule, EPA noted that hydrocarbons were used in industrial process refrigeration, including specialized industrial applications such as oil refineries and chemical plants. EPA noted that these users were familiar with hydrocarbons, had safety procedures in place, and that their facilities were designed to comply with the safety standards required for managing flammable chemicals.

The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low when used according to standard practices for industrial processes and for industrial process refrigeration. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. Ammonia has a PEL of 50 ppm over 8 hours from OSHA. HFE–7200 has an 8-hour manufacturer acceptable exposure limit (AEL) of 200 ppm and HFE–7000 has an 8-hour manufacturer AEL of 75 ppm. Within the industrial process refrigeration end use, such as at chemical or other industrial plants, proper exposure controls and ventilation are generally available as well as established protocols for handling potentially hazardous materials, and therefore overall occupational risk is mitigated. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, PELs, and manufacturer AELs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry.

Therefore, we find the newly listed substitutes (in IV.F.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the industrial process refrigeration end use.

G. Bus and Passenger Train Air-Conditioning

The bus and passenger train air-conditioning end use previously had substitutes listed as acceptable for HCFC–22 itself, but not as substitutes for blends containing HCFC–22 and/or HCFC–142b; this is reflected in category (1), below.

1. EPA previously found the following acceptable as substitutes for HCFC–22 in bus and passenger train air-conditioning:

- HFC–134a (new and retrofit equipment)
- R–125/134a/600a (28.1%/70.0%/1.9% by weight) (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–417A (new and retrofit equipment)
- R–422B and R–422D (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–427A (retrofit equipment)
- R–434A (new and retrofit equipment)
- R–438A (new and retrofit equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in bus and passenger train air-conditioning:

- Evaporative cooling (new equipment)
- HFC–134a (new and retrofit equipment)
- R–125/134a/600a (28.1%/70.0%/1.9% by weight) (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–417A (new and retrofit equipment)
- R–422B and R–422D (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–426A (new and retrofit equipment)
- R–427A (retrofit equipment)
- R–434A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- RS–24 (2002 formulation) (new and retrofit equipment)
- SP34E (new and retrofit equipment)
- Stirling cycle (new equipment)

Comparison to other refrigerants in the bus and passenger train air-conditioning end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section G.1 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3250, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920 and the GWP of R–507A is about 3990. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

None of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. For each of these substitutes, EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, and PELs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry.

Therefore, we find the newly listed substitutes (in IV.G.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the bus and passenger train air-conditioning end use.

H. Ice Skating Rinks

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in ice skating rinks:

- R–404A (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–422A (ISCEON 79) (new and retrofit equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22

and blends containing HCFC–22 and/or HCFC–142b in ice skating rinks:

- Ammonia vapor compression or absorption systems (new equipment)
- HFC–134a (new and retrofit equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
- R–407A and R–407B (new and retrofit equipment)
- R–410B (new equipment)
- R–417A (new and retrofit equipment)
- R–421A and R–421B (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)
- R–423A (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–426A (new and retrofit equipment)
- R–428A (new and retrofit equipment)
- R–434A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- RS–24 (2002 formulation) (new and retrofit equipment)
- RS–44 (2003 formulation) (new and retrofit equipment)

Comparison to other refrigerants in the ice skating rinks end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section H.2 are non-ozone depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3610, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, and the GWP of R–422A is about 3140. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (*see* 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. In comparison, one of the substitutes previously found acceptable in IV.H.1, above, (R–422A) contains a VOC component. Emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

With the exception of ammonia, none of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. EPA believes that the flammability risks posed by ammonia can be addressed by existing standards from OSHA and ASHRAE and other safety precautions common in the refrigeration and air-conditioning industry.

The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. Ammonia has a PEL of 50 ppm over 8 hours from OSHA. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, and PELs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry. Therefore, we find the newly listed substitutes (in IV.H.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the ice skating rinks end use.

I. Cold Storage Warehouses

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in cold storage warehouses:

- R–404A (new and retrofit equipment)
- R–407A and R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–422A (ISCEON 79) (new and retrofit equipment)
- R–428A (new and retrofit equipment)
- R–507A (new and retrofit equipment)
- R–744 (Carbon dioxide, CO_2) (new equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in cold storage warehouses:

- Ammonia vapor compression or absorption systems (new equipment)
- Desiccant cooling (new equipment)
- Evaporative cooling (new equipment)
- HFC–134a (new and retrofit equipment)
- HFC–227ea (new equipment)
- Pressure stepdown (new equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
- R–407B (new and retrofit equipment)
- R–410B (new equipment)
- R–417A (new and retrofit equipment)
- R–421A and R–421B (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)
- R–423A (ISCEON 39TC) (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–426A (new and retrofit equipment)
- R–434A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- RS–24 (2002 formulation) (new and retrofit equipment)
- RS–44 (2003 formulation) (new and retrofit equipment)
- Self-chilling cans containing recycled CO_2 (not generating CO_2 via chemical reaction) (new and retrofit equipment)
- SP34E (new and retrofit equipment)
- Stirling cycle

Comparison to other refrigerants in the cold storage warehouses end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section I.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, the GWP of R–422A is about 3140, the GWP of R–428A is about 3610, and the GWP of R–507A is about 3990. The contribution of these refrigerants to greenhouse gas emissions

is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. In comparison, two of the substitutes previously found acceptable in IV.I.1, above, (R–422A and R–428A) contain some VOC components. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

With the exception of ammonia, none of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. EPA believes that the flammability risks posed by ammonia can be addressed by existing standards from OSHA and ASHRAE and other safety precautions common in the refrigeration and air-conditioning industry.

The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. Ammonia has a PEL of 50 ppm over 8 hours from OSHA. For each of these substitutes, EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, and PELs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry. Therefore, we find the newly listed substitutes (in IV.I.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the cold storage warehouse end use.

J. Refrigerated Transport

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in refrigerated transport:

- R–404A (new and retrofit equipment)
- R–407A and R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–428A (new and retrofit equipment)
- R–507A (new and retrofit equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in refrigerated transport:

- Cryogenic system using recaptured liquid CO_2 or liquid nitrogen (new equipment)
- Direct nitrogen expansion (new equipment)
- HFC–134a (new and retrofit equipment)
- R–125/134a/600a (28.1%/70.0%/1.9% by weight) (new and retrofit equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
- R–407B and R–407D (new and retrofit equipment)
- R–410B (new equipment)
- R–417A (new and retrofit equipment)
- R–421A and R–421B (new and retrofit equipment)
- R–422A (ISCEON 79) (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–426A (new and retrofit equipment)
- R–434A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- RS–24 (2002 formulation) (new and retrofit equipment)
- RS–44 (2003 formulation) (new and retrofit equipment)
- SP34E (new and retrofit equipment)
- Stirling cycle (new equipment)

Comparison to other refrigerants in the refrigerated transport end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section J.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407A is about 2110, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, the GWP of R–428A is about 3610, and the GWP of R–507A is about 3990. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. In comparison, one of the substitutes previously found acceptable in IV.J.1, above, (R–428A) contains some VOC components. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

None of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. For each of these substitutes, EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, and PELs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry. Therefore, we find the newly listed substitutes (in IV.J.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the refrigerated transport end use.

K. Retail Food Refrigeration

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in retail food refrigeration:

- R–404A (new and retrofit equipment)
- R–407A (new and retrofit equipment)
- R–407C (new and retrofit equipment)

- R–410A (new equipment)
- R–422A (ISCEON 79) (new and retrofit equipment)
- R–428A (new and retrofit equipment)
- R–507A (new and retrofit equipment)
- R–744 (Carbon dioxide, CO_2) (new equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in retail food refrigeration:

- Ammonia vapor compression with a secondary loop (new equipment)
- HFC–134a (new and retrofit equipment)
- HFE–7100 and HFE–7200 as secondary heat transfer fluid in not-in-kind systems (new equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
- R–407B (new and retrofit equipment)
- R–410B (new equipment)
- R–417A (new and retrofit equipment)
- R–421A and R–421B (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–426A (new and retrofit equipment)
- R–427A (retrofit equipment)
- R–434A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- RS–24 (2002 formulation) (new and retrofit equipment)
- RS–44 (2003 formulation) (new and retrofit equipment)
- SP34E (new and retrofit equipment)

Comparison to other refrigerants in the retail food refrigeration end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section K.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, the GWP of R–422A is about 3140, the GWP of R–428A is about 3610, and the GWP of R–507A is about 3990. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. In comparison, two of the substitutes previously found acceptable in IV.K.1, above, (R–422A and R–428A) contain some VOC components. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

With the exception of ammonia, none of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. EPA believes that the flammability risks posed by ammonia can be addressed by existing standards from OSHA and ASHRAE and other safety precautions common in the refrigeration and air-conditioning industry.

The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. Ammonia has a PEL of 50 ppm over 8 hours from OSHA. HFE–7200 has an 8-hour manufacturer AEL of 200 ppm. For each of these substitutes, EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, PELs, and manufacturer AEL) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry.

Therefore, we find the newly listed substitutes (in IV.K.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the retail food refrigeration end use.

L. Commercial Ice Machines

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in commercial ice machines:

- R–404A (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–428A (new and retrofit equipment)
- R–507A (new and retrofit equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in commercial ice machines:

- Ammonia vapor compression or absorption-systems (new equipment)
- HFC–134a (new equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
- R–407A and R–407B (new and retrofit equipment)
- R–410B (new equipment)
- R–417A (new and retrofit equipment)
- R–421A and R–421B (new and retrofit equipment)
- R–422A (ISCEON 79) (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–426A (new and retrofit equipment)
- R–434A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- RS–24 (2002 formulation) (new and retrofit equipment)
- RS–44 (2003 formulation) (new and retrofit equipment)
- Stirling cycle (new equipment)

Comparison to other refrigerants in the commercial ice machines end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section L.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, the GWP of R–428A is about 3610, and the GWP of R–507A is about 3990. The contribution of these

refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. In comparison, one of the substitutes previously found acceptable in IV.L.1, above, (R–428A) contains some VOC components. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

With the exception of ammonia, none of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. EPA believes that the flammability risks posed by ammonia can be addressed by existing standards from OSHA and ASHRAE and other safety precautions common in the refrigeration and air-conditioning industry.

The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. Ammonia has a PEL of 50 ppm over 8 hours from OSHA. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, and PELs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry.

Therefore, we find the newly listed substitutes (in IV.L.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the commercial ice machines end use.

M. Household Refrigerators and Freezers

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in household refrigerators and freezers:

- R–404A (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)
- R–422A (ISCEON 79) (new and retrofit equipment)
- R–428A (new and retrofit equipment)
- R–507A (new and retrofit equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in household refrigerators and freezers:

- Ammonia absorption systems (new equipment)
- HFC–134a (new and retrofit equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
- R–410B (new equipment)
- R–417A (new and retrofit equipment)
- R–421A and R–421B (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)
- R–424A (new and retrofit equipment)
- R–426A (new and retrofit equipment)
- R–427A (retrofit equipment)
- R–434A (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- RS–24 (2002 formulation) (new and retrofit equipment)
- RS–44 (2003 formulation) (new and retrofit equipment)

Comparison to other refrigerants in the household refrigerators and freezers end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section M.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, the GWP of R–422A is about 3140, the GWP of R–428A is about 3610, and the GWP of R–507A is about 3990. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. In comparison, two of the substitutes previously found acceptable in IV.M.1, above, (R–422A and R–428A) contain some VOC components. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

With the exception of ammonia, none of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. EPA believes that the flammability risks posed by ammonia can be addressed by existing standards from OSHA and ASHRAE and other safety precautions common in the refrigeration and air-conditioning industry.

The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. Ammonia has a PEL of 50 ppm over 8 hours from OSHA. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, and PELs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry.

Therefore, we find the newly listed substitutes (in IV.M.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the household refrigerators and freezers end use.

N. Vending Machines

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in vending machines:

- R–404A (new and retrofit equipment)

• R–407C (new and retrofit equipment)
• R–410A (new equipment)
• R–507A (new and retrofit equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in vending machines:

• HFC–134a (new and retrofit equipment)
• R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
• R–410B (new equipment)
• R–417A (new and retrofit equipment)
• R–421A (new and retrofit equipment)
• R–422B, R–422C, and R–422D (new and retrofit equipment)
• R–426A (new and retrofit equipment)
• R–438A (new and retrofit equipment)
• RS–24 (2002 formulation) (new and retrofit equipment)
• SP34E (new and retrofit equipment)
• Stirling cycle (new equipment)

Comparison to other refrigerants in the vending machines end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section N.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, and the GWP of R–507A is about 3990. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. None of the substitutes previously found acceptable in IV.N.1, above, contain VOCs. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

None of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, and PELs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry.

Therefore, we find the newly listed substitutes (in IV.N.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the vending machines end use.

O. Water Coolers

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in water coolers:

• R–404A (new and retrofit equipment)
• R–407C (new and retrofit equipment)
• R–410A (new equipment)
• R–507A (new and retrofit equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in water coolers:

• HFC–134a (new and retrofit equipment)
• R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
• R–410B (new equipment)
• R–417A (new and retrofit equipment)
• R–421A and R–421B (new and retrofit equipment)
• R–422B, R–422C, and R–422D (new and retrofit equipment)
• R–426A (new and retrofit equipment)
• R–434A (new and retrofit equipment)
• R–438A (new and retrofit equipment)
• RS–24 (2002 formulation) (new and retrofit equipment)
• SP34E (new and retrofit equipment)

Comparison to other refrigerants in the water coolers end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section O.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, the GWP of R–410A is about 2090, and the GWP of R–507A is about 3990. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. None of the substitutes previously found acceptable in IV.O.1, above, contain VOCs. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

None of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, and PELs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry.

Therefore, we find the newly listed substitutes (in IV.O.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the vending machines end use.

P. Very Low Temperature Refrigeration

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in very low temperature refrigeration:

- R–404A (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in very low temperature refrigeration:

- HFE–7100 and HFE–7200 as secondary heat transfer fluid in not-in-kind systems (new equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
- R–422B and R–422C (new and retrofit equipment)
- R–744 (Carbon dioxide, CO_2) (new equipment)

Comparison to other refrigerants in the very low temperature refrigeration end use:

The newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b listed above in section P.2 are non-ozone-depleting, in contrast to HCFC–22 or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, and the GWP of R–410A is about 2090. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. None of the substitutes previously found acceptable in IV.P.1, above, contain VOCs. However, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

None of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b is flammable. The toxicity risks of the newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b are low. Most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. HFE–7200 has an 8-hour manufacturer AEL of 200 ppm. R–744 has a PEL of 5000 ppm. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, PELs and AEL) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry.

Therefore, we find the newly listed substitutes (in IV.P.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the vending machines end use.

Q. Non-Mechanical Heat Transfer Systems

HFO–1234ze,[12] which was previously listed as a substitute for class I and class II ODS in several foam blowing end uses (September 30, 2009; 74 FR 50129) is today being listed as acceptable as a substitute for CFC–113, HCFC–22, and blends containing HCFC–22 and/or HCFC–142b, in the heat transfer end use. You may find the submission under Docket items EPA–HQ–OAR–2003–0118–0222 and EPA–HQ–OAR–2003–0118–0247 at *http://www.regulations.gov*. We note that EPA is also reviewing this substance through a Pre-Manufacture Notice (PMN) under the Toxic Substances Control Act (TSCA) and users will be subject under TSCA to any requirements established through the PMN process.

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC blends, including those containing HCFC–22 and/or HCFC–142b, in non-mechanical heat transfer systems:

- HFC–4310mee (new and retrofit equipment)
- R–404A (new and retrofit equipment)
- R–407C (new and retrofit equipment)
- R–410A (new equipment)

2. EPA is newly finding the following acceptable as substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b in non-mechanical heat transfer systems:

- C6-perfluoroketone [13] (Novec™ 649) (new and retrofit equipment)
- HFC–245fa (new and retrofit equipment)
- HFE–7000 (new and retrofit equipment)
- HFE–7100 (new and retrofit equipment)
- HFE–7200 (new and retrofit equipment)
- HFO–1234ze (new and retrofit equipment)
- R–125/290/134a/600a (55.0%/1.0%/42.5%/1.5% by weight) (ICOR AT–22) (new and retrofit equipment)
- R–417A (new and retrofit equipment)
- R–422B, R–422C, and R–422D (new and retrofit equipment)
- R–438A (new and retrofit equipment)
- R–744 (Carbon Dioxide, CO_2) (new and retrofit equipment)
- Volatile Methyl Siloxanes [14] (new and retrofit equipment)
- Water (new and retrofit equipment)

3. EPA is newly finding the following acceptable as a substitute for CFC–113 in non-mechanical heat transfer systems:

- HFO–1234ze (new and retrofit equipment)

Comparison to other refrigerants in the non-mechanical heat transfer systems end use:

The newly listed substitutes for CFC–113, HCFC–22, and blends containing HCFC–22 and/or HCFC–142b listed above in section P.2 and 3 are non-ozone-depleting, in contrast to CFC–113, HCFC–22, or blends containing HCFC–22 and/or HCFC–142b. They are comparable to other acceptable substitutes for CFC–113, HCFC–22, and blends containing HCFC–22 and/or HCFC–142b in their lack of risk for ozone depletion. HFO–1234ze has no

[12] HFC–1234ze; HFO–1234ze(E); HFC–1234ze(E); trans-1,3,3-tetrafluoroprop-1-ene; CAS ID #29118–24–9.

[13] 1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone or FK–5–1–12mmy2; CAS ID #756–13–8.

[14] Octamethylcyclo-tetrasiloxanes (*e.g.,* D4, CAS ID #556–67–2) and decamethylcyclo-pentasiloxanes (*e.g.,* D5, CAS ID #541–02–6).

ODP. HFO–1234ze has a GWP of 6 and an atmospheric lifetime of approximately 2 weeks (Javadi et al., 2008). The newly listed substitutes have GWPs ranging from 0 to about 3390, comparable to or lower than that of other substitutes for CFC–113, HCFC–22, and blends containing HCFC–22 and/or HCFC–142b. For example, the GWP of HFC–4310mee is about 1640, the GWP of R–404A is about 3920, the GWP of R–407C is about 1770, and the GWP of R–410A is about 2090. The contribution of these refrigerants to greenhouse gas emissions is limited given the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1), which limit emissions of refrigerant substitutes.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. C6-perfluoroketone and HFO–1234ze are considered VOCs under CAA regulations (*see* 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. Some of the newly listed substitutes contain small amounts of components that are considered VOCs under those regulations. In comparison, none of the substitutes previously found acceptable in IV.Q.1, above, contain VOCs. EPA has received a petition to exempt HFO–1234ze from the definition of VOC for purposes of SIPs to attain and maintain the NAAQS on the basis that the chemical has a low photochemical reactivity. EPA intends to address the request through notice-and-comment rulemaking. Further, emissions of VOCs from refrigerant blends are expected to be small relative to the total emissions of VOCs from all sources.

With the exception of some of the volatile methyl siloxanes, none of the newly listed substitutes for CFC–113, HCFC–22, and blends containing HCFC–22 and/or HCFC–142b is flammable. Some volatile methyl siloxanes have flammability risks, and EPA believes that these will be addressed by existing standards from OSHA, ASHRAE, guidelines in the MSDSs, and other safety precautions common in the refrigeration and air-conditioning industry.

The toxicity risks of the newly listed substitutes for CFC–113, HCFC–22, and blends containing HCFC–22 and/or HCFC–142b are low. The potential health effects of HFO–1234ze at lower concentrations include drowsiness and dizziness. At sufficiently high concentrations, it may cause central nervous system depression or irregular heartbeat. HFO–1234ze could cause asphyxiation, if air is displaced by vapor in a confined space. The substitute may also irritate the lungs, skin or eyes or cause frostbite. These potential health effects are common to many refrigerants. EPA anticipates that users of non-mechanical heat transfer systems will take action consistent with the recommendations specified in the manufacturers' MSDSs for HFO–1234ze. EPA recommends a workplace AEL of 1,000 ppm on an 8-hour time-weighted average for HFO–1234ze.[15] EPA recommends a preliminary consumer exposure limit (acute) of 10,000 ppm on a 30-minute time-weighted average. Our risk screen found that workplace and consumer exposure, respectively, are likely to be well below these levels.[16]

As for the other newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b, most of the blends contain HFC or hydrocarbon components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. C6-perfluoroketone has an 8-hour manufacturer AEL of 150 ppm, HFE–7200 has an 8-hour manufacturer AEL of 200 ppm, and HFE–7000 has an 8-hour manufacturer AEL of 75 ppm. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, PELs, manufacturer AELs and EPA recommendation) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the refrigeration and air-conditioning industry. Therefore, we find the newly listed substitutes (in IV.P.2 and 3, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the non-mechanical heat transfer end use.

V. What are my existing and new options for alternative foam blowing agents?

Historically, HCFC–22 and HCFC–142b, along with HCFC–141b, have been used as substitutes for CFC–11 and CFC–12 in foam blowing. HCFC–22 and HCFC–142b were originally found acceptable as substitutes for CFCs in all foam blowing end uses under the SNAP program (March 18, 1994; 59 FR 13084). In 2007, EPA found a number of foam blowing agents containing HCFCs unacceptable for use as substitutes for ODS, because alternatives exist with zero or lower ODPs. Specifically, EPA has found HCFC–22, HCFC–142b, and blends thereof unacceptable as substitutes for CFCs in the following end uses:

- Rigid polyurethane and polyisocyanurate laminated boardstock;
- Rigid polyurethane appliance;
- Rigid polyurethane spray and commercial refrigeration, and sandwich panels;
- Rigid polyurethane slabstock and other foams;
- Polystyrene extruded insulation boardstock and billet;
- Phenolic insulation board and bunstock;
- Flexible polyurethane; and
- Polystyrene extruded sheet

(40 CFR part 82 appendix Q to subpart G)

EPA has also found HCFC–22, HCFC–142b, and blends thereof unacceptable as substitutes for HCFC–141b in the following end uses:

- Rigid polyurethane and polyisocyanurate laminated boardstock;
- Rigid polyurethane appliance;
- Rigid polyurethane spray and commercial refrigeration, and sandwich panels; and
- Rigid polyurethane slabstock and other foams

(40 CFR part 82 appendix K to subpart G and 40 CFR part 82 appendix Q to subpart G)

Existing users of HCFC–22, HCFC–142b, and blends thereof, as of November 4, 2005, were allowed a transition period (which varied in time by end use and application) to switch to alternatives, depending on the specific use. The last of these transition periods ended January 1, 2010 (40 CFR part 82 appendix Q to subpart G).

Finally, EPA has found that HCFC–124 is unacceptable as a substitute for HCFC–123, HCFC–141b, HCFC–142b, HCFC–22, or blends thereof in all foam blowing end uses (40 CFR Part 82 Appendix K to Subpart G).

In the original SNAP rulemaking EPA addressed the use of blends in foam blowing applications. EPA determined that notification was not required for "use of blends or mixtures of substitutes listed as acceptable under the SNAP program in open-celled or closed-cell or semi-rigid end uses" but was required in the following end-uses: polyurethane and polyisocyanurate rigid laminated boardstock; polyurethane spray foam; polystyrene extruded boardstock and billet foams; phenolic foams; and polyolefin foams (59 FR 13084, March

[15] Due to additional data on toxicity, EPA is able to use a lower uncertainty factor and recommend a higher workplace AEL compared to the preliminary AEL analysis (where an AEL of 375 ppm was recommended).

[16] The risk screen as well as derivations of EPA's recommended workplace AEL and preliminary consumer exposure limit (acute) are available at *http://www.regulations.gov* as item EPA–HQ–OAR–2003–0118–0250.

18, 1994). Therefore, blends of acceptable substitutes are also acceptable substitutes for the following foam blowing end uses: rigid polyurethane, appliance; rigid polyurethane, commercial (including commercial foam and sandwich panels, but excluding spray foam); rigid polyurethane, slabstock; flexible polyurethane; polystyrene, extruded sheet; and integral skin polyurethane.

To aid end users as they transition from use of HCFC–22 and HCFC–142b, sections IV.A through K list, by end use: (1) Foam blowing agents that EPA previously found acceptable as substitutes for HCFC–22, HCFC–142b, or all HCFCs; and (2) foam blowing agents that EPA is newly finding acceptable as substitutes for HCFC–22, HCFC–142b, or blends thereof. At the end of the decision for each end use, there is narrative comparing environmental, flammability, and toxicity information of the newly acceptable alternatives with other currently or potentially available alternatives. Flammable blowing agents are hazardous waste when disposed and must be disposed of consistent with regulations under RCRA. More environmental information, flammability information, and toxicity and exposure data is also available in the original SNAP rule of March 18, 1994, the notice of acceptability in which each substitute was first listed, or the sector table for each of the acceptable alternatives to HCFC–22, HCFC–142b, and blends thereof, in the foam blowing sector. The sector table is available at *http://www.epa.gov/ozone/snap/foams/index.html*. The sector table also includes further identification information (including composition and trade names) for each substitute.

Due to the unique flammability concerns that affect listings in the spray foam application, for greater clarity this document separates listings for spray foam (section V.D) from listings for commercial refrigeration foam and sandwich panels (section V.C). Commercial refrigeration foam, spray foam, and sandwich panels together constitute the rigid polyurethane commercial refrigeration foam, spray foam, and sandwich panels end use. However, because of the heightened risk of using a flammable blowing agent when blowing spray foam, in most cases we have not listed flammable substitutes as acceptable in spray foam (*e.g.,* methyl formate and C3–C6 saturated light hydrocarbons), although we have found some acceptable for use in commercial refrigeration foam and in sandwich panels (*see* April 11, 2000; 65 FR 19327, December 18, 2000; 65 FR 78977, August 21, 2003; 68 FR 50533, and September 30, 2009; 74 FR 50129). In limited circumstances, where the submitter of a specific substitute has supplied EPA with a safety training program for customers to address the flammability risks unique to spray foam, we have listed such flammable blowing agents as acceptable for spray foam applications (see December 6, 1999; 64 FR 68039 and October 1, 2004; 69 FR 58903).

A. Rigid Polyurethane & Polyisocyanurate Laminated Boardstock

HFO–1234ze,[17] which was previously listed as a substitute for class I and class II ODS in several foam blowing end uses (September 30, 2009; 74 FR 50129) is today being listed as a substitute for HCFC–22, HCFC–142b, and blends thereof in five other foam blowing end uses. You may find the submission under Docket items EPA–HQ–OAR–2003–0118–0222 and EPA–HQ–OAR–2003–0118–0246 at *http://www.regulations.gov*.

1. EPA previously found the following acceptable as substitutes for HCFC–22, HCFC–142b, blends thereof, or for all HCFCs in rigid polyurethane & polyisocyanurate laminated boardstock:

- Carbon dioxide, CO_2
- 2-chloropropane
- Ecomate™
- Formacel® TI
- Formic acid
- HFC–134a
- HFC–152a
- HFC–245fa
- Methyl formate
- Transcend™ Technologies, as an additive to SNAP-approved blowing agents in blends making up to 5% by weight of the total foam formulation.
- Water

2. EPA is newly finding the following acceptable as substitutes for HCFC–22, HCFC–142b, and blends thereof in rigid polyurethane & polyisocyanurate laminated boardstock:

- Electroset technology
- Exxsol blowing agents
- HFC–365mfc
- HFO–1234ze
- Saturated light hydrocarbons C3–C6 (e.g., propane, butane, isobutane, pentane, cyclopentane, hexane, cyclohexane)

Comparison to other foam blowing agents in the rigid polyurethane & polyisocyanurate laminated boardstock end use:

The newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof listed above in section A.2 are non-ozone-depleting, in contrast to HCFC–22, HCFC–142b, or blends thereof. They are comparable to other acceptable substitutes for HCFC–22, HCFC–142b, and blends thereof in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to 794, comparable to or lower than that of other substitutes for HCFC–22, HCFC–142b, and blends thereof. For example, the GWP of HFC–134a is about 1430 and the GWP of HFC–245fa is about 1030.

None of the newly listed refrigerant substitutes contain any components that are defined as HAPs under the CAA. C3–C6 saturated hydrocarbons, HFO–1234ze, and some components of Exxsol blowing agents are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. EPA has received a petition to exempt HFO–1234ze from the definition of VOC for purposes of SIPs to attain and maintain the NAAQS on the basis that the chemical has a low photochemical reactivity. EPA intends to address the request through notice-and-comment rulemaking. Of the substitutes previously found acceptable in V.A.1, above, 2-chloropropane and formic acid are VOCs.

Among the newly listed substitutes for HCFC–22, HCFC–142b, or blends thereof, Exxol Blowing Agents, HFC–365mfc, and C3–C6 saturated hydrocarbons are flammable. Examples of other flammable foam blowing agents that we previously found acceptable in this end use include 2-chloropropane, Ecomate™, formic acid, HFC–152a, and methyl formate. EPA believes that the flammability risks can be addressed by existing standards from OSHA, guidelines from the manufacturer, and other safety precautions common in the foam blowing industry.

The toxicity risks of the newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof are low. The potential health effects of HFO–1234ze at lower concentrations include drowsiness and dizziness. The substitute may also irritate the lungs, skin or eyes or cause frostbite. At sufficiently high concentrations, it may cause central nervous system depression or irregular heart beat. HFO–1234ze could cause asphyxiation, if air is displaced by vapor in a confined space. These potential health effects are common to many foam blowing agents. EPA anticipates that users in foam blowing end uses will take action consistent with the recommendations specified in the manufacturers' MSDSs for HFO–1234ze. EPA recommends a

[17] HFO–1234ze(E); HFC–1234ze(E); trans-1,3,3-tetrafluoroprop-1-ene; CAS ID #29118–24–9.

workplace AEL of 1,000 ppm on an 8-hour time-weighted average for HFO–1234ze, which is updated from our preliminary recommendation that accompanied the acceptability listing for HFO–1234ze in several other foam blowing end uses (74 FR 50129; September 30, 2009).[18] Our risk screen found that workplace exposure is likely to be well below that level.[19]

As for the other newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b, HFC–365mfc, C3–C6 saturated light hydrocarbons, and Exxsol blowing agents contain components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from ACGIH. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, PELs and EPA recommendation) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the foam blowing industry. Therefore, we find the newly listed substitutes (in V.A.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the rigid polyurethane & polyisocyanurate laminated boardstock end use.

B. Rigid Polyurethane Appliance Foam

1. EPA previously found the following acceptable as substitutes for HCFC–22, HCFC–142b, blends thereof, or for all HCFCs in rigid polyurethane appliance foam:

- Carbon dioxide, CO_2
- Ecomate™
- Formacel® TI
- Formic acid
- HFC–134a
- HFC–152a
- HFC–245fa
- HFO–1234ze
- Methyl formate
- Transcend™ Technologies, as an additive to SNAP-approved blowing agents in blends making up to 5% by weight of the total foam formulation.
- Water

2. EPA is newly finding the following acceptable as substitutes for HCFC–22, HCFC–142b, and blends thereof in rigid polyurethane appliance foam:

- Electroset technology
- Exxsol blowing agents
- HFC–365mfc
- Saturated light hydrocarbons C3–C6 (e.g., propane, butane, isobutane, pentane, cyclopentane, hexane, cyclohexane)
- Vacuum panels

Comparison to other foam blowing agents in the rigid polyurethane appliance foam end use:

We are finding all of the newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof listed above in section V.B.2, with the exception of vaccum panels, to also be acceptable in the rigid polyurethane and polyisocyanurate laminated boardstock end use. Vacuum panels have an ODP and GWP of 0, are not VOCs or HAPs, are non-flammable, and do not present toxicity concerns. *Please see* section V.A.2 for further information on the environmental and safety impacts of the newly listed alternatives compared to other available alternatives. For the reasons discussed above in this section and in section V.A.2, we find that the newly listed substitutes (in V.B.2, above) are acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the rigid polyurethane appliance foam end use.

C. Rigid Polyurethane Commercial Refrigeration Foam and Sandwich Panels

1. EPA previously found the following acceptable as substitutes for HCFC–22, HCFC–142b, blends thereof, or for all HCFCs in rigid polyurethane commercial refrigeration foam and sandwich panels:

- Carbon dioxide, CO_2
- Ecomate™
- Formacel® TI
- Formic acid
- HFC–134a
- HFC–152a
- HFC–245fa
- HFO–1234ze
- Methyl formate
- Transcend™ Technologies, as an additive to SNAP-approved blowing agents in blends making up to 5% by weight of the total foam formulation.
- Water

2. EPA is newly finding the following acceptable as substitutes for HCFC–22, HCFC–142b, and blends thereof in rigid polyurethane commercial refrigeration foam and sandwich panels:

- Electroset technology
- Exxsol blowing agents
- HFC–365mfc
- HFC–365mfc/HFC–245fa blends containing at least 5% HFC–245fa
- Saturated light hydrocarbons C3–C6 (e.g., propane, butane, isobutane, pentane, cyclopentane, hexane, cyclohexane)

Comparison to other foam blowing agents in the rigid polyurethane commercial refrigeration foam and sandwich panels end use:

We are finding all of the newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof listed above in section V.C.2, with the exception of HFC–365mfc/HFC–245fa blends containing at least 5% HFC–245fa, to also be acceptable in the rigid polyurethane and polyisocyanurate laminated boardstock end use. Blends of HFC–365mfc/HFC–245fa containing at least 5% HFC–245fa are comparable to other acceptable substitutes for HCFC–22, HCFC–142b, or blends thereof in the rigid polyurethane commercial refrigeration foam and sandwich panels end use in their lack of risk for ozone depletion. In addition, these blends have average GWPs ranging from 870 to 960, comparable to or lower than other substitutes (e.g., the GWP of HFC–134a is about 1430 and the GWP of HFC–245fa is about 1030). HFC–365mfc and HFC–245fa are exempt from the definition of VOCs under CAA regulations addressing the development of SIPs to attain and maintain the national ambient air quality standards. HFC–365mfc is flammable. Examples of other flammable foam blowing agents that we previously found acceptable in this end use include Ecomate™, formic acid, HFC–152a, and methyl formate. EPA believes the flammability risks can be addressed by existing standards from OSHA, guidelines from the manufacturer, and other safety precautions common in the foam blowing industry. With regard to toxicity, HFC–245fa has an 8-hour WEEL of 300 ppm. EPA anticipates that users will be able to meet the WEEL and will address potential health risks by following requirements and recommendations in the MSDS and other safety precautions common in the foam blowing industry. Please see section V.A.2 for further information on the environmental and safety impacts of the other newly listed alternatives compared to available alternatives.

For the reasons discussed above in this section and in section V.A.2, we find the newly listed substitutes (in V.C.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the rigid polyurethane commercial refrigeration foam and sandwich panels end use.

[18] Due to additional data on toxicity, EPA is able to use a lower uncertainty factor and recommend a higher workplace AEL compared to the preliminary AEL analysis (where an AEL of 375 ppm was recommended).

[19] The risk screen is available at *http://www.regulations.gov* as item EPA–HQ–OAR–2003–0118–0250.

D. Rigid Polyurethane Spray Foam

1. EPA previously found the following acceptable as substitutes for HCFC–22, HCFC–142b, blends thereof, or for all HCFCs in rigid polyurethane spray foam:

- Carbon dioxide, CO_2
- Ecomate™
- Formacel® TI
- Formic acid
- HFC–134a
- HFC–152a
- HFC–245fa
- HFO–1234ze
- Water

2. EPA is newly finding the following acceptable as substitutes for HCFC–22, HCFC–142b, and blends thereof in rigid polyurethane spray foam:

- Electroset technology
- Exxsol blowing agents
- HFC–365mfc/HFC–245fa blends containing at least 5% HFC–245fa

Comparison to other foam blowing agents in the rigid polyurethane spray foam end use:

We are finding all of the newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof listed above in section V.D.2 to also be acceptable in the rigid polyurethane and polyisocyanurate laminated boardstock end use. Please see section V.A.2 for further information on the environmental and safety impacts of the newly listed alternatives compared to available alternatives. For the reasons above in this section and in section V.A.2, we find the newly listed substitutes (in V.D.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the rigid polyurethane spray foam end use.

E. Rigid Polyurethane Slabstock and Other

1. EPA previously found the following acceptable as substitutes for HCFC–22, HCFC–142b, blends thereof, or for all HCFCs in rigid polyurethane slabstock and other foams:

- Carbon dioxide, CO_2
- Ecomate™
- Formacel® TI
- Formic acid
- HFC–134a
- HFC–152a
- HFC–245fa
- Methyl formate
- Transcend™ Technologies, as an additive to SNAP-approved blowing agents in blends making up to 5% by weight of the total foam formulation.
- Water

2. EPA is newly finding the following acceptable as substitutes for HCFC–22, HCFC–142b, and blends thereof in rigid polyurethane slabstock and other foams:

- Electroset technology
- Exxsol blowing agents
- HFC–365mfc
- HFO–1234ze
- Saturated light hydrocarbons C3–C6 (e.g., propane, butane, isobutane, pentane, cyclopentane, hexane, cyclohexane)

Comparison to other foam blowing agents in the rigid polyurethane slabstock and other foams end use:

We are finding all of the newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof listed above in section V.E.2 to also be acceptable in the rigid polyurethane and polyisocyanurate laminated boardstock end use. Please see section V.A.2 for further information on the environmental and safety impacts of the newly listed alternatives compared to available alternatives. For the reasons above and in V.A.2, we find the newly listed substitutes (in V.E.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the rigid polyurethane, slabstock and other foam end use.

F. Polystyrene Extruded Boardstock and Billet

1. EPA previously found the following acceptable as substitutes for HCFC–22, HCFC–142b, blends thereof, or for all HCFCs in polystyrene extruded boardstock and billet:

- Carbon dioxide, CO_2
- Ecomate™
- Formacel® B
- Formacel® TI
- HFC–134a
- HFC–152a
- HFC–245fa
- HFO–1234ze
- Water

2. EPA is newly finding the following acceptable as substitutes for HCFC–22, HCFC–142b, and blends thereof in polystyrene extruded boardstock and billet:

- Electroset technology
- Exxsol blowing agents
- HFC–365mfc
- Saturated light hydrocarbons C3–C6 (e.g., propane, butane, isobutane, pentane, cyclopentane, hexane, cyclohexane)

Comparison to other foam blowing agents in the polystyrene extruded boardstock and billet end use:

We are finding all of the newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof listed above in section V.F.2 to also be acceptable in the rigid polyurethane and polyisocyanurate laminated boardstock end use. Please see section V.A.2 for further information on the environmental and safety impacts of the newly listed alternatives compared to available alternatives. For the reasons above and in section V.A.2, we find the newly listed substitutes (in V.F.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the polystyrene, extruded boardstock and billet end use.

G. Phenolic Insulation Board and Bunstock

1. EPA previously found the following acceptable as substitutes for HCFC–22, HCFC–142b, blends thereof, or for all HCFCs in phenolic insulation board and bunstock:

- Carbon dioxide, CO_2
- Ecomate™
- HFC–134a
- HFC–152a
- HFC–245fa
- Water

2. EPA is newly finding the following acceptable as substitutes for HCFC–22, HCFC–142b, and blends thereof in phenolic insulation board and bunstock:

- 2-chloropropane
- Electroset technology
- Exxsol blowing agents
- HFC–365mfc
- HFO–1234ze
- Saturated light hydrocarbons C3–C6 (e.g., propane, butane, isobutane, pentane, cyclopentane, hexane, cyclohexane)

Comparison to other foam blowing agents in the phenolic insulation board and bunstock end use:

We are finding all of the newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof listed above in section V.G.2, with the exception of 2-chloropropane, to also be acceptable in the rigid polyurethane and polyisocyanurate laminated boardstock end use. 2-chloropropane is comparable to other acceptable substitutes for HCFC–22, HCFC–142b, and blends thereof in the phenolic insulation board and bunstock end use in its lack of risk for ozone depletion. Additionally, we estimate it has a GWP of 5 or less, comparable to or lower than that of other substitutes for HCFC–22, HCFC–142b, and blends thereof (e.g., the GWP of HFC–134a is about 1430, the GWP of HFC–245fa is about 1030, and the GWP of carbon dioxide is 1). 2-chloropropane is considered a VOC under CAA regulations addressing the development of SIPs to attain and maintain the national ambient air quality standards. 2-chloropropane is flammable, like the

newly listed substitutes for HCFC–22, HCFC–142b, or blends thereof, Exxol Blowing Agents, HFC–365mfc, and C3–C6 saturated hydrocarbons. Examples of other flammable foam blowing agents that we previously found acceptable in this end use include Ecomate™, HFC–152a, and methyl formate. EPA believes the flammability risks can be addressed by existing standards from OSHA, guidelines from the manufacturer, and other safety precautions common in the foam blowing industry. With regard to toxicity, EPA recommends a workplace exposure limit of 350 ppm on an 8-hour time-weighted average for 2-chloropropane (65 FR 37900, June 19, 2000). EPA anticipates users will be able to meet the recommended workplace exposure limit and will address potential health risks by following requirements and recommendations in the MSDS and other safety precautions common in the foam blowing industry. Please see section V.A.2 for further information on the environmental and safety impacts of the other newly listed alternatives compared to available alternatives. For the reasons above and in section V.A.2, we find the newly listed substitutes (in V.G.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the phenolic insulation board & bunstock end use.

H. Polystyrene, Extruded Sheet

1. EPA previously found the following acceptable as substitutes for HCFC–22, HCFC–142b, blends thereof, or for all HCFCs in polystyrene, extruded sheet:

- Carbon dioxide, CO_2
- Ecomate™
- Formacel® TI
- HFC–134a
- HFC–152a
- HFC–245fa
- Water

2. EPA is newly finding the following acceptable as substitutes for HCFC–22, HCFC–142b, and blends thereof in polystyrene, extruded sheet:

- Electroset technology
- Exxsol blowing agents
- HFC–365mfc
- Saturated light hydrocarbons C3–C6 (e.g., propane, butane, isobutane, pentane, cyclopentane, hexane, cyclohexane)

Comparison to other foam blowing agents in the polystyrene, extruded sheet end use:

We are finding all of the newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof listed above in section V.H.2 to also be acceptable in the rigid polyurethane and polyisocyanurate laminated boardstock end use. Please see section V.A.2 for further information on the environmental and safety impacts of the newly listed alternatives compared to available alternatives. For the reasons above and in section V.A.2, we find the newly listed substitutes (in V.H.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the polystyrene, extruded sheet end use.

I. Flexible Polyurethane

1. EPA previously found the following acceptable as substitutes for HCFC–22, HCFC–142b, blends thereof, or for all HCFCs in flexible polyurethane:

- Carbon dioxide, CO_2
- Ecomate™
- HFC–134a
- HFC–152a
- HFC–245fa
- Water

2. EPA is newly finding the following acceptable as substitutes for HCFC–22, HCFC–142b, and blends thereof in flexible polyurethane:

- Acetone
- Electroset technology
- Exxsol blowing agents
- HFC–365mfc
- Saturated light hydrocarbons C3–C6 (e.g., propane, butane, isobutane, pentane, cyclopentane, hexane, cyclohexane)

Comparison to other foam blowing agents in the flexible polyurethane end use:

We are finding all of the newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof listed above in section V.I.2, with the exception of acetone, to also be acceptable in the rigid polyurethane and polyisocyanurate laminated boardstock end use. Acetone is comparable to other acceptable substitutes for HCFC–22, HCFC–142b, and blends thereof in its lack of risk for ozone depletion. Acetone has a GWP of 0.5, comparable to or lower than that of other substitutes for HCFC–22, HCFC–142b, and blends thereof (e.g., the GWP of HFC–134a is about 1430, the GWP of HFC–245fa is about 1030, and the GWP of carbon dioxide is 1). Acetone is exempt from the definition of VOC under CAA regulations addressing the development of SIPs to attain and maintain the national ambient air quality standards. Acetone is flammable, along with other substitutes for HCFC–22, HCFC–142b, or blends thereof, including Exxol Blowing Agents, HFC–365mfc, and C3–C6 saturated hydrocarbons. Examples of other flammable foam blowing agents that we previously found acceptable in this end use include Ecomate™ and HFC–152a. EPA believes that the flammability risks can be addressed by existing standards from OSHA, guidelines from the manufacturer, and other safety precautions common in the foam blowing industry. With regard to toxicity, acetone has an 8-hour ACGIH TLV of 500 ppm. EPA anticipates that users will be able to meet the TLV and will address potential health risks by following requirements and recommendations in the MSDS and other safety precautions common in the foam blowing industry. Please see section V.A.2 for further information on the environmental and safety impacts of the other newly listed alternatives compared to available alternatives. For the reasons above and in section V.A.2, we find the newly listed substitutes (in V.I.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the flexible polyurethane end use.

J. Polyolefin

1. EPA previously found the following acceptable as substitutes for HCFC–22, HCFC–142b, blends thereof, or for all HCFCs in polyolefin:

- Carbon dioxide, CO_2
- Ecomate™
- Formacel® TI
- HFC–134a
- HFC–152a
- HFC–245fa
- Water

2. EPA is newly finding the following acceptable as substitutes for HCFC–22, HCFC–142b, and blends thereof in polyolefin:

- Blends of HFC–152a and saturated light hydrocarbons (C3–C6)
- Chemical Blend A [20]
- Electroset technology
- Exxsol blowing agents
- HFC–365mfc
- HFO–1234ze
- Saturated light hydrocarbons C3–C6 (e.g., propane, butane, isobutane, pentane, cyclopentane, hexane, cyclohexane)

Comparison to other foam blowing agents in the polyolefin end use:

The newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof listed above in section V.J.2 are non-ozone-depleting, in contrast to HCFC–22, HCFC–142b, or blends thereof. They are comparable to other acceptable substitutes for HCFC–22, HCFC–142b, and blends thereof in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to 790, comparable to or

[20] Composition is claimed as CBI by the submitter.

lower than that of other substitutes for HCFC–22, HCFC–142b, and blends thereof. For example, the GWP of HFC–134a is about 1430 and the GWP of HFC–245fa is about 1030.

HFO–1234ze is currently considered a VOC, and Exxsol blowing agents and C3–C6 saturated hydrocarbons contain compounds that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. EPA has received a petition to exempt HFO–1234ze from the definition of VOC for purposes of SIPs to attain and maintain the NAAQS on the basis that the chemical has a low photochemical reactivity. EPA intends to address the request through notice-and-comment rulemaking. None of the acceptable substitutes previously listed in this end use are VOCs. However, HFO–1234ze, Exxsol blowing agents, and C3–C6 saturated hydrocarbons have lower overall environmental and health risk compared to other substitutes.

Among the newly listed substitutes for HCFC–22, HCFC–142b, or blends thereof, Exxol Blowing Agents, HFC–365mfc, and C3–C6 saturated hydrocarbons are flammable. Examples of other flammable foam blowing agents that we previously found acceptable in this end use include Ecomate™ and HFC–152a. EPA believes the flammability risks can be addressed by following existing standards from OSHA, guidelines from the manufacturer, and other safety precautions common in the foam blowing industry.

The toxicity risks of the newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof are low. The potential health effects of HFO–1234ze at lower concentrations include drowsiness and dizziness. The substitute may also irritate the skin or eyes or cause frostbite. At sufficiently high concentrations, it may cause central nervous system depression or irregular heart beat. HFO–1234ze could cause asphyxiation, if air is displaced by vapor in a confined space. The substitute may also irritate the lungs, skin or eyes or cause frostbite. These potential health effects are common to many foam blowing agents. EPA anticipates that users in foam blowing end uses will take action consistent with the recommendations specified in the manufacturers' MSDSs for HFO–1234ze. EPA recommends a workplace AEL of 1,000 ppm on an 8-hour time-weighted average for HFO–1234ze, which is updated from our preliminary recommendation that accompanied the acceptability listing for HFO–1234ze in several other foam blowing end uses (74 FR 50129; September 30, 2009). Our risk screen found that workplace exposure is likely to be well below that level.[21]

As for the other newly listed substitutes for HCFC–22 and blends containing HCFC–22 and/or HCFC–142b, HFC–365mfc, C3–C6 saturated light hydrocarbons and Exxsol blowing agents contain components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or TLVs from the ACGIH. EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, PELs, manufacturer's recommendation, and EPA recommendation) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the foam blowing industry. For the above reasons, we find the newly listed substitutes (in V.J.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the polyolefin end use.

K. Integral Skin Polyurethane

1. EPA previously found the following acceptable as substitutes for HCFC–22, HCFC–142b, blends thereof, or for all HCFCs in integral skin polyurethane:

- Carbon dioxide, CO_2
- Ecomate™
- Formacel® TI
- Formic acid
- HFC–134a
- HFC–152a
- HFC–245fa
- Methyl formate
- Water

2. EPA is newly finding the following acceptable as substitutes for HCFC–22, HCFC–142b, and blends thereof in integral skin polyurethane:

- Acetone
- Electroset technology
- Exxsol blowing agents
- HFC–365mfc
- HFO–1234ze
- Saturated light hydrocarbons C3–C6 (e.g., propane, butane, isobutane, pentane, cyclopentane, hexane, cyclohexane)

Comparison to other foam blowing agents in the integral skin polyurethane end use:

The newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof listed above in section V.K.2 are non-ozone-depleting, in contrast to HCFC–22, HCFC–142b, or blends thereof. They are comparable to other acceptable substitutes for HCFC–22, HCFC–142b, and blends thereof in their lack of risk for ozone depletion. The newly listed substitutes have GWPs ranging from 0 to 794, comparable to or lower than that of other substitutes for HCFC–22, HCFC–142b, and blends thereof. For example, the GWP of HFC–134a is about 1430 and the GWP of HFC–245fa is about 1030.

HFO–1234ze is currently considered a VOC, and Exxsol blowing agents and C3–C6 saturated hydrocarbons contain compounds that are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. EPA has received a petition to exempt HFO–1234ze from the definition of VOC for purposes of SIPs to attain and maintain the NAAQS on the basis that the chemical has a low photochemical reactivity. EPA intends to address the request through notice-and-comment rulemaking. An acceptable substitute previously listed in this end use that is a VOC is formic acid.

Among the newly listed substitutes for HCFC–22, HCFC–142b, or blends thereof, acetone, Exxol Blowing Agents, HFC–365mfc, and C3–C6 saturated hydrocarbons are flammable. Examples of other flammable foam blowing agents that we previously found acceptable in this end use include Ecomate™, formic acid, and HFC–152a. EPA believes that the flammability risks can be addressed by existing standards from the OSHA, guidelines from the manufacturer, and other safety precautions common in the foam blowing industry.

The toxicity risks of the newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof are low. HFC–365mfc, C3–C6 saturated light hydrocarbons and Exxsol blowing agents contain components with workplace exposure limits of 500 to 1,000 ppm averaged over 8 hours, such as WEELs from the AIHA or threshold limit values (TLVs) from the ACGIH. EPA recommends a workplace AEL of 1000[22] ppm on an 8-hour time-weighted average for HFO–1234ze, which is updated from our preliminary recommendation that accompanied the acceptability listing for HFO–1234ze in several other foam blowing end uses (74 FR 50129, September 30, 2009). EPA anticipates that users will be able to meet the workplace exposure limits (WEELs, TLVs, PELs and EPA recommendation) and will address

[21] The risk screen is available at *http://www.regulations.gov* as item EPA–HQ–OAR–2003–0118–0250.

[22] The derivation of EPA's recommended AEL is available at *http://www.regulations.gov* as item EPA–HQ–OAR–2003–0118–0250.

potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common in the foam blowing industry. For the above reasons, we find the newly listed substitutes (in V.K.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the integral skin polyurethane end use.

VI. What are my existing and new options for alternative aerosols?

A. Propellants

We previously found HCFC–22 and HCFC–142b acceptable as substitutes for CFC–11 in the aerosol propellant end use. In the aerosol propellants end use, the two HCFCs typically have not been blended.

Under the Nonessential Products Ban in Section 610 of the CAA, and EPA's regulations implementing that provision at 40 CFR subpart C, the sale and distribution or offer for sale and distribution of HCFCs in pressurized containers is banned. However, EPA regulations at 40 CFR 82.70 provide exceptions for a limited number of specific uses. For aerosol propellants, these include:

- Medical devices listed in 21 CFR 2.125(e);
- Mold release agents that contain HCFC–22 as a propellant where evidence of good faith efforts to secure alternatives indicates that, other than a class I substance, there are no suitable alternatives;
- Spinnerette lubricants/cleaning sprays used in the production of synthetic fibers, which contain class II substances for solvent purposes and/or contain class II substances for propellant purposes;
- Document preservation sprays which contain HCFC–22 as a propellant, but which contain no other class II substance and which are used solely on thick books, books with coated, dense or paper and tightly bound documents;
- Aerosol or pressurized dispenser cleaning fluid for electronic and photographic equipment which contains a class II substance that is sold or distributed to a commercial purchaser.

To aid end users in the aerosol propellants end use as they transition from use of HCFC–22, HCFC–142b, and blends thereof, this section lists: 1) Propellants that EPA previously found acceptable as substitutes for HCFC–22 and HCFC–142b; and 2) a propellant that EPA is newly finding acceptable as a substitute for CFC–11, HCFC–22, HCFC–142b, and blends thereof. At the end of the decision for the end use, there is narrative comparing environmental, flammability, and toxicity information of the newly acceptable alternative with other currently or potentially available alternatives. More environmental and health information is also available in the original SNAP rule of March 18, 1994, the notice of acceptability in which each substitute was first listed, or the sector table for each of the acceptable alternatives to HCFC–22, HCFC–142b, and blends thereof, in the aerosol propellants end use. The sector table is available at *http://www.epa.gov/ozone/snap/aerosol/index.html*. The sector table also includes further identification information (including composition and trade names) for each substitute.

1. EPA previously found the following acceptable as substitutes for HCFC–22 and HCFC–142b in aerosol propellants:

- Alternative processes (pumps, mechanical pressure dispensers, non-spray dispensers)
- Compressed gases (e.g., carbon dioxide, air, nitrogen, and nitrous oxide)
- Dimethyl ether
- HFC–125
- HFC–134a
- HFC–152a
- HFC–227ea
- Saturated light hydrocarbons, C3–C6 (e.g., propane, isobutane, n-butane)

2. EPA is newly finding the following acceptable as a substitute for CFC–11, HCFC–22, HCFC–142b, and blends thereof as an aerosol propellant:

- HFO–1234ze [23]

HFO–1234ze is non-ozone-depleting in contrast to the ozone depleting substances which it replaces. In its lack of risk for ozone depletion, HFO–1234ze is comparable to other substitutes for HCFC–22 and HCFC–142b such as HFC–134a, HFC–152a, and compressed CO_2. HFO–1234ze's 100-year GWP is 6, comparable to or lower than that of other substitutes for CFC–11, HCFC–22 and HCFC–142b. For example, the GWP of HFC–134a is about 1430, the GWP of HFC–152a is about 124, and the GWP of compressed CO_2 is 1.

Neither HFO–1234ze nor any of the previously acceptable substitutes in the propellant end use are HAPs. HFO–1234ze is currently considered a VOC under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. Other acceptable substitutes in the propellant end use that are VOCs are dimethyl ether and the saturated light hydrocarbons (C3–C6). EPA has received a petition to exempt HFO–1234ze from the definition of VOC for purposes of SIPs to attain and maintain the NAAQS on the basis that the chemical has a low photochemical reactivity. EPA intends to address the request through notice-and-comment rulemaking.

HFO–1234ze is not flammable. The toxicity risks of HFO–1234ze are low. The potential health effects of HFO–1234ze at lower concentrations include drowsiness and dizziness. At sufficiently high concentrations, it may cause central nervous system depression or irregular heart beat. HFO–1234ze could cause asphyxiation, if air is displaced by vapor in a confined space. The substitute may also irritate the lungs, skin or eyes or cause frostbite. These potential health effects are common to many propellants. EPA anticipates that users in the propellant end use will take action consistent with the recommendations specified in the manufacturers' MSDSs for HFO–1234ze. EPA recommends a workplace exposure limit of 1,000 ppm on an 8-hour time-weighted average for HFO–1234ze. EPA recommends a preliminary consumer exposure limit (intermittent) of 420 ppm. Our risk screen found that workplace and consumer exposure, respectively, are likely to be well below these levels.[24] EPA anticipates that users will be able to meet the recommended workplace and consumer exposure limits and will address potential health risks by following requirements and recommendations in the MSDSs and labels and other safety precautions common in the aerosol industry. For the above reasons, we find HFO–1234ze acceptable because it does not pose a greater overall risk to human health and the environment than the other substitutes acceptable in the aerosol propellants end use.

VII. What are my existing and new options for alternative sterilants?

A. Sterilants

Sterilants are chemicals, blends, or devices used to sterilize medical equipment. Many sterilants contain ethylene oxide (EtO) as a component. In this sector, EPA has previously found acceptable ethylene oxide blends containing a blend of HCFC–22 and/or HCFC–124. HCFC–142b has not been used in this sector.

To aid end users in the sterilant end use as they transition from use of

[23] HFO–1234ze(E); HFC–1234ze(E); trans-1,3,3-tetrafluoroprop-1-ene; CAS ID #29118–24–9.

[24] The derivation of EPA's recommended AEL, preliminary consumer exposure limit (intermittent), and risk screen are available at *http://www.regulations.gov* as item EPA–HQ–OAR–2003–0118–0250.

ethylene oxide blends containing HCFC–22, this section lists: (1) Sterilants that EPA previously found acceptable as substitutes for ethylene oxide blends containing HCFC–22; and (2) sterilants that EPA is newly finding acceptable as substitutes for ethylene oxide blends containing HCFC–22.

At the end of the decision for the end use, there is narrative comparing environmental, flammability, and toxicity information of the newly acceptable alternative with other currently or potentially available alternatives. Flammable and highly reactive sterilants are hazardous waste when disposed. Sterilants must be registered by EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) prior to use. Also, requirements of the Food and Drug Administration for medical devices apply to equipment using sterilants.

More environmental and health information is also available in the original SNAP rule of March 18, 1994, the notice of acceptability in which each substitute was first listed, or the sector table for each of the acceptable alternatives to ethylene oxide blends containing HCFC–22, in the sterilant end use. The sector table is available at *http://www.epa.gov/ozone/snap/sterilants/index.html*. The sector table also includes further identification information (including composition and trade names) for each substitute.

1. EPA previously found the following acceptable as substitutes for ethylene oxide blends containing HCFC–22 as sterilants:

- IoGas™ Sterilant Blends 1, 3, and 6 (blends of $CF_3I/CO_2/EtO$)
- Mini-Max® Cleaner

2. EPA is newly finding the following acceptable as substitutes for ethylene oxide blends containing HCFC–22 as sterilants:

- CO_2/EtO
- Hydrogen peroxide gas plasma systems
- Peroxyacetic acid/hydrogen peroxide gas plasma systems
- Pure EtO
- Steam

The newly listed substitutes for HCFC–22, HCFC–142b, and blends thereof listed above in section VII.A.2. are non-ozone-depleting, in contrast to HCFC–22 blends. They are comparable to other acceptable substitutes for HCFC–22 blends in their lack of risk for ozone depletion. The newly listed substitutes have GWPs of one or less, comparable to or lower than that of other substitutes for HCFC–22 blends. For example, the GWP of the IoGas blends is less than one.

Peroxyacetic acid and ethylene oxide are considered VOCs under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. Ethylene oxide is a hazardous air pollutant under EPA regulations. EPA's National Emission Standards for Hospital Ethylene Oxide Sterilizers apply to this substance and blends that contain it (*see* subpart WWWWW of 40 CFR part 63). EPA has previously found other blends containing ethylene oxide to be acceptable as sterilants. Further, blends that do not contain ethylene oxide are often still reactive.

Among the newly listed substitutes for HCFC–22 blends, pure ethylene oxide and peroxyacetic acid, a component in a peroxyacetic acid/hydrogen peroxide gas plasma system, are flammable. Hydrogen peroxide is not flammable per se, but is highly reactive and must be handled cautiously at the concentrations required for use in sterilization equipment. These sterilants should be used in equipment designed to reduce the risks of flammable or highly reactive chemicals. EPA believes that the flammability and reactivity risks can be addressed by existing standards from OSHA, NIOSH, and EPA, and/or by guidelines from the manufacturer, and other safety precautions common during sterilization.

The toxicity risks of the newly listed substitutes for HCFC–22 blends are comparable to the risks of the IoGas blends that EPA previously found acceptable as substitutes for blends of ethylene oxide and HCFCs. Ethylene oxide has an OSHA PEL of 1 ppm on an 8-hour time-weighted average and a NIOSH IDLH of 800 ppm (30-minute). This compound may be carcinogenic. Hydrogen peroxide, used in gas plasma systems, has an OSHA PEL of 1 ppm (8-hr TWA) and a NIOSH IDLH value of 75 ppm (30 min). Peroxyacetic acid, used together with hydrogen peroxide in gas plasma systems, has an AEGL–1 of 0.17 ppm from 10 min to 8 hours to avoid irritation and an AEGL–2 of 0.5 ppm from 10 min to 8 hours to avoid "irreversible or other serious, long-lasting adverse health effects * * *." (*Acute Exposure Guideline Levels for Selected Airborne Chemicals,* Committee on Acute Exposure Guideline Levels, National Research Council of the National Academies, 2009). EPA anticipates that users will be able to meet the workplace exposure limits (PELs, IDLHs, and AEGLs) and will address potential health risks by following requirements and recommendations in the MSDSs and other safety precautions common when working with sterilants. For the above reasons, we find the newly listed substitutes (in VII.A.2, above) acceptable because they do not pose a greater overall risk to human health and the environment than the other substitutes available in the end use.

You can find a complete chronology of SNAP decisions and the appropriate **Federal Register** citations from the SNAP section of EPA's Ozone Depletion Web site at *http://www.epa.gov/ozone/snap/chron.html.* This information is also available from the Air Docket (*see* **ADDRESSES** section above for contact information).

List of Subjects in 40 CFR Part 82

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

Dated: June 10, 2010.

Brian J. McLean,

Director, Office of Atmospheric Programs, Office of Air and Radiation.

[FR Doc. 2010–14510 Filed 6–15–10; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 174

[EPA–HQ–OPP–2009–0609; FRL–8829–9]

Bacillus thuringiensis eCry3.1Ab Protein in Corn; Temporary Exemption from the Requirement of a Tolerance

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: This regulation establishes a temporary exemption from the requirement of a tolerance for residues of *Bacillus thuringiensis* eCry3.1Ab protein in corn in or on the food and feed commodities of corn; corn, field; corn, sweet; and corn, pop, when used as a plant-incorporated protectant in accordance with the terms of Experimental Use Permit 67979-EUP-8. Syngenta Seeds, Incorporated submitted a petition to EPA under the Federal Food, Drug, and Cosmetic Act (FFDCA), requesting a temporary exemption from the requirement of a tolerance. This regulation eliminates the need to establish a maximum permissible level for residues of *Bacillus thuringiensis* eCry3.1Ab protein in corn under the FFDCA. The temporary tolerance exemption expires on June 1, 2012.

DATES: This regulation is effective June 16, 2010. Objections and requests for