

**ENVIRONMENTAL PROTECTION  
AGENCY**
**40 CFR Part 82**
**[FRL-5139-7]**
**Protection of Stratospheric Ozone**
**AGENCY:** Environmental Protection Agency.

**ACTION:** Notice of acceptability.

**SUMMARY:** This notice expands the list of acceptable substitutes for ozone depleting substances (ODSs) under the U.S. Environmental Protection Agency's (EPA) Significant New Alternatives Policy (SNAP) program. SNAP implements section 612 of the amended Clean Air Act of 1990 which requires EPA to evaluate substitutes for the ODSs, and regulate the use of substitutes where other alternatives exist that reduce overall risk to human health and the environment. Through these evaluations, SNAP generates lists of acceptable and unacceptable substitutes for each of the major industrial use sectors.

On March 18, 1994, EPA promulgated its plan for administering the SNAP program, and issued decisions on the acceptability and unacceptability of a number of substitutes (59 FR 13044). In today's Notice, EPA issues decisions on the acceptability of substitutes not previously reviewed by the Agency. The intended effect of this action is to expedite movement away from ozone depleting compounds. To arrive at determinations on the acceptability of substitutes, the Agency completed a cross-media sector end-use screening assessment of risks to human health and the environment.

**EFFECTIVE DATE:** January 13, 1995.

**ADDRESSES:** Information relevant to this notice is contained in Air Docket A-91-42, Central Docket Section, South Conference Room 4, U.S. Environmental Agency, 401 M Street, SW., Washington, DC 20460. Telephone: (202) 260-7548. The docket may be inspected between 8 a.m. and 5:30 p.m. weekdays. As provided in 40 CFR part 2, a reasonable fee may be charged for photocopying.

**FOR FURTHER INFORMATION CONTACT:** Jeffrey Levy at (202) 233-9727 or fax (202) 233-9577, U.S. EPA, Stratospheric Protection Division, 401 M Street, SW., Mail Code 6205J, Washington, DC 20460.

**SUPPLEMENTARY INFORMATION:**
**I. Overview of This Action**

This action is divided into six sections, including this overview:

- I. Overview of This Notice
  - II. Section 612 Program
    - A. Statutory Requirements
    - B. Regulatory History
  - III. Listing of Acceptable Substitutes
  - IV. Listing of Substitutes Pending Review
  - V. Additional Information
- Appendix A Summary of Acceptable and Pending Decisions

**II. Section 612 Program**
**A. Statutory Requirements**

Section 612 of the Clean Air Act authorizes EPA to develop a program for evaluating alternatives to ozone-depleting substances. EPA is referring to this program as the Significant New Alternatives Policy (SNAP) program. The major provisions of section 612 are:

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

**Listing of Unacceptable/Acceptable Substitutes**—Section 612(c) also requires EPA to publish a list of the substitutes unacceptable for specific uses. EPA must publish a corresponding list of acceptable alternatives for specific uses.

**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 6 months.

**90-day Notification**—Section 612(e) requires 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.

**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.

**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. Regulatory History**

On March 18, 1994, EPA published the Final Rulemaking (FRM) (59 FR 13044) which described the process for administering the SNAP program and issued EPA's first acceptability lists for substitutes in the major industrial use sectors. These sectors include: refrigeration and air conditioning; foam blowing; solvent cleaning; fire suppression and explosion protection; sterilants; aerosols; adhesives, coatings and inks; and tobacco expansion. These sectors compose the principal industrial sectors that historically consumed the largest volumes of ozone-depleting compounds.

As described in the final rule for the SNAP program (59 FR 13044), EPA does not believe that rulemaking procedures are required to list alternatives as acceptable with no limitations. Such listings do not impose any sanction, nor do they remove any prior license to use a substance. Consequently, EPA is adding substances to the list of acceptable alternatives without first requesting comment on new listings.

EPA does, however, believe that notice-and-comment rulemaking is required to place any substance on the list of prohibited substitutes, to list a substance as acceptable only under certain conditions, to list substances as acceptable only for certain uses, or to remove a substance from either the list of prohibited or acceptable substitutes. Updates to these lists are published as separate notices of rulemaking in the **Federal Register**.

The Agency defines a "substitute" as any chemical, product substitute, or alternative manufacturing process, whether existing or new, that could replace a class I or class II substance. Anyone who produces a substitute must provide the Agency with health and safety studies on the substitute at least 90 days before introducing it into interstate commerce for significant new use as an alternative. This requirement applies to substitute manufacturers, but

may include importers, formulators or end-users, when they are responsible for introducing a substitute into commerce.

Since the SNAP FRM, EPA has published a Notice listing acceptable alternatives on August 26, 1994 and a Notice of Proposed Rulemaking restricting the use of certain substitutes on September 26, 1994.

### III. Listing of Acceptable Substitutes

This section presents EPA's most recent acceptable listing decisions for class I substitutes in the following industrial sectors: refrigerants and air conditioning, foam blowing, solvent cleaning, fire suppression and explosion protection; sterilants; aerosols; adhesives, coatings and inks. These decisions represent substitutes not previously reviewed in the final rulemaking for SNAP (59 FR 13044; March 18, 1994) and, consequently, add to the lists of acceptable substitutes under SNAP. For copies of the full list, contact the EPA Stratospheric Protection Hotline at the number listed in Section V of this Notice.

Parts A through D below present a detailed discussion of the substitute listing determinations by major use sector. Tables summarizing listing decisions in this Notice are in Appendix A. The comments contained in Appendix A provide additional information on a substitute, but like the listings themselves, are not regulatory in nature. Thus, adherence to recommendations in the comments are not mandatory for use of a substitute. In addition, the comments should not be considered comprehensive with respect to other legal obligations pertaining to the use of the substitute. However, EPA encourages users of acceptable substitutes to apply all comments to their use of these substitutes. In many instances, the comments simply allude to sound operating practices that have already been identified in existing industry and/or building-code standards. Thus, many of the comments, if adopted, would not require significant changes in existing operating practices for the affected industry.

#### A. Refrigeration and Air Conditioning

Please refer to the final SNAP rule for detailed information pertaining to the designation of end-uses, additional requirements imposed under sections 608 and 609, and other information related to the use of alternative refrigerants.

##### 1. R-401A and R-401B

*R-401A and R-401B, which consist of HCFC-22, HFC-152a, and HCFC-124, are acceptable as substitutes for CFC-*

*11, CFC-12, R-500, and R-502 in the following end-uses:*

- New and Retrofitted Reciprocating Chillers.
- New Industrial Process Refrigeration.
- New Cold Storage Warehouses.
- New Refrigerated Transport.
- New Retail Food Refrigeration.
- New Commercial Ice Machines.
- New Vending Machines.
- New Water Coolers.
- New Household Refrigerators.
- New Household Freezers.
- New Residential Dehumidifiers.

Please note that different temperature regimes may affect the applicability of these substitutes within these end-uses.

Two of the constituents in these blends are HCFCs and thus contribute to ozone depletion; HCFC production will be phased out according to the accelerated schedule. While the GWP of HCFC-22 is somewhat high, refrigerant leak regulations should reduce its contribution to global warming. The GWPs of the other components are low. Although these blends do contain one flammable constituent, HFC-152a, the blends themselves are not flammable. In addition, each blend is a near azeotrope, and it does not fractionate in normal operation. Finally, leak testing of each blend demonstrated that while the vapor and liquid compositions changed, neither phase became flammable. Testing of these blends with centrifugal compressors is inadequate, and therefore such use is not recommended by the manufacturer. Further testing may resolve this uncertainty.

##### 2. CO<sub>2</sub>

*CO<sub>2</sub> is acceptable as follows:*

- *As a substitute for CFC-13, R-13B1, and R-503 in Very Low Temperature Refrigeration, Retrofit and New.*
- *As a substitute for CFC-13, R-13B1, and R-503 in Industrial Process Refrigeration, Retrofit and New.*
- *As a substitute for CFC-11, CFC-12, CFC-113, CFC-114, and CFC-115 in Non-mechanical Heat Transfer, Retrofit and New.*

CO<sub>2</sub> was historically used in refrigeration systems. It is a well-known, nontoxic, nonflammable gas. Its GWP is defined as 1, and all other GWPs are indexed to it. Since it is readily available as a waste gas, no additional chemical will need to be produced. Thus, the use of CO<sub>2</sub> as a refrigerant will not contribute to global warming. CO<sub>2</sub>'s usefulness is limited to temperatures above -70°F.

##### 3. HCFC-22

*HCFC-22 is acceptable as a substitute for R-400(60/40) and CFC-114 in New Industrial Process Air Conditioning.*

EPA recommends that HCFC-22 only be used where ambient temperatures are lower than 115°F because of very high system pressures.

HCFC-22 has been used in a variety of air conditioning and refrigeration applications for many years. HCFC-22 contributes to ozone depletion and is considered a transitional alternative. HCFC-22 production will be phased out according to the accelerated phaseout schedule. HCFC-22's GWP and atmospheric lifetime are higher than other HCFCs. HCFC-22 is not flammable and it is compatible with existing oils used in most refrigeration and air conditioning equipment.

##### 4. HFC-134a

*HFC-134a is acceptable as a substitute for R-400(60/40) and CFC-114 in New Industrial Process Air Conditioning.*

EPA recommends that HFC-134a only be used where ambient temperatures are lower than 125°F because of very high system pressures. HFC-134a does not contribute to ozone depletion. HFC-134a's GWP and atmospheric lifetime are close to those of other alternatives which are acceptable in this end-use. While HFC-134a is compatible with most existing refrigeration and air conditioning equipment parts, it is not compatible with the mineral oils currently used in such systems. An appropriate ester-based, polyalkylene glycol-based, or other type of lubricant should be used.

##### 5. R-401A

*R-401A and R-401B, which consist of HCFC-22, HFC-152a, and HCFC-124, is acceptable as a substitute for R-400(60/40) and CFC-114 in Retrofitted Industrial Process Air Conditioning.*

See the discussion on R-401A for more information about this blend.

##### 6. R-404A

*R-404A, which consists of HFC-125, HFC-143a, and HFC-134a, is acceptable as a substitute for CFC-12 in new household refrigerators.*

None of this blend's constituents contains chlorine, and thus this blend poses no threat to stratospheric ozone. However, HFC-125 and HFC-143a have very high GWPs, and the GWP of HFC-134a is somewhat high. EPA strongly encourages recycling and reclamation of this blend in order to reduce its direct global warming impact. Although HFC-143a is flammable, the blend is not. Leak testing has demonstrated that its composition never becomes flammable.

7. R-507

R-507, which consists of HFC-125 and HFC-143a, is acceptable as a substitute for CFC-12 in new household refrigerators.

None of this blend's constituents contains chlorine, and thus this blend poses no threat to stratospheric ozone. However, HFC-125 and HFC-143a have very high GWPs. EPA strongly encourages recycling and reclamation of this blend in order to reduce its direct global warming impact. Although HFC-143a is flammable, the blend is not. Leak testing has demonstrated that its composition never becomes flammable.

8. Hydrocarbon Blend B

Hydrocarbon Blend B is acceptable as a substitute for CFC-12 in retrofitted and new industrial process refrigeration systems.

This blend contains several hydrocarbons. It does not contribute to ozone depletion, nor does it contribute significantly to global warming. This blend contains flammable refrigerants, and EPA recommends but does not require that it only be used at industrial facilities which already manufacture or use hydrocarbons in the process stream. Such facilities are designed to comply with the safety standards required for managing flammable chemicals. Note that EPA only finds this product acceptable in this specific end-use

because other flammable refrigerants are acceptable and sufficient occupational safety rules exist to protect workers.

B. Foams

1. Rigid Polyurethane Appliance

a. Vacuum Panels—Vacuum panels are acceptable substitutes for CFC-11 blown rigid polyurethane appliance foam. The Agency has reviewed data on existing and proposed models of vacuum panels and believes that this alternative technology offers lower risk than continued use of CFC-11 blown polyurethane foam.

IV. Substitutes Pending Review

The Agency describes submissions as pending if data are incomplete or for which the 90-day review period is underway and EPA has not yet reached a final decision. For submissions that are incomplete, the Agency will contact the submitter to determine a schedule for providing the missing information if the Agency needs to extend the 90-day review period. EPA will use its authority under section 114 of the Clean Air Act to gather this information, if necessary. Any delay of the review period does not affect a manufacturer's ability to sell a product 90 days after notification of the Agency. Substitutes currently pending completion of review are listed in Appendix A.

V. Additional Information

Contact the Stratospheric Protection Hotline at 1-800-296-1996, Monday-Friday, between the hours of 10:00 a.m. and 4:00 p.m. (Eastern Standard Time).

For more information on the Agency's process for administering the SNAP program or criteria for evaluation of substitutes, refer to the SNAP final rulemaking published in the **Federal Register** on March 18, 1994 (59 FR 13044). **Federal Register** notices can be ordered from the Government Printing Office Order Desk (202) 783-3238; the citation is the date of publication. This Notice can also be retrieved electronically from EPA's Technology Transfer Network (TTN), Clean Air Act Amendment Bulletin Board. If you have a 1200 or 2400 bps modem, dial (919) 541-5742. If you have a 9600 bps modem, dial (919) 541-1447. For assistance in accessing this service, call (919) 541-5384.

List of Substitutes in 40 CFR Part 82

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

Dated: December 28, 1994.

Mary D. Nichols,

Assistant Administrator.

**Note:** The following appendix will not appear in the Code of Federal Regulations:

APPENDIX A.—SUMMARY OF ACCEPTABLE AND PENDING DECISIONS  
REFRIGERANTS ACCEPTABLE SUBSTITUTES

End-use	Substitute	Decision	Comments
CFC-12 Reciprocating Chillers (Retrofit & New Equipment/ NIKs).	R-401A .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
	R-401B .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
CFC-11, CFC-12, R-502 Industrial Process Refrigeration (Retrofit).	Hydrocarbon Blend B .....	Acceptable .....	This refrigerant is highly flammable.
CFC-11, CFC-12, R-502 Industrial Process Refrigeration (New Equipment/NIKs).	R-401A .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
	R-401B .....	Acceptable.	
	Hydrocarbon Blend B .....	Acceptable .....	This refrigerant is highly flammable.
CFC-13, R-13B1, R-503 Industrial Process Refrigeration (Retrofit and New Equipment/ NIKs).	CO <sub>2</sub> .....	Acceptable.	
CFC-12, R-502 Cold Storage Warehouses (New Equipment/NIKs).	R-401A .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
	R-401B .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
CFC-12, R-500, R-502 Refrigerated Transport (New Equipment/NIKs).	R-401A .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
	R-401B .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.

APPENDIX A.—SUMMARY OF ACCEPTABLE AND PENDING DECISIONS—Continued  
REFRIGERANTS ACCEPTABLE SUBSTITUTES

End-use	Substitute	Decision	Comments
CFC-12, R-502 Retail Food Refrigeration (New Equipment/NIKs).	R-401A .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
	R-401B .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
CFC-12, R-502 Commercial Ice Machines (New Equipment/NIKs).	R-401A .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
	R-401B .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
CFC-12 Vending Machines (New Equipment/NIKs).	R-401A .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
	R-401B .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
CFC-12 Water Coolers (New Equipment/NIKs).	R-401A .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
	R-401B .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
CFC-12 Household Refrigerators (New Equipment/NIKs).	R-401A .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
	R-401B .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
CFC-12, R-502 Household Freezers (New Equipment/NIKs).	R-401A .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
	R-401B .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
CFC-12, R-500 Residential Dehumidifiers (New Equipment/NIKs).	R-401A .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
	R-401B .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
CFC-13, R-13B1, and R-503 Very Low Temperature Refrigeration (Retrofit and New Equipment/NIKs).	CO <sub>2</sub> .....	Acceptable .....	
CFC-11, CFC-12, CFC-113, CFC-114, CFC-115 Non-Mechanical Heat Transfer, Retrofit and New.	CO <sub>2</sub> .....	Acceptable .....	
CFC-114 Industrial Process Air Conditioning (Retrofit).	R-401A .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
	R-401B .....	Acceptable .....	This substitute is subject to containment and recovery regulations covering HCFCs.
CFC-114 Industrial Process Air Conditioning (New Equipment/NIKs).	HCFC-22 .....	Acceptable .....	HCFC-22 should only be used where ambient temperatures are below 115°F because of excessive compressor pressures. This substitute is subject to containment and recovery regulations covering HCFCs.
	HFC-134a .....	Acceptable .....	HFC-134a should only be used where ambient temperatures are below 125°F because of excessive compressor pressures. EPA strongly encourages the containment and reclamation of this refrigerant.

REFRIGERANTS PENDING DECISIONS

Application	Substitute	Comments
CFC-12 Motor Vehicle Air Conditioning .....	HCFC Blend Delta .....	EPA has requested additional data.

FOAMS SECTOR ACCEPTABLE SUBSTITUTES

End-use	Substitute	Decision	Comments
CFC-11 Polyurethane Appliance ..	Vacuum Panels .....	Acceptable .....	

FOAMS SECTOR PENDING DECISIONS

End-use	Substitute	Comments
HCFC-141b, HCFC-22 Rigid polyurethane and polyisocyanurate laminated boardstock.	Saturated light hydrocarbons C3-C6 .....	Agency has not completed review of data.

FOAMS SECTOR PENDING DECISIONS—Continued

End-use	Substitute	Comments
HCFC-141b, HCFC-22 Polyurethane, rigid appli- ance.	Saturated light hydrocarbons C3-C6 .....	Agency has not completed review of data.
HCFC-141b, HCFC-22 Polyurethane, rigid com- mercial, refrigeration, spray and sandwich pan- els.	Saturated light hydrocarbons C3-C6 .....	Agency has not completed review of data.
HCFC-141b, HCFC-22, HCFC-142b Poly- urethane, rigid slabstock and other.	HFC-134a .....	Agency has not completed review of data.
HCFC-22, HCFC-142b Polystyrene, extruded boardstock and billet.	Saturated light hydrocarbons C3-C6 .....	Agency has not completed review of data.
HCFC-141b, HCFC-22, HCFC-142b Phenolic, in- sulation boardstock and bunstock.	Saturated light hydrocarbons C3-C6 .....	Agency has not completed review of data.
HCFC-22 Polyurethane, integral skin .....	Saturated light hydrocarbons C3-C6 .....	Agency has not completed review of data.
HCFC-22, HCFC-142b Polyolefin .....	HFC-134a .....	Agency has not completed review of data.
	Saturated light hydrocarbons C3-C6 .....	Agency has not completed review of data.

SOLVENT CLEANING PENDING

End-use	Substitute	Comments
Metals cleaning w/CFC-113, MCF and HCFC-141b.	HCFC-225 .....	
Metals cleaning w/CFC-113, MCF and HCFC-141b.	HCFC-122 .....	
Electronics cleaning w/ CFC-113, MCF and HCFC-141b.	HCFC-122 .....	
Electronics cleaning w/ HCFC- 141b.	Perfluorocarbons (C5F12, C6F12, C6F14, C7F16, C8F18, C5F11NO, C6F13NO, C7F15NO, and C8F16).	
Precision cleaning w/CFC-113, MCF and HCFC-141b.	HCFC-122 .....	
Precision cleaning w/HCFC-141b .	Perfluorocarbons (C5F12, C6F12, C6F14, C7F16, C8F18, C5F11NO, C6F13NO, C7F15NO, and C8F16).	

FIRE SUPPRESSION AND EXPLOSION PROTECTION PENDING DECISIONS

End-use	Substitute	Comments
Halon 1211 .....	CF <sub>3</sub> I .....	Pending publication of the upcoming NPRM and subsequent FRM.
Streaming Agents .....	HFC-227ea .....	Complete SNAP submission and personal monitoring data required.
Halon 1301 .....	[HFC Blend] A .....	Agency analysis of this agent is not yet complete.
Total Flooding Agents .....	[Inert Gas Blend] B .....	Pending publication of upcoming NPRM and subsequent FRM.
	[Inert Gas Blend] C .....	Pending publication of upcoming NPRM and subsequent FRM.
	[Powdered Aerosol] A .....	For use in occupied areas, pending medical assessment by peer re- view panel.
	[Water Mist System] A .....	Pending receipt of medical assessment by peer review panel.
	[Water Mist System] B .....	Pending receipt of medical assessment by peer review panel.

STERILANTS PENDING DECISIONS

End-use	Substitute	Comments
12/88 Blend of EtO/CFC-12 .....	HFC-125	Pending FIFRA registration and completion of Agency review.
Sterilant .....	HFC-227ea	Pending FIFRA registration and receipt of complete SNAP submission.

AEROSOLS PENDING

End-use	Substitute	Comments
CFC-11, CFC-113, MCF, HCFC- 141b as aerosol solvents.	Volatile methyl siloxanes .....	EPA investigating feasibility of meeting exposure standards for this class of chemicals when used in occupational settings.

ADHESIVES, COATINGS AND INKS PENDING DECISIONS

End-use	Substitute	Comments
Metals cleaning w/CFC-113 MCF ...	Monochloro-toluene/benzo- trifluorides.	Agency has not completed review of data. Evaluation of exposure and toxicity data still ongoing.