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**Environmental
Protection Agency**

40 CFR Part 82
Protection of Stratospheric Ozone; Final
Rule

ENVIRONMENTAL PROTECTION AGENCY**40 CFR Part 82**

[FRL-5556-5]

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 (ODS) under the U.S. Environmental Protection Agency's (EPA) Significant New Alternatives Policy (SNAP) program. In addition, this Notice clarifies information on refrigerant blends R-410A, R-410B, and R-407C that EPA previously added to the acceptable substitute list.

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, S.W., Washington, D.C. 20460. Telephone: (202) 260-7548. The docket may be inspected between 8:00 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:

Nancy Smagin at (202) 233-9126 or fax (202) 233-9577, U.S. EPA, Stratospheric Protection Division, 401 M Street, S.W., Mail Code 6205J, Washington, D.C. 20460; EPA Stratospheric Ozone Protection Hotline at (800) 296-1996; EPA World Wide Web Site at <http://www.epa.gov/ozone/title6/snap/snap.html>.

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I. 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 refers 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. At the

same time, EPA also 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 is 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 by this notice.

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.

EPA published lists of acceptable alternatives on August 26, 1994 (59 FR 44240), January 13, 1995 (60 FR 3318), July 28, 1995 (60 FR 38729), February 8, 1996 (61 FR 4736) and published Final Rulemakings restricting the use of certain substitutes on June 13, 1995 (60 FR 31092), and May 22, 1996 (61 FR 25585). EPA also published a Notice of Proposed Rulemaking restricting the use of certain substitutes on May 22, 1996 (61 FR 25604).

II. Listing of Acceptable Substitutes

This section presents EPA's most recent acceptable listing decisions for substitutes for class I and class II substances in the following industrial sectors: refrigeration and air conditioning, foam blowing, and fire

suppression and explosion protection. In this Notice, EPA has split the refrigeration and air conditioning sector into two parts: substitutes for class I substances and substitutes for class II substances. For copies of the full list, contact the EPA Stratospheric Protection Hotline at (800) 296-1996.

Parts A through G below present a detailed discussion of the substitute listing determinations by major use sector. Tables summarizing today's listing decisions are in Appendix A. The comments contained in Appendix A provide additional information on a substitute, but for listings of acceptable substitutes, they are not legally binding under section 612 of the Clean Air Act. Thus, adherence to recommendations in the comments is not mandatory for use as 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: Class I

1. Secondary Loop Systems

In this Notice, EPA requests information about fluids used in secondary loop systems. Unlike most other end-uses, secondary loop systems do not circulate refrigerant through heat exchangers that are in direct contact with the refrigerated or air conditioned space. Rather, the primary refrigerant exchanges heat only with a second fluid, which in turn carries heat away from the cooled space.

A good example of such a system is a large building chiller. The primary loop chills water, which then circulates throughout the building, where fans blow air over the cold pipes to air condition occupied spaces. Another example is an ammonia-based supermarket refrigeration system. The ammonia-containing primary loop is isolated from the occupied area of the store, while a secondary loop fluid carries the chill to the refrigerated cases.

Secondary loop systems are gaining market share in many areas because they offer potential safety improvements, particularly when the primary refrigerant is flammable or

toxic. The primary system generally has a relatively small charge, and it can be placed in an external building, thereby removing the risk to occupants. In addition, a smaller charge means that less refrigerant can escape during a leak. Given even the lower ozone depletion potential (ODP) of HCFCs, and global warming potential (GWP) of some HCFCs and HFCs, this reduced leakage yields direct benefits to the environment. Because of the potential environmental and safety benefits of secondary loop systems, EPA is investigating whether it would be appropriate to list secondary fluids formally under the SNAP program.

Such systems would use an already EPA-acceptable refrigerant in the primary loop and a different fluid in the secondary loop. Therefore, such a system could be listed as a not-in-kind replacement for CFC-based refrigeration and air conditioning equipment. EPA is aware that water, ethylene glycol, propylene glycol, ice slurries, CO₂, ethyl alcohol, calcium chloride, Flo-ice, HCFC-123, and certain hydrofluoroethers are either used today or are being considered for use as secondary fluids. While studying whether this end-use would be appropriate for listing, EPA invites companies interested in listing other secondary loop fluids to contact the SNAP coordinator at 202-233-9126, fax 202-233-9577.

2. Acceptable Substitutes for Other End-Uses

Note that EPA acceptability does not mean that a given substitute will work in a specific type of equipment within an end-use. Engineering expertise must be used to determine the appropriate use of these and any other substitutes. In addition, although some alternatives are listed for multiple refrigerants, they may not be appropriate for use in all equipment or under all conditions.

a. Hot Shot and GHG-X4

Hot Shot and GHG-X4, both of which consist of HCFC-22, HCFC-124, HCFC-142b, and isobutane, are acceptable as substitutes for CFC-12 and R-500 in the following retrofitted and new end-uses:

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

• Non-Automotive Motor Vehicle Air Conditioners

Because HCFC-22 and HCFC-142b contribute to ozone depletion, they will be phased out of production. Therefore, these blends will be used primarily as retrofit refrigerants. However, these blends are acceptable for use in new systems. Regulations regarding recycling and reclamation issued under section 608 of the Clean Air Act apply to these blends. HCFC-142b has one of the highest ODPs among the HCFCs. The GWPs of HCFC-22 and HCFC-142b are 1700 and 2000, respectively, which are somewhat high. However, this concern is mitigated by the scheduled phaseout of these refrigerants. Although HCFC-142b and isobutane are flammable, these blends are not. In addition, testing on these blends has shown that they do not become flammable after leaks. GHG-X4 is being sold under the trade names "Autofrost" and "Chill-It."

b. R-401C

R-401C, which consists of HCFC-22, HFC-152a, and HCFC-124, is acceptable as a substitute for CFC-12 in retrofitted and new non-automotive motor vehicle air conditioners. Because HCFC-22 and HCFC-124 contribute to ozone depletion, they will be phased out of production. Therefore, these blends will be used primarily as retrofit refrigerants. However, these blends are acceptable for use in new systems. Regulations regarding recycling and reclamation issued under section 608 of the Clean Air Act apply to these blends. HCFC-142b has one of the highest ODPS among the HCFCs. The GWP of HCFC-22 is 1700, which is somewhat high. However, this concern is mitigated by the scheduled phaseout of this refrigerant. Although HCFC-142b and isobutane are flammable, these blends are not. In addition, testing on these blends has shown that they do not become flammable after leaks. GHG-X4 is being sold under the trade names "Autofrost" and "Chill-It."

c. NARM-502

NARM-502, which consists of HCFC-22, HFC-23, and HFC-152a, is acceptable as a substitute for R-503 and CFC-13 in new and retrofitted very low temperature refrigeration and industrial process refrigeration. Because HCFC-22 contributes to ozone depletion, it will be phased out of production. Therefore, this blend will be used primarily as a retrofit refrigerant. However, NARM-502 is acceptable for use in new systems. Regulations regarding recycling and reclamation issued under section 608 of the Clean Air Act apply to this blend. The GWP of HCFC-22 is 1700,

which is somewhat high, and the GWP of HFC-23 is 12,100, which is extremely high. However, other acceptable refrigerants in this end-use also contain either HFC-23 or perfluorocarbons (PFCs), with higher GWPs. In addition, the percentage of HFC-23 is quite small, so this blend poses much lower global warming risk than other substitutes for this end-use. Although HFC-152a is flammable, NARM-502 as blended is not, and testing has shown that it does not become flammable after leaks.

d. Freezone (Formerly Listed as HCFC Blend Delta) and FREEZE 12

Freezone, which consists of HFC-134a, HCFC-142b, and a lubricant, and FREEZE 12, which consists of HFC-134a and HCFC-142b, are acceptable as substitutes for CFC-12 in the following retrofitted and new end-uses:

- Centrifugal and Reciprocating Chillers
- Industrial Process Refrigeration
- Ice Skating Rinks
- Cold Storage Warehouses
- Refrigerated Transport
- Retail Food Refrigeration
- Vending Machines
- Water Coolers
- Commercial Ice Machines
- Household Refrigerators
- Household Freezers
- Residential Dehumidifiers
- Non-Automotive Motor Vehicle Air Conditioners

Because HCFC-142b contributes to ozone depletion, it will be phased out of production. Therefore, these blends will be used primarily as retrofit refrigerants. However, they are acceptable for use in new systems. Regulations regarding recycling and reclamation issued under section 608 of the Clean Air Act apply to these blends. HCFC-142b has one of the highest ODPs among the HCFCs. In addition, the GWP of HCFC-142b is 2000, which is somewhat high. However, this concern is mitigated by the scheduled phaseout of this refrigerant. Although HCFC-142b is flammable, Freezone and FREEZE 12 as blended are not, and testing has shown that they do not become flammable after leaks.

e. G2018C

G2018C, which consists of HCFC-22, HFC-152a, and propylene, is acceptable as a substitute for CFC-12 in the following retrofitted and new end-uses:

- Centrifugal and Reciprocating Chillers
- Industrial Process Refrigeration
- Ice Skating Rinks
- Cold Storage Warehouses
- Refrigerated Transport
- Retail Food Refrigeration
- Vending Machines

- Water Coolers
- Commercial Ice Machines

Because HCFC-22 contributes to ozone depletion, it will be phased out of production. Therefore, this blend will be used primarily as a retrofit refrigerant. However, it is acceptable for use in new systems. Regulations regarding recycling and reclamation issued under section 608 of the Clean Air Act apply to G2018C. The GWP of HCFC-22 is 1700, which is somewhat high. However, this concern is mitigated by the scheduled phaseout of this refrigerant. Although HFC-152a is flammable, G2018C as blended is not, and testing has shown that it does not become flammable after leaks.

B. Refrigeration and Air Conditioning: Class II

1. Clarification of Previous Notice (61 FR 4736)

Please refer to the March 18, 1994 SNAP rule (59 FR 13044) 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.

This Notice marks the second time EPA has listed acceptable substitutes for HCFC-22 in the refrigeration and air conditioning sector. Although the substitutes listed below were intended specifically to replace HCFC-22, HCFC-22 is itself frequently used as a substitute for class I refrigerants (e.g., CFC-11 and CFC-12). Therefore, the listings below also describe these HCFC-22 substitutes as acceptable alternatives for class I refrigerants in new equipment. The underlying reasoning is that if, for instance, HCFC-22 poses lower overall risk than CFC-12, and R-410A poses lower overall risk than HCFC-22, then R-410A must also pose lower overall risk than CFC-12. Therefore, even though R-410A is not designed to be a direct replacement for CFC-12, in new equipment it may be appropriate to design for R-410A rather than for another CFC-12 substitute. As with all listings, however, engineering expertise is required to determine the best match between a given class I refrigerant and an alternative.

The February 8, 1996 Notice of Acceptability (61 FR 4736) inadvertently described R-410A, R-410B, and R-407C as not containing any components regulated as volatile organic compounds (VOC) under Title I of the Clean Air Act. In fact, all three blends contain HFC-32, which is a VOC-regulated compound.

2. Acceptable Substitutes

a. R-507

R-507, which consists of HFC-143a and HFC-125, is acceptable as a substitute for HCFC-22, and by extension, class I refrigerants, in equipment in the following new and retrofit end-uses:

- Commercial comfort air conditioning
- Industrial process refrigeration systems
- Industrial process air conditioning
- Refrigerated transport
- Retail food refrigeration
- Cold storage warehouses
- Vending machines
- Commercial ice machines
- Household and light commercial air conditioning

R-507 contains HFC-125 and HFC-143a. HFC-125 and HFC-143a exhibit a fairly high global warming potential (3,200 and 4,400 respectively at 100 year integrated time horizon) compared to other HFCs and HCFC-22. However, their potential for contributing to global warming will be mitigated in the listed end uses through the implementation of the venting prohibition under Section 608(c)(2) of the Clean Air Act. Note that the prohibition on venting, which applies to all substitute refrigerants, was mandated in section 608(c)(2) and took effect through regulations on November 15, 1995. While the current rule issued under section 608 of the CAA (58 FR 28660) does not specify recycling or leak repair requirements, it is illegal to vent this refrigerant at any time. In addition, EPA anticipates proposing new recycling regulations for non-ozone-depleting refrigerants in the near future. A fact sheet on the proposal is available from the EPA Ozone Hotline at (800) 296-1996. R-507 does not contain ozone-depleting substances and is low in toxicity. Although HFC-143a is flammable, the blend is not. It is a near azeotrope, so it will not fractionate during operation. Leak testing has demonstrated that its composition never becomes flammable.

b. Ammonia

Ammonia, either in vapor compression or absorption systems, is acceptable as a substitute for HCFC-22, and by extension, class I refrigerants, in equipment in the following new end-uses:

- Industrial process air conditioning
- Industrial process refrigeration
- Ice skating rinks
- Cold storage warehouses
- Commercial ice machines
- Commercial comfort air conditioning (absorption chillers or vapor compression with a secondary loop)

- Retail food refrigeration (with a secondary loop)
- Household refrigerators (absorption systems only)
- Household and light commercial air conditioning (absorption systems only)

Ammonia applications that do not fall under any of the above-listed end uses and for which ammonia has traditionally been used as the refrigerant fluid, whether in vapor compression or absorption systems, are not covered under the SNAP program. Therefore, does not require notification or listing under the SNAP program.

Ammonia has been used as a medium to low temperature refrigerant in vapor compression cycles for more than 100 years. Ammonia has excellent refrigerant properties, a characteristic pungent odor, no long-term atmospheric risks, and low cost. It is, however, moderately flammable and toxic, although it is not a cumulative poison. Ammonia may be used safely if existing OSHA and ASHRAE standards are followed. Users should check local building codes related to the use of ammonia. Ammonia does not deplete the ozone or contribute to global warming.

c. Alternative Technologies

Several technologies already exist as alternatives to equipment using class I substances. As a result of the CFC phaseout, they are gaining prominence in the transition away from CFCs. Examples of these technologies include evaporative cooling, desiccant cooling, and absorption refrigeration and air conditioning. In addition, several technologies are currently under development. Significant progress has expanded the applicability of these alternatives, and their environmental benefits generally include zero ODP and low direct GWP. In addition, evaporative cooling offers significant energy savings, which results in reduced indirect GWP.

(1) Evaporative Cooling

Evaporative Cooling is acceptable as a substitute for HCFC-22, and by extension, class I refrigerants, in equipment in the following new end-uses:

- Industrial process air conditioning
- Commercial comfort air conditioning
- Household and light commercial air conditioning

Evaporative cooling does not contribute to ozone depletion or global warming and has the potential to be more energy efficient than current refrigeration and air conditioning

systems. Evaporative cooling uses no chemicals, but relies instead on water evaporation as a means of cooling. It is in widespread use in office buildings in the western U.S. Recent design improvements have greatly expanded its applicability to other regions.

(2) Desiccant Cooling

Desiccant cooling is acceptable as a substitute for HCFC-22, and by extension, class I refrigerants, in equipment in the following new end-uses:

- Industrial process air conditioning
- Commercial comfort air conditioning
- Residential air conditioning

Desiccant cooling is an alternate technology to the vapor compression cycle. Desiccant cooling systems do not contribute to ozone depletion or global warming. These systems offer potential energy savings over conventional HCFC-22 vapor compression systems.

(3) Water/Lithium Bromide Absorption

Water/lithium bromide absorption is acceptable as an alternative technology to centrifugal chillers using HCFC-22. Some absorption systems use water as the refrigerant and lithium bromide as the absorber. Lithium bromide has zero ODP and GWP. It is low in toxicity and is nonflammable.

C. Foam Blowing

1. Acceptable Substitutes

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

Proprietary Blowing Agent 1 (PBA 1) is an acceptable substitute for CFCs and HCFCs in rigid polyurethane and polyisocyanurate laminated boardstock foam; rigid polyurethane appliance; rigid polyurethane slabstock and other; and rigid polyurethane spray and commercial refrigeration, and sandwich panels. This blowing agent was submitted as a proprietary formulation by a foam system manufacturer. PBA 1 does not contain ozone depleting chemicals and has very low or zero global warming potential. This blend is not flammable. No other significant health or environmental risks are anticipated from the use of this substitute as long as other existing relevant health, environmental and safety requirements are met. Exposure assessments indicate worker exposure is unlikely to exceed the OSHA permissible exposure level.

D. Fire Suppression and Explosion Protection

1. Acceptable Substitutes

a. Total Flooding Agents

(1) Foam A—formerly [Water Mist/Surfactant Blend] A

Foam A is acceptable as a Halon 1301 substitute. This agent was previously identified as [Water Mist/Surfactant Blend] A in the July 28, 1995 Notice (60 FR 38729), and was listed as acceptable for use in normally unoccupied areas only. Since that time, the manufacturer has clarified to EPA that this agent is not a water mist system, nor is it a wetting agent, but instead is a low density, short duration foam. This agent is dispensed as bubbles which physically interfere with the mixture of fuel and air, and provide some cooling of the flame front, both of which contribute to control of the fire.

In the event that the manufacturer develops a misting system based on this agent, EPA requires the manufacturer to submit a separate SNAP application for assessment of exposure to fine water mist particles containing additives.

E. Solvent Cleaning

1. Acceptable Substitutes

a. Metals Cleaning

Hydrofluoroether (HFE): C4F9OCH3 (methoxynonafluorobutane, iso and normal) is an acceptable substitute for CFC-113 and methyl chloroform (MCF) in metals cleaning. This HFE is a new chemical that completed review in May 1996 under EPA's Premanufacture Notice Program under the Toxic Substances Control Act. This chemical does not deplete the ozone layer since it does not contain chlorine or bromine. It has a 4.1-year atmospheric lifetime and a GWP of 150 over a 500-year time horizon and 480 over a 100-year time horizon.

This HFE exhibits only moderate toxicity in tests reviewed by EPA, and the 600 ppm 8-hr Time Weighted Average workplace standard set by the company was deemed sufficiently protective. Based on the combination of the feasibility of meeting the exposure standard and the moderate toxicity exhibited by this chemical, EPA is listing this substance as acceptable without restrictions. As with workplace exposure standards for other CFC alternatives, this standard for this substance, too, will be examined by the Workplace Environmental Exposure Limit subcommittee of the American Industrial Hygiene Association.

b. Electronics Cleaning

Hydrofluoroether (HFE): C4F9OCH3 (methoxy-nonafluorobutane, iso and normal) is an acceptable substitute for CFC-113 and methyl chloroform (MCF) in electronics cleaning. This HFE is a new chemical that completed review in May 1996 under EPA's Premanufacture Notice Program under the Toxic Substances Control Act. This chemical does not deplete the ozone layer since it does not contain chlorine or bromine. It has a atmospheric 4.1-year lifetime and a GWP of 150 over a 500-year time horizon and 480 over a 100-year time horizon. The GWP and lifetime for this HFE are both lower than the GWP and lifetime for CFC-113 and for PFCs.

This HFE exhibits only moderate toxicity in tests reviewed by EPA, and the 600 ppm 8-hr Time Weighted Average workplace standard set by the company was deemed sufficiently protective. Based on the combination of the feasibility of meeting the exposure standard and the moderate toxicity exhibited by this chemical, EPA is listing this substance as acceptable without restrictions. As with workplace exposure standards for other CFC alternatives, this standard for this substance, too, will be examined by the Workplace Environmental Exposure Limit subcommittee of the American Industrial Hygiene Association.

c. Precision Cleaning

Hydrofluoroether (HFE): C4F9OCH3 (methoxy-nonafluorobutane, iso and normal) is an acceptable substitute for CFC-113 and methyl chloroform (MCF) in precision cleaning. This HFE is a new chemical that completed review this past May under EPA's Premanufacture Notice Program under the Toxic Substances Control Act. This chemical does not deplete the ozone layer since it does not contain chlorine or bromine. It has a 4.1-year atmospheric lifetime

and a low GWP of 150 over a 500-year time horizon and 480 over a 100-year time horizon. The GWP and lifetime for this HFE are both lower than the GWP and lifetime for CFC-113 and PFCs.

This HFE exhibits only moderate toxicity in tests reviewed by EPA, and the 600 ppm 8-hr Time Weighted Average workplace standard set by the company was deemed sufficiently protective. Based on the combination of the feasibility of meeting the exposure standard and the moderate toxicity exhibited by this chemical, EPA is listing this substance as acceptable without restrictions. As with workplace exposure standards for other CFC alternatives, this standard for this substance, too, will be examined by the Workplace Environmental Exposure Limit subcommittee of the American Industrial Hygiene Association.

F. Aerosols

1. Acceptable Substitutes

a. Solvents

Hydrofluoroether (HFE): C4F9OCH3 (methoxy-nonafluorobutane, iso and normal) is an acceptable substitute for CFC-113 and methyl chloroform (MCF) as a solvent in aerosol products. This HFE is a new chemical that completed review this past May under EPA's Premanufacture Notice Program under the Toxic Substances Control Act. This chemical does not deplete the ozone layer since it does not contain chlorine or bromine. It has a 4.1-year atmospheric lifetime and a GWP of 150 over a 500-year time horizon and 480 over a 100-year time horizon. The GWP and lifetime for this HFE are both lower than the GWP and lifetime for CFC-113 and for PFCs.

This HFE exhibits only moderate toxicity in tests reviewed by EPA, and the 600 ppm 8-hr Time Weighted Average workplace standard set by the company was deemed sufficiently

protective. Based on the combination of the feasibility of meeting the exposure standard and the moderate toxicity exhibited by this chemical, EPA is listing this substance as acceptable without restrictions. As with workplace exposure standards for other CFC alternatives, this standard for this substance, too, will be examined by the Workplace Environmental Exposure Limit subcommittee of the American Industrial Hygiene Association.

G. Adhesives, Coatings and Inks

1. Acceptable Substitutes

a. *Trans-1,2-dichloroethylene*

Trans-1,2-dichloroethylene is acceptable as an alternative to MCF and CFC-113 in adhesives. The OSHA set exposure limit (PEL) is 200 ppm.

III. 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) weekdays.

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 may also be obtained on the World Wide Web at <http://www.epa.gov/ozone/title6/snap/snap.html>.

Dated: August 13, 1996.

Mary D. Nichols,
Assistant Administrator for Air and Radiation.

Note: The following Appendix will not appear in the Code of Federal Regulations.

APPENDIX A.—SUMMARY OF ACCEPTABLE AND PENDING DECISIONS

End-Use	Substitute	Decision	Comments
CFC-12 and R-500 Centrifugal and Reciprocating Chillers; CFC-12 Industrial Process Refrigeration, Ice Skating Rinks, Cold Storage Warehouses, Refrigerated Transport, Retail Food Refrigeration, Vending Machines, Water Coolers, Commercial Ice Machines (Retrofitted and New).	Hot Shot	Acceptable	
	GHG-X4	Acceptable	
	Freezone	Acceptable	
	FREEZE 12	Acceptable	
	G2018C	Acceptable	
CFC-12 Household Refrigerators, Household Freezers, and Residential Dehumidifiers (Retrofitted and New).	Hot Shot	Acceptable	
	GHG-X4	Acceptable	
	Freezone	Acceptable	
	FREEZE 12	Acceptable	
CFC-13, R-13B1, and R-503 Very Low Temperature Refrigeration and Industrial Process Refrigeration (Retrofitted and New).	NARM-502	Acceptable	

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

End-Use	Substitute	Decision	Comments
Non-Automotive Motor Vehicle Air Conditioning, e.g., buses, trains, planes (Retrofitted and New).	R-401C	Acceptable	
	Hot Shot	Acceptable	
	GHG-X4	Acceptable	
	Freezone	Acceptable	
	FREEZE 12	Acceptable	

**Refrigeration and Air Conditioning
Acceptable Substitutes for Class II Substances**

Household and Light Commercial Air Conditioning.	R-507, Ammonia, Evaporative and Desiccant Cooling.	Acceptable	Ammonia includes absorption systems only. EPA urges recycling of R-507.
Commercial Comfort Air Conditioning	R-507, Ammonia, Evaporative and Desiccant Cooling, Water/Lithium Bromide.	Acceptable	Includes ammonia absorption chillers and vapor compression with a secondary loop. EPA urges recycling of R-507.
Industrial Process Refrigeration	R-507, Ammonia	Acceptable	Includes ammonia vapor compression and absorption systems. EPA urges recycling of R-507.
Industrial Process Air Conditioners	R-507, Ammonia, Evaporative and Desiccant Cooling.	Acceptable	Includes ammonia vapor compression and absorption systems. EPA urges recycling of R-507.
Ice Skating Rinks	Ammonia	Acceptable	Includes ammonia vapor compression and absorption systems.
Refrigerated Transport	R-507	Acceptable	EPA urges recycling.
Retail Food Refrigeration	R-507, Ammonia	Acceptable	Ammonia includes vapor compression with secondary loop systems only. EPA urges recycling of R-507.
Ice Machines	R-507, Ammonia	Acceptable	Includes ammonia vapor compression and absorption systems. EPA urges recycling of R-507.
Household and Other Refrigerated Appliances.	Ammonia	Acceptable	Includes absorption systems only.

**Foam Blowing
Acceptable Substitutes**

Rigid polyurethane and polyisocyanurate laminated boardstock; Rigid Polyurethane Appliance; Rigid Polyurethane Slabstock and Other; and Rigid Polyurethane Spray and Commercial Refrigeration; and Sandwich Panels CFCs and HCFCs.	Proprietary Blowing Agent 1 (PBA 1)	Acceptable	Proprietary formulation. PBA 1 has zero-ODP and has very low or zero GWP. Not flammable, and no other significant health environmental risks are anticipated from the use of this substitute as long as other existing relevant health, environmental and safety requirements are met.
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**Fire Suppression and Explosion Protection
Acceptable Substitutes**

Total Flooding with Halon 1301	Foam A	Acceptable	Previously identified as [Water Mist/Surfactant Blend] A (60 FR 38729).
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**Acceptable Substitutes
Solvent Cleaning**

Metals cleaning with CFC-113, MCF and HCFC-141b.	Hydrofluoroether (HFE): C4F9OCH3 (methoxynonafluorobutane, iso and normal).	Acceptable	
Electronics cleaning with CFC-113, MCF and HCFC-141b.	Hydrofluoroether (HFE): C4F9OCH3 (methoxynonafluorobutane, iso and normal).	Acceptable	
Precision cleaning with CFC-113, MCF and HCFC-141b.	Hydrofluoroether (HFE): C4F9OCH3 (methoxynonafluorobutane, iso and normal).	Acceptable	

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

End-Use	Substitute	Decision	Comments
Acceptable Substitutes Aerosols			
CFC-11, CFC-113, MCF and HCFC-141b as aerosol solvents.	Hydrofluoroether (HFE): C4F9OCH3 (methoxynonafluorobutane, iso and normal).	Acceptable	
Acceptable Substitutes Adhesives, Coatings, and Inks			
MCF and CFC-113 as solvents in adhesives.	Trans-1,2-dichloroethylene	Acceptable	The OSHA set exposure limit (PEL) is 200 ppm.
End-Use	Substitute	Comments	
Solvent Cleaning Pending Substitutes			
Metals Cleaning w/CFC-113 and MCF	n-propylbromide	EPA awaiting results from ODP study. EPA also examining new toxicity data reported under the Toxic Substances Control Act.	
Electronics Cleaning w/CFC-113 and MCF.	n-propylbromide	EPA awaiting results from ODP study. EPA also examining new toxicity data reported under the Toxic Substances Control Act.	
Precision Cleaning w/CFC-113 and MCF	n-propylbromide	EPA awaiting results from ODP study. EPA also examining new toxicity data reported under the Toxic Substances Control Act.	
Aerosols Pending Substitutes			
CFC-113, MCF, and HCFC-141b as aerosol solvents.	HFC-4310	EPA awaiting results on occupational exposure study.	

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