ENVIRONMENTAL PROTECTION AGENCY 6560-50-P

40 CFR Part 82

[EPA-HQ-OAR-2003-0118; FRL-9813-6]

RIN 2060-AG12

Protection of Stratospheric Ozone: Determination 28 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 (EPA) Significant New Alternatives Policy (SNAP) program. The determinations concern new substitutes for use in the refrigeration and air conditioning; foam blowing; solvent cleaning; adhesives, coatings and inks; and fire suppression sectors.

DATES: This determination is effective on [**Insert date of publication in the Federal Register**].

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: Margaret Sheppard by telephone at (202) 343-9163, by facsimile at (202) 343-2338, by e-mail at sheppard.margaret@epa.gov, or by mail at U.S. Environmental Protection Agency, Mail Code 6205J, 1200 Pennsylvania Avenue, NW, 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 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 at EPA's Ozone Depletion World Wide Web site at http://www.epa.gov/ozone/ including the SNAP portion at http://www.epa.gov/ozone/snap/.

SUPPLEMENTARY INFORMATION:

I. Listing of New Acceptable Substitutes

I. Listing of New Acceptable Substitutes

This section presents EPA's most recent acceptable listing decisions for substitutes in the refrigeration and air conditioning; foam blowing; solvent cleaning; adhesives, coatings and inks; and fire suppression sectors. For copies of the full list of substitutes in all of the regulated industrial sectors, visit EPA's Ozone Layer Protection web site at http://www.epa.gov/ozone/snap/lists/index.html.

The sections below discuss each substitute listing in detail. Appendix A contains a table summarizing today's listing decisions for new substitutes. The statements in the "Further Information" column in the table provide additional information but are not legally binding under section 612 of the Clean Air Act (CAA). In addition, the "further information" may not be a comprehensive list of other legal obligations you may need to meet when using the substitute. Although you are not required to follow recommendations in the "further information" column of the table to use a substitute consistent with section 612 of the CAA, EPA strongly encourages you to apply the information when using these substitutes. In many instances, the information simply refers to standard operating practices in existing industry and/or building-code standards. However, some of these statements may refer to obligations that are enforceable or binding under federal or state programs other than the SNAP program. Many of these statements, if adopted, would not require significant changes to existing operating practices.

You can find submissions to EPA for the use of the substitutes listed in this document and other materials supporting the decisions in this action in docket EPA-HQ-OAR-2003-0118 at http://www.regulations.gov.

As described in this document and elsewhere, including the original SNAP rulemaking published in the Federal Register at 59 FR 13044 on March 18, 1994, the SNAP program evaluates substitutes within a comparative risk framework. The SNAP program compares new substitutes both to the ozone-depleting substances being phased out under the *Montreal Protocol on Substances that Deplete the Ozone Layer* and the CAA and to other available or potentially available alternatives for the same end uses. The environmental and health risk factors that the SNAP program considers include ozone depletion potential, flammability, toxicity, occupational and consumer health and safety, as well as contributions to global warming and

other environmental factors. Environmental and human health exposures can vary significantly depending on the particular application of a substitute – and over time, information applicable to a substitute can change. This approach does not imply fundamental tradeoffs with respect to different types of risk, either to the environment or to human health. EPA recognizes that during the nearly two- decade long history of the SNAP program, new alternatives and new information about alternatives have emerged. To the extent possible, EPA considers new information and improved understanding of the risk factors for the environment and human health in the context of the available or potentially available alternatives for a given use.

A. *Refrigeration and Air Conditioning*

1. R-442A (RS-50)

EPA's decision: EPA finds R-442A acceptable as a substitute for use in retrofit equipment in:

- Ice skating rinks
- Commercial ice machines
- Retail food refrigeration (rack refrigeration systems only)

R-442A is a blend by weight of 31.1 percent hydrofluorocarbon (HFC)-125, which is also known as 1,1,1,2,2-pentafluoroethane (Chemical Abstracts Service Registry Number [CAS Reg. No.] 354-33-6), 30.0 percent HFC-134a, which is also known as 1,1,1,2-tetrafluoroethane (CAS Reg. No. 811-97-2), 3.0 percent R-152a, which is also known as 1,1-difluoroethane (CAS Reg. No. 75-37-6)], 5.0 percent HFC-227ea, which is also known as 1,1,1,2,3,3,3-heptafluoropropane

(CAS Reg. No. 431-89-0), and 31.1 percent HFC-32, which is also known as difluoromethane (CAS Reg. No. 75-10-5). You may find the submission under Docket item EPA-HQ-OAR-2003-0118-0286 at *http://www.regulations.gov*.

Environmental information: R-442A has no ozone depletion potential (ODP). Its components (HFC-134a, HFC-125, HFC-227ea, HFC-32 and HFC-152a) have 100-year integrated (100-yr) global warming potentials (GWPs) of 1430[1], 3500, 3220, 675 and 124 respectively. If these values are weighted by the mass percentage of the components, then R-442A has a GWP of about 1890. All components of R-442A are exempt from the definition of volatile organic compounds (VOC) under CAA regulations (see 40 CFR 51.100(s)) addressing the development of State Implementation Plans (SIPs) to attain and maintain the national ambient air quality standards. The emissions of this refrigerant will be limited given it is subject to the venting prohibition under section 608(c)(2) of the CAA and EPA's implementing regulations codified at 40 CFR 82.154(a)(1).

Flammability information: While some components are flammable, R-442A as formulated and in the worst-case fractionation formulation is not flammable.

Toxicity and exposure data: Potential health effects of this substitute include drowsiness, incoordination or dizziness. The substitute may also irritate the skin or eyes or cause frostbite. At sufficiently high concentrations, the substitute may cause

[1] Unless otherwise stated, all GWPs in this document are from: IPCC, 2007: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. This document is accessible at *http://www.ipcc.ch/publications_and_data/ar4/wg1/en/contents.html*

irregular heartbeat. The substitute could cause asphyxiation if air is displaced by vapors in a confined space. These potential health effects are common to many refrigerants.

EPA anticipates that R-442A will be used consistent with the recommendations specified in the Material Safety Data Sheets (MSDSs) for the blend and for the individual components. For the blend, the manufacturer recommends an acceptable exposure limit (AEL) of 1000 ppm on an 8-hour time-weighted average (8-hr TWA). For HFC-134a, HFC-125, HFC-32 and HFC-152a, the American Industrial Hygiene Association (AIHA) recommends workplace environmental exposure limits (WEELs) of 1000 ppm on an 8-hr TWA. In addition, the manufacturer of HFC-227ea recommends an AEL of 1000 ppm on an 8-hr TWA. EPA anticipates that users will be able to meet workplace exposure limits (WEELs and manufacturer AELs) and address potential health risks by following requirements and recommendations in the MSDS and other safety precautions common to the refrigeration and air conditioning industry.

Comparison to other refrigerants: R-442A is not ozone-depleting, comparable to a number of other acceptable non-ozone-depleting substitutes for these end uses such as HFC-134a, R-410A, and R-404A. R-442A's lack of ozone depletion potential is in contrast to some other substitutes, such as R-401A, R-414A and other blends containing HCFC-22 or HCFC-142b[2] with ODPs ranging from about 0.01 to about 0.047, and HCFC-22 (with an ODP of 0.04[3]), an ozone-depleting substance

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

[3] Unless otherwise stated, all ODPs in this document are from WMO (World Meteorological Organization), 2010. Scientific Assessment of Ozone Depletion: 2010, Global Ozone Research and Monitoring Project—Report No. 52, 516 pp., Geneva, Switzerland, 2011. This document is accessible at *http://www.wmo.int/pages/prog/arep/gaw/ozone_2010/ozone_asst_report.html* .

which it replaces. R-442A's GWP of about 1890 is lower than or comparable to that of a number of other substitutes in the same refrigeration and air conditioning end uses for which we are finding it acceptable. For example, the GWP for R-442A is lower than that of R-404A with a GWP of 3930 and comparable to that of R-410A with a GWP of 2100. R-442A's GWP is, however, higher than that of HFC-134a with a GWP of 1430. The GWP of R-442A is also comparable to those of ozone depleting substances it is replacing, such as HCFC-22 with a GWP of 1810. Flammability and toxicity risks are low, as discussed above, if used in accordance with the MSDSs. EPA finds R-442A acceptable for retrofit equipment in the end uses listed above because the overall environmental and human health risk posed by R-442A is lower than or comparable to the risks posed by other substitutes found acceptable in the same end uses for retrofit equipment.

B. *Foam Blowing*

1. Commercial Blends of HFC-365mfc and HFC-227ea (Solkane® 365/227)

EPA's decision: EPA finds commercial blends of HFC-365mfc and HFC-227ea, containing 7% to 13% HFC-227ea and the remainder HFC-365mfc, are acceptable as substitutes in:

- Rigid polyurethane spray
- Extruded polystyrene, boardstock and billet

HFC-365mfc is also known as 1,1,3,3,3-pentafluoropropane (CAS Reg. No. 138495-42-8), and HFC-227ea is also known as 1,1,1,2,3,3,3-heptafluoropropane (CAS Reg. No. 431-89-0). The manufacturer produces two commercial blends for foam blowing, one containing 93% HFC-365mfc and 7% HFC-227ea and the other containing 87% HFC-365mfc and 13%

HFC-227ea, and these are marketed under the trade name Solkane® 365/227. You may find the submission under Docket item EPA-HQ-OAR-2003-0118-0278 at *http://www.regulations.gov*. EPA previously listed HFC-365mfc as an acceptable substitute for a number of foam blowing end uses (September 30, 2009; 74 FR 50129).

Environmental information: Blends of HFC-365mfc and HFC-227ea have no ODP. HFC-365mfc and HFC-227ea have 100-yr GWPs of 794 and 3220 respectively. The commercial blends of these components, if weighted by mass percentage, have GWPs of roughly 900 to 1100. Both HFC-365mfc and HFC-227ea are exempt from the definition of 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.

Flammability information: By itself, HFC-365mfc is flammable. The commercial blends of HFC-365mfc and HFC-227ea are not flammable as formulated. However, care should be taken to follow all precautions in the MSDS and any guidance from the manufacturer, in cases where the non-flammable HFC-227ea may evaporate before the flammable component HFC-365mfc evaporates, especially with open containers of blowing agent or polyol premix.

Toxicity and exposure data: Potential health effects of this substitute include drowsiness or dizziness. The substitute may also irritate the skin or eyes or cause frostbite. At sufficiently high concentrations, the substitute may cause irregular heartbeat, unconsciousness or death. The substitute could cause asphyxiation if air is displaced by vapors in a confined space. These potential health effects are common to many foam blowing agents.

EPA anticipates that commercial blends of HFC-365mfc and HFC-227ea will be used consistent with the recommendations specified in the MSDSs for the blend and for the individual components. For HFC-365mfc, HFC-227ea and for the blends, the manufacturer recommends an AEL of 1000 ppm on an 8-hr TWA. EPA anticipates that users will be able to meet the manufacturer's AELs and address potential health risks by following requirements and recommendations in the MSDS and other safety precautions common in the foam blowing industry.

Comparison to other foam blowing agents: Commercial blends of HFC-365mfc and HFC-227ea are non-ozone depleting, comparable to a number of other acceptable non-ozone-depleting substitutes for these end uses, such as HFC-245fa, ecomate™ and CO_2. Commercial blends of HFC-365mfc and HFC-227ea have no ODP, compared to the acceptable substitute *trans*-1-chloro-3,3,3-trifluoroprop-1-ene with an ODP of approximately 0.00024 to 0.00034. The blends' lack of ODP is in contrast to an ODP of 1.0 for CFC-11 and an ODP of 0.12[4] for HCFC-141b, ozone depleting substances which they replace. The GWPs of the commercial blends of HFC-365mfc and HFC-227ea of 900 to 1100 are lower than or comparable to those of some other substitutes in these end uses such as HFC-134a with a GWP of 1430 and HFC-245fa with a GWP of 1030. The GWP of the non-flammable commercial blends of HFC-365mfc and HFC-227ea is higher than that for some other acceptable, but flammable, substitutes such as HFC-365mfc[5] alone with a GWP of 794, Exxsol Blowing Agents with a GWP less than 10 and ecomate™ with a GWP less than 5. The GWPs of the commercial blends of HFC-365mfc and HFC-227ea of 900 to 1100

[4] WMO (World Meteorological Organization), *Scientific Assessment of Ozone Depletion: 2006*, Global Ozone Research and Monitoring Project—Report No. 50, 572 pp., Geneva, Switzerland, 2007. This document is accessible at *http://www.wmo.int/pages/prog/arep/gaw/ozone_2006/ozone_asst_report.html*

[5] HFC-365mfc alone is listed as acceptable in all foam blowing end uses with the exception of spray foam.

are higher than those of HCFC-141b with a GWP of 725 and are lower than CFC-11's GWP of 4750. Flammability and toxicity risks are low, as discussed above, if used in accordance with the MSDSs. We find that commercial blends of HFC-365mfc and HFC-227ea are acceptable because they do not pose a greater overall risk to public health and the environment than the other substitutes acceptable in the end uses listed above.

C. *Solvent Cleaning*

1. *Trans*–1–chloro–3,3,3–trifluoroprop–1–ene (Solstice™ 1233zd(E))

EPA's decision: EPA finds trans–1–chloro–3,3,3–trifluoroprop–1–ene acceptable as a substitute in:

- Metals cleaning
- Electronics cleaning
- Precision cleaning

Trans–1–chloro–3,3,3–trifluoroprop–1–ene ((E) –1–chloro–3,3,3–trifluoroprop–1–ene, CAS Reg. No. 102687–65–0) is marketed under the trade names Solstice™ 1233zd(E) and Solstice™ Performance Fluid. EPA previously listed *trans*–1–chloro–3,3,3–trifluoroprop–1–ene as an acceptable alternative for various CFCs and HCFCs in a number of sectors and end uses (August 10, 2012, 77 FR 47768). You may find the redacted submission under Docket item EPA–HQ–OAR–2003–0118-0285 (continuation of Air Docket A–91–42) at *http://www.regulations.gov*.

Environmental information: Solstice™ 1233zd(E) is not regulated as an ODS but it has an ODP of 0.00024 to 0.00034.[6,7] Estimates of this compound's potential to deplete the ozone layer found that even with worst-case estimates of emissions which assume that this compound would substitute for all compounds it could replace, the impact on global atmospheric ozone abundance would be statistically insignificant.[8] Solstice™ 1233zd(E) has a 100-yr GWP reported as 4.7 to 7 and an atmospheric lifetime of approximately 26 days.[9,10] EPA has issued a proposed rule that, if finalized as proposed, would exempt Solstice™ 1233zd(E) from the definition of 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 (February 15, 2013; 79 FR 11101, 11119).

Flammability information: Solstice™ 1233zd(E) is not flammable.

Toxicity and exposure data: Potential health effects of this substitute include serious eye irritation, skin irritation, or frostbite. It may cause central nervous system effects such as drowsiness and dizziness. It could cause asphyxiation if air is displaced by vapors in a confined space.

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[6] Wang D., Olsen S., Wuebbles D. 2011. "Preliminary Report: Analyses of tCFP's Potential Impact on Atmospheric Ozone." Department of Atmospheric Sciences. University of Illinois, Urbana, IL. September 26, 2011.
[7] Patten and Wuebbles, 2010. "Atmospheric Lifetimes and Ozone Depletion Potentials of *trans*-1-chloro-3,3,3-trichloropropylene and *trans*-1,2-dichloroethylene in a three-dimensional model." *Atmos. Chem. Phys.*, 10, 10867–10874, 2010.
[8] Wang et al., 2011. *Op. cit.*
[9] Sulbaek, Andersen, Nilsson, Neilsen, Johnson, Hurley and Wallington, "Atmospheric chemistry of trans-CF3CH=CHCl: Kinetics of the gas-phase reactions with Cl atoms, OH radicals, and O_3", *Jrnl of Photochemistry and Photobiology A: Chemistry* 199 (2008) 92-97; and Wang D., Olsen S., Wuebbles D. Undated. "Three-Dimensional Model Evaluation of the Global Warming Potentials for tCFP." Department of Atmospheric Sciences. University of Illinois, Urbana, IL. Draft report, undated.
[10] Wang et al. 2011 and Sulbaek Andersen et al., 2008. *Op cit.*

EPA anticipates that Solstice™ 1233zd(E) will be used consistent with the recommendations specified in the manufacturer's MSDS. The manufacturer recommends an AEL of 300 ppm (8-hr TWA) for Solstice™ 1233zd(E). EPA also developed a short-term exposure limit (STEL) of 900 ppm over a 15-minute period, based on the submitter's 300 ppm AEL value. EPA anticipates that users will be able to meet the recommended workplace exposure limits (manufacturer's and EPA's) and address potential health risks by following requirements and recommendations in the MSDS and other safety precautions commonly used in the solvent cleaning industry.

Comparison to other cleaning solvents: Solstice™ 1233zd(E) has an ODP of 0.00024 to 0.00034. This is higher than the ODP of a number of acceptable non-ozone-depleting substitutes in these end uses such as HFC-4310mee, HFE-7100, acetone, and aqueous cleaners. The ODP of Solstice™ 1233zd(E) is comparable to the ODPs of *trans*-1,2-dichloroethylene and trichloroethylene and an order of magnitude lower than the ODP of perchloroethylene, other substitutes in the solvent cleaning sector that are not regulated as ODS.[11,12] Solstice™ 1233zd(E)'s ODP is several orders of magnitude lower than that of ozone-depleting substances it replaces, including CFC–113, methyl chloroform, HCFC-225ca and HCFC-225cb (ODPs ranging from 0.02 to 0.85). Solstice™ 1233zd(E)'s GWP of 4.7 to 7 is lower than that of other substitutes in the metals, precision and electronics cleaning end uses, such as HFC-4310mee with a GWP of 1640 and HFE-7100 with a GWP of 297. Solstice™ 1233zd(E), a non-flammable compound, has a GWP that is comparable to or slightly higher than that of some other acceptable,

[11] Wuebbles and Patten, 2010. Atmospheric lifetimes and Ozone Depletion Potentials of trans-1-chloro-3,3,3-trifluoropropylene and trans-1,2-dichloroethylene in a three-dimensional model. *Atmos. Chem. Phys.*, 10, 10867–10874, 2010.
[12] WMO, 2010. Section 1.3.6.2.

but flammable, substitutes such as *trans*-1,2-dichloroethylene with a GWP less than 10 and acetone with a GWP of less than 1. Its climate impacts cannot be compared directly to those of aqueous cleaners with no direct GWP. Furthermore, the GWP of Solstice™ 1233zd(E) is several orders of magnitude less than those of ozone-depleting substances it replaces, including methyl chloroform, CFC-113, HCFC-225ca and HCFC-225cb (GWPs ranging from 122 to 6,130). Flammability and toxicity risks are low, as discussed above, if used in accordance with the MSDS. The potential health effects of Solstice™ 1233zd(E) are common to many solvents, including many of those already listed as acceptable under SNAP. EPA finds *trans*–1–chloro–3,3,3–trifluoroprop–1–ene (Solstice™ 1233zd(E)) acceptable in the end uses listed above because the overall environmental and human health risk posed by Solstice™ 1233zd(E) is lower than or comparable to the risks posed by other substitutes found acceptable in the same end uses.

D. *Adhesives, Coatings and Inks*

1. *Trans*–1–chloro–3,3,3–trifluoroprop–1–ene (Solstice™ 1233zd(E))

EPA's decision: EPA finds trans–1–chloro–3,3,3–trifluoroprop–1–ene acceptable as a substitute carrier solvent in:

- Adhesives
- Coatings

Trans–1–chloro–3,3,3–trifluoroprop–1–ene ((E) –1–chloro–3,3,3–trifluoroprop–1–ene, Chemical Abstracts Service Registry Number [CAS Reg. No.] 102687–65–0) is marketed under the trade names Solstice™ 1233zd(E) and Solstice™ Performance Fluid. EPA previously listed *trans*–1–chloro–3,3,3–trifluoroprop–1–ene as an acceptable alternative for various CFCs and

HCFCs in a number of sectors and end uses (August 10, 2012, 77 FR 47768). You may find the redacted submission under Docket item EPA–HQ–OAR–2003–0118-0285 (continuation of Air Docket A–91–42) at *http://www.regulations.gov*.

Environmental information: The environmental information for this substitute is set forth in the "Environmental information" section in listing C.1. above.

Flammability information: Solstice™ 1233zd(E) is not flammable.

Toxicity and exposure data: The toxicity information for this substitute is set forth in the "Toxicity and exposure data" section in listing C.1. above.

EPA anticipates that Solstice™ 1233zd(E) will be used consistent with the recommendations specified in the manufacturer's MSDS. The manufacturer recommends an AEL of 300 ppm (8-hour TWA) for Solstice™ 1233zd(E). EPA also developed a STEL of 900 ppm over a 15-minute period, based on the submitter's 300 ppm AEL value. EPA anticipates that users will be able to meet the recommended workplace exposure limits (manufacturer and EPA recommendations) and address potential health risks by following requirements and recommendations in the MSDS and other safety precautions common when using adhesives or coatings.

Comparison to other carrier solvents in adhesives and coatings: Solstice™ 1233zd(E) has an ODP of 0.00024 to 0.00034. This is higher than the ODP of a number of substitutes in these end uses such as HFE-7100, acetone and ultraviolet-cured formulations and is comparable to the ODP of *trans*-1,2-dichloroethylene, another acceptable substitute in the adhesives

and coatings end uses that is not regulated as an ODS.[13,14] Solstice™ 1233zd(E)'s ODP is several orders of magnitude lower than those of ozone-depleting substances it replaces, including methyl chloroform and HCFC-141b (ODPs respectively of 0.16 and 0.012). Solstice™ 1233zd(E)'s GWP of 4.7 to 7 is lower than that of some substitutes in the adhesives and coatings end uses, such as HFE-7100 with a GWP of 297. Solstice™ 1233zd(E), a non-flammable compound, has a GWP that is comparable to or slightly higher than that of some other acceptable, but flammable, substitutes such as *trans*-dichloroethylene with a GWP less than 10 and acetone with a GWP of less than one. Its climate impacts cannot be compared directly to those of ultraviolet-cured formulations with no direct GWP. Furthermore, the GWP of Solstice™ 1233zd(E) is one to two orders of magnitude less than those of methyl chloroform and HCFC-141b, ozone-depleting substances in these end uses (GWPs ranging from 146 to 725). Flammability and toxicity risks are low, as discussed above, if used in accordance with the MSDS. The potential health effects of Solstice™ 1233zd(E) are common to many carrier solvents, including many of those already listed as acceptable under SNAP. EPA finds *trans*–1–chloro–3,3,3–trifluoroprop–1–ene (Solstice™ 1233zd(E)) acceptable in the end uses listed above because the overall environmental and human health risk posed by Solstice™ 1233zd(E) is lower than or comparable to the risks posed by other substitutes found acceptable in the same end uses.

E. *Fire Suppression*

1. K-Ace

[13] *Op cit.*
[14] *Op cit.*.

EPA's decision: EPA finds K-Ace acceptable as a substitute for total flooding uses in both occupied and unoccupied areas.

K-Ace is a blend by weight of 50% percent potassium acetate, which is also known as $C_2H_3KO_2$ (CAS Reg. No. 127–08–2), and 50% water (CAS Reg No. 7732–18–5). You may find the submission under Docket item EPA–HQ–OAR–2003–0118-0320 (continuation of Air Docket A–91–42) at *http://www.regulations.gov*.

Environmental information: K-Ace has no ODP and no GWP. K-Ace does not contain any VOC as defined under CAA regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards.

K-Ace is expected to aerosolize rapidly during expulsion from the fire suppression system and then settle as a salt water film on surfaces in the space being protected, rather than becoming airborne and moving to surface waters. After settling, cleanup would involve confining the release and recovering as much of the solution as possible, and washing or rinsing of surfaces. During cleanup, we recommend that discharges of K-Ace be disposed of in accordance with local, state, and federal requirements and the manufacturer's MSDS.

Flammability information: K-Ace is not flammable.

Toxicity and exposure data: K-Ace is not expected to pose a risk to human health, as the active ingredient is potassium acetate, which is commonly used in pharmaceuticals, foods, and textiles. Potassium acetate is approved by the U.S. Food and Drug Administration (FDA) as a synthetic flavoring (21 CFR 172.515) and to treat diabetic ketoacidosis via injection (FDA

Application No. NDA 018896). Potassium acetate may cause gastrointestinal discomfort or minor irritation to the eyes, skin, or respiratory tract. Given the low toxicity of its constituents, EPA expects no adverse health effects when the recommended safety precautions and normal industry practices are applied and use of the substitute is in accordance with the manufacturer's MSDS. To minimize worker exposure to any chemicals during manufacture, installation, and maintenance through an accidental release or spill, EPA has outlined the following recommendations in accordance with established good manufacturing practices:

- Training in safe handling procedures for employees that would likely handle containers of K-Ace or extinguishing units filled with the material;
- Use of PPE selected in accordance with the OSHA Technical Manual by employees handling the proposed substitute;
- Adequate ventilation;
- Clean-up of all spills immediately in accordance with good industrial hygiene practices.

Comparison to other fire suppressants: K-Ace has no ODP or GWP. K-Ace's ODP of zero is comparable to those of other acceptable non-ozone-depleting substitutes for this end use, such as Cold Fire®, Inert Gas 541, HFC–227ea, and HFC–125, and in contrast to Halon 1301, an ODS which it replaces, with an ODP of 16.. K-Ace's GWP of zero is less than that of a number of other acceptable substitutes for this end use, such as HFC–227ea with a GWP of 3220 and HFC–125 with a GWP of 3500 and is comparable to that of other acceptable substitutes for this end use, such as Cold Fire® with a GWP of 0 and Inert Gas 541 with a GWP of 0. Furthermore, K-Ace's GWP is lower than that of Halon 1301, an ODS it replaces, with a direct

GWP of 7140. Toxicity risks are low, as discussed above, if used in accordance with the MSDS. EPA finds K-Ace acceptable in the end use listed above because the overall environmental and human health risk posed by K-Ace is lower than or comparable to the risks posed by other substitutes found acceptable in the same end use.

II. Section 612 Program

A. 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 (ODSs). EPA refers to this program as the Significant New Alternatives Policy (SNAP) program. The major provisions of section 612 are:

1. Rulemaking

Section 612(c) requires EPA to promulgate rules making it unlawful to replace any class I substance (chlorofluorocarbon, halon, carbon tetrachloride, methyl chloroform, and hydrobromofluorocarbon) or class II substance (hydrochlorofluorocarbon) with any substitute that the Administrator determines may present adverse effects to human health or the environment where the Administrator has identified an alternative that (1) reduces the overall risk to human health and the environment, and (2) is currently or potentially available.

2. Listing of Unacceptable/Acceptable Substitutes

Section 612(c) requires EPA to publish a list of the substitutes unacceptable for specific uses and to publish a corresponding list of acceptable alternatives for specific uses. The list of acceptable substitutes may be found at

http://www.epa.gov/ozone/snap/lists/index.html and the lists of “unacceptable,” “acceptable subject to use conditions,” and “acceptable subject to narrowed use limits” substitutes are found in the appendices to subpart G of 40 CFR part 82.

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. EPA's Regulations Implementing Section 612

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

Section 612 of the CAA requires EPA to list as acceptable 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 the Regulations for the SNAP Program Work

Under the SNAP regulations, anyone who plans to market or produce a substitute to replace a class I substance or class II substance in one of the eight major industrial use sectors must provide notice to the Agency, including health and safety information on the substitute, at least 90 days before introducing it into interstate commerce for significant new use as an alternative. 40 CFR 82.176(a). This requirement applies to the persons planning to introduce the substitute into interstate

commerce,[15] which typically are chemical manufacturers but may include importers, formulators, equipment manufacturers, and end-users when they are responsible for introducing a substitute into commerce.[16] The 90-day SNAP review process begins once EPA receives the submission and determines that the submission includes complete and adequate data. 40 CFR 82.180(a). The CAA and the SNAP regulations, 40 CFR 82.174(a), prohibit use of a substitute earlier than 90 days after notice has been provided to the Agency.

The Agency has identified four possible decision categories for substitutes that are submitted for evaluation: acceptable; acceptable subject to use conditions; acceptable subject to narrowed use limits; and unacceptable[17] (40 CFR 82.180(b)). Use conditions and narrowed use limits are both considered "use restrictions" and are explained below. Substitutes that are deemed acceptable with no use restrictions (no use conditions or narrowed use limits) can be used for all applications 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.

After reviewing a substitute, the Agency may make a determination 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

[15] 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.

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

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

such substitutes as "acceptable subject to use conditions." Entities that use these substitutes without meeting the associated use conditions are in violation of EPA's SNAP regulations. 40 CFR 82.174(c).

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

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

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

D. Additional Information about the SNAP Program

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

List of Subjects in 40 CFR Part 82

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

Date: May 3, 2013

Sarah Dunham, Director
Office of Atmospheric Programs

APPENDIX A: SUMMARY OF ACCEPTABLE DECISIONS

Refrigeration and Air Conditioning

End-Use	Substitute	Decision	Further Information[1]
Ice skating rinks *(retrofit only)*	R-442A (RS-50)	Acceptable	The manufacturer has an acceptable exposure limit of 1000 ppm over an 8-hour time-weighted average for R-442A.
Commercial ice machines *(retrofit only)*	R-442A (RS-50)	Acceptable	The manufacturer has an acceptable exposure limit of 1000 ppm over an 8-hour time-weighted average for R-442A.
Retail food refrigeration (rack refrigeration systems only) *(retrofit only)*	R-442A (RS-50)	Acceptable	The manufacturer has an acceptable exposure limit of 1000 ppm over an 8-hour time-weighted average for R-442A.

[1] Follow all precautions in the MSDS and any guidance from the manufacturer.

Foam Blowing Agents

End Use	Substitute	Decision	Further Information[1]
Rigid polyurethane spray	Commercial blends of HFC-365mfc and HFC-227ea containing 7% to 13% HFC-227ea and the remainder HFC-365mfc (Solkane® 365/227)	Acceptable	The manufacturer has an acceptable exposure limit of 1000 ppm over an 8-hour time-weighted average for HFC-365mfc/HFC-227ea. Care should be taken to follow all precautions in the MSDS and any guidance from the manufacturer, particularly in cases where the non-flammable HFC-227ea may evaporate before the flammable component, HFC-365mfc, evaporates, especially with open containers of blowing agent or polyol premix.
Extruded polystyrene, boardstock and billet	Commercial blends of HFC-365mfc and HFC-227ea containing 7% to 13% HFC-227ea and the remainder HFC-365mfc (Solkane® 365/227)	Acceptable	The manufacturer has an acceptable exposure limit of 1000 ppm over an 8-hour time-weighted average for HFC-365mfc/HFC-227ea. Care should be taken to follow all precautions in the MSDS and any guidance from the manufacturer, particularly in cases where the non-flammable HFC-227ea may evaporate before the flammable component, HFC-365mfc, evaporates, especially with open containers of blowing agent or polyol premix.

[1] Follow all precautions in the MSDS and any guidance from the manufacturer

Solvent Cleaning

End-Uses	Substitute	Decision	Further Information
Metals cleaning Electronics cleaning Precision cleaning	*Trans*-1-chloro-3,3,3-trifluoroprop-1-ene (Solstice™ 1233zd(E))	Acceptable	*Trans*-1-chloro-3,3,3-trifluoroprop-1-ene has an ODP of approximately 0.00024 at temperate latitudes. It has a 100-year global warming potential of 4.7 to 7. Its Chemical Abstracts Service Registry number (CAS Reg. No.) is 102687-65-0. The manufacturer recommends an acceptable exposure limit of 300 ppm over an 8-hour time-weighted average for *trans*-1-chloro-3,3,3-trifluoroprop-1-ene. Note that this substitute boils at room temperature. Therefore, EPA recommends using this substitute in equipment designed to minimize solvent losses, emissions and worker exposure. Examples of such equipment include containers with connected hoses and valves that allow for direct transfer of the solvent to cleaning equipment without opening of the storage container, and enclosed or low-emission cleaning equipment. Observe recommendations in the manufacturer's MSDS and guidance for using this substitute.

Adhesives, Coatings and Inks

End-Uses	Substitute	Decision	Further Information
Adhesives Coatings	*Trans*-1-chloro-3,3,3-trifluoroprop-1-ene (Solstice™ 1233zd(E))	Acceptable	*Trans*-1-chloro-3,3,3-trifluoroprop-1-ene has an ODP of approximately 0.00024 at temperate latitudes. It has a 100-year global warming potential of 4.7 to 7. Its Chemical Abstracts Service Registry number (CAS Reg. No.) is 102687-65-0. The manufacturer recommends an acceptable exposure limit of 300 ppm over an 8-hour time-weighted average for *trans*-1-chloro-3,3,3-trifluoroprop-1-ene. Note that this substitute boils at room temperature, which may require some adjustments when switching to this substitute. At this time, it appears to be particularly suitable for spray adhesive applications and dip coatings. Observe recommendations in the manufacturer's MSDS and guidance for using this substitute.

Fire Suppression

End-Use	Substitute	Decision	Further Information[1, 2]
Total flooding systems *(occupied and unoccupied areas)*	K-Ace (solution of 50% potassium acetate and 50% water).	Acceptable	EPA recommends that use of this system should be in accordance with the manufacturer's MSDS.

1. EPA recommends that users consult Section VIII of the OSHA Technical Manual for information on selecting the appropriate types of personal protective equipment for all listed fire suppression agents. EPA has no intention of duplicating or displacing OSHA coverage related to the use of personal protective equipment (e.g., respiratory protection), fire protection, hazard communication, worker training or any other occupational safety and health standard with respect to halon substitutes.

2. Use of all listed fire suppression agents should conform to relevant OSHA requirements, including 29 CFR Part 1910, subpart L, sections 1910.160 and 1910.162.

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