Dated: April 29, 2022

LaDonn A. Allen,

Captain, Commander, Coast Guard Sector Mobile, Captain of the Port Mobile.

[FR Doc. 2022–09577 Filed 5–3–22; 8:45 am]

BILLING CODE 9110–04–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 82

[EPA–HQ–OAR–2021–0347; FRL–8470–01–OAR]

RIN 2060–AV25

Protection of Stratospheric Ozone: Listing of HFO-1234yf Under the Significant New Alternatives Policy Program for Motor Vehicle Air Conditioning in Nonroad Vehicles and Servicing Fittings for Small Refrigerant Cans

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Pursuant to the EPA's Significant New Alternatives Policy program, this action lists the refrigerant 2,3,3,3-tetrafluoroprop-1-ene, also known as HFO-1234yf or R-1234yf, as acceptable, subject to use conditions, in the motor vehicle air conditioning end-use for certain types of newly manufactured nonroad (also called off-road) vehicles, which includes some vehicles that are also considered heavy-duty vehicles. EPA is also adopting the current versions of the industry safety standards SAE J639, SAE J1739, and SAE J2844 by incorporating them by reference into the use conditions for the listings in nonroad vehicles and previous listings for certain onroad vehicles covered in final rules issued separately in March 2011 and December 2016. In addition, EPA is requiring unique servicing fittings for use with small refrigerant cans (two pounds or less) of 2,3,3,3-tetrafluoroprop-1-ene that are used to service onroad and nonroad vehicles. Finally, EPA is adding a reference to the Agency's regulations under the Toxic Substances Control Act for 2,3,3,3-tetrafluoroprop-1-ene for the listings in nonroad vehicles and previous listings for certain onroad vehicles.

DATES: This final rule is effective on June 3, 2022. The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register as of June 3, 2022.

ADDRESSES: EPA has established a docket for this action under Docket ID No. EPA–HQ–OAR–2021–0347. All documents in the docket are listed on the *www.regulations.gov* website. Although listed in the index, some information is not publicly available, *e.g.,* CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the internet and will be publicly available only in hard copy form. Publicly available docket materials are available electronically through *www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT: Chenise Farquharson, Stratospheric Protection Division, Office of Atmospheric Programs (Mail Code 6205 T), Environmental Protection Agency, 1200 Pennsylvania Ave. NW, Washington, DC 20460; telephone number: 202–564–7768; email address: *farquharson.chenise@epa.gov.* Notices and rulemakings under EPA's Significant New Alternatives Policy program are available on EPA's Stratospheric Ozone website at *www.epa.gov/snap/snap-regulations.*

SUPPLEMENTARY INFORMATION:

Table of Contents

I. General Information

A. Executive Summary and Background

As proposed, EPA is listing 2,3,3,3-tetrafluoroprop-1-ene, also known as hydrofluoroolefin (HFO)-1234yf or R-1234yf, hereafter referred to as ''HFO–1234yf,'' as acceptable, subject to use conditions, under the Significant New Alternatives Policy (SNAP) program, as of 30 days after publication of this final rule, for motor vehicle air conditioning (MVAC) systems [1] in the following types

[1] Under the SNAP program, MVAC systems are those systems that provide passenger comfort cooling for light-duty cars and trucks, heavy-duty vehicles (large pickups, delivery trucks, recreational vehicles, and semi-trucks), nonroad vehicles, buses, and rail vehicles. See final rules published on March 29, 2011 (76 FR 17488) and on December 1, 2016 (81 FR 86778). For informational purposes, we note that this includes systems that are also included in the definitions that apply under other provisions of EPA's regulations under title VI of the CAA. In this regard, we note that EPA's subpart F regulations at 40 CFR 82.152 define MVAC-like appliance to mean a mechanical vapor compression, open-drive compressor appliance with a full charge of 20 pounds or less of refrigerant used to cool the driver's or passenger's compartment of off-road vehicles or equipment. This includes, but is not limited to, the air-conditioning equipment found on agricultural or construction vehicles. This definition is not intended to cover appliances using R–22 refrigerant. By contrast, EPA's subpart F regulations at 40 CFR 82.152 define Motor vehicle air conditioner (MVAC) as ''any appliance that is a motor vehicle air conditioner as defined in 40 CFR part 82, subpart B. The subpart B regulations at 40 CFR 82.32 provide that: Motor vehicle air conditioners means mechanical vapor compression refrigeration equipment used to cool the driver's or passenger's compartment of any motor vehicle. This definition is not intended to encompass the hermetically sealed refrigeration systems used on motor vehicles for refrigerated cargo and the air conditioning systems on passenger buses using HCFC–22 refrigerant. Further, the subpart B regulations at 40 CFR 82.32 provide that: Motor vehicle as used in this subpart means any vehicle which is self-propelled and designed for transporting persons or property on a street or highway, including but not limited to passenger cars, light duty vehicles, and heavy duty vehicles. This definition does not include a vehicle where final assembly of the vehicle has not been completed by the original equipment manufacturer.

of newly manufactured (hereafter ''new'') [2] nonroad vehicles,[3] including some vehicles that are also considered heavy-duty (HD) [4] vehicles:

- Agricultural tractors with greater than 40 horsepower (HP);
- Self-propelled agricultural machinery;
- Compact equipment;
- Construction, forestry, and mining equipment; and
- Commercial utility vehicles.

EPA received four comments on the proposed rule from refrigerant suppliers and equipment manufacturers, and all commenters strongly supported finalizing the rule as proposed. The comment summaries and EPA's responses to the comments are below in section II.F.

EPA has previously listed HFO-1234yf as acceptable, subject to use conditions, in new light-duty (LD) passenger cars and trucks (76 FR 17488; March 29, 2011) and new medium-duty passenger vehicles (MDPV), HD pickup trucks, and complete HD vans (81 FR 86778; December 1, 2016). The use conditions for those prior listings, which are intended to mitigate flammability and toxicity risks, require that MVAC systems designed to use HFO-1234yf meet the requirements of three technical safety standards developed by SAE International (SAE) (*i.e.,* SAE J639, SAE J1739, and SAE J2844). In this action, EPA is requiring the same use conditions, with certain updates discussed below, for MVAC systems designed to use HFO-1234yf in certain new nonroad vehicles. EPA is listing HFO-1234yf as acceptable, subject to use conditions, after its evaluation of human health and environmental information on various substitutes submitted to the SNAP program. In listing HFO-1234yf as acceptable, subject to use conditions, this action provides additional flexibility for industry stakeholders by expanding the list of acceptable substitutes for certain types of nonroad vehicles.

EPA is also adopting the current versions of SAE J639, SAE J1739, and SAE J2844 by incorporating them by reference into the use conditions for the nonroad vehicles addressed in this action. EPA is also modifying the use conditions for the previous listings of HFO-1234yf in certain onroad vehicles to replace the references to older versions of the three SAE standards with references to the current versions. The current versions of the three standards are SAE J639 (revised November 2020), ''Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems;'' SAE J1739 (revised January 2021), ''Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA–MSR, and Process FMEA;'' and SAE J2844 (revised January 2013), ''R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems.''

In addition, EPA is including a use condition, which requires unique servicing fittings, to provide for servicing MVAC systems in the nonroad vehicles addressed in this action, including use of small refrigerant cans (two pounds or less). For the previous listings of HFO-1234yf in certain onroad vehicles, EPA is revising the use conditions to require unique servicing fittings for use with small cans (two pounds or less).

Finally, EPA is including a reference to the Agency's Significant New Use Rule (SNUR) for HFO-1234yf under the Toxic Substances Control Act (80 FR 37166, June 30, 2015) in Appendix B subpart G of part 82, under the 'Comments' column, for the listings of HFO-1234yf for the nonroad vehicles addressed in this action, as well as for all the previous listings of HFO-1234yf in certain onroad vehicles. The SNUR states that commercial users or consumers can only recharge MVAC systems with HFO-1234yf where the original charging of the system with HFO-1234yf was done by the Original Equipment Manufacturer (OEM).

The Agency is not modifying regulations promulgated under section 608 of the Clean Air Act (CAA). EPA notes that there are additional requirements that concern the sale or offer for sale of refrigerants, including a sales restriction under the regulations implementing CAA section 608, which can be found at 40 CFR part 82 subpart F. These regulations collectively comprise the national recycling and emissions reduction program and may be commonly referred to as the stationary refrigeration and air conditioning management program. The general sales restriction provisions are codified at 40 CFR 82.154(c) and the specifications for self-sealing valves relevant to an exemption to the sales restriction for small cans of MVAC refrigerant are codified at 40 CFR 82.154(c)(2). This action does not modify the provisions under 40 CFR 82.154, including the restriction on the sale of substitute refrigerants and requirements for self-sealing valves.

B. SNAP Program Background

The SNAP program implements CAA section 612. Several major provisions of section 612 are:

1. Rulemaking

Section 612 requires EPA to promulgate rules making it unlawful to replace any class I (chlorofluorocarbon (CFC), halon, carbon tetrachloride, methyl chloroform, methyl bromide fluorocarbon, and chlorobromomethane) or class II (hydrochlorofluorocarbon (HCFC)) ozone-depleting substances (ODS) 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 that it finds to be unacceptable for specific uses and to publish a corresponding list of acceptable substitutes for specific uses.

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).

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 a new or existing chemical is introduced into interstate commerce for significant new use as a substitute for a class I substance.[5] The producer must

[2] This is intended to mean a completely new refrigeration circuit containing a new compressor, evaporator, condenser, and refrigerant tubing.

[3] In the past, EPA has referred to these vehicles as ''off-road vehicles'' under the SNAP program. In this action, we are aligning our terminology with that of other EPA programs and using the term ''nonroad vehicle,'' which is defined under CAA section 216 to mean ''a vehicle that is powered by a nonroad engine and that is not a motor vehicle or a vehicle used solely for competition.'' EPA's regulations issued under that section of the Act defining a nonroad engine are codified at subpart A of 40 CFR part 1068.

[4] Heavy-duty vehicles are often subdivided by vehicle weight classifications, as defined by the vehicle's gross vehicle weight rating (GVWR), which is a measure of the combined curb (empty) weight and cargo carrying capacity of the truck. Heavy-duty vehicles have GVWRs above 8,500. See *https://www.epa.gov/emission-standards-reference-guide/vehicle-weight-classifications-emission-standards-reference-guide.*

[5] EPA's SNAP regulations at 40 CFR 82.176 extend this requirement to substitutes for class II substances, providing that ''[a]ny producer of a new substitute must submit a notice of intent to

Continued

also provide the Agency with the producer's unpublished health and safety studies on such substitutes.

The regulations for the SNAP program are promulgated at 40 CFR part 82, subpart G, and the Agency's process for reviewing SNAP submissions is described in regulations at 40 CFR 82.180. Under these rules, the Agency has identified five types of listing decisions: Acceptable; acceptable subject to use conditions; acceptable subject to narrowed use limits; unacceptable; and pending (40 CFR 82.180(b)). Use conditions and narrowed use limits are both considered ''use restrictions,'' as described below. Substitutes that are deemed acceptable with no use restrictions (no use conditions or narrowed use limits) can be used for all applications within the relevant end-uses in the sector. After reviewing a substitute, the Agency may determine that a substitute is acceptable only if certain conditions in the way that the substitute is used are met to minimize risks to human health and the environment. EPA describes such substitutes as ''acceptable subject to use conditions.'' (40 CFR 82.180(b)(2)). 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.'' Under the narrowed use limit, users intending to adopt these substitutes ''must ascertain that other alternatives are not technically feasible.'' (40 CFR 82.180(b)(3)).

In making decisions regarding whether a substitute is acceptable or unacceptable, and whether substitutes present risks that are lower than or comparable to risks from other substitutes that are currently or potentially available in the end-uses under consideration, EPA examines the criteria in 40 CFR 82.180(a)(7): (i) Atmospheric effects and related health and environmental impacts; (ii) general population risks from ambient exposure to compounds with direct toxicity and to increased ground-level ozone; (iii) ecosystem risks; (iv) occupational risks; (v) consumer risks; (vi) flammability; and (vii) cost and availability of the substitute.

Many SNAP listings include ''comments'' or ''further information'' to provide additional information on substitutes. Since this additional information is not part of the regulatory decision, these statements are not binding for use of the substitute under the SNAP program. However, regulatory requirements so listed are binding as applicable under other regulatory programs (*e.g.,* worker protection regulations promulgated by the U.S. Occupational Safety and Health Administration (OSHA)). The ''further information'' classification does not necessarily include all other legal obligations pertaining to the use of the substitute. While the items listed are not legally binding under the SNAP program, EPA encourages users of substitutes to apply all statements in the ''further information'' column in their use of these substitutes. In many instances, the information simply refers to sound operating practices that have already been identified in existing industry and/or building codes or standards. Thus, many of the statements, if adopted, would not require the affected user to make significant changes in existing operating practices.

For additional information on the SNAP program, visit the SNAP portion of EPA's Ozone Layer Protection website at *https://www.epa.gov/snap.* Copies of the full lists of acceptable substitutes for ODS in all industrial sectors are available at *https://www.epa.gov/snap/snap-substitutes-sector.* For more information on the Agency's process for administering the SNAP program or criteria for evaluation of substitutes, refer to the initial SNAP rulemaking published March 18, 1994 (59 FR 13044), codified at 40 CFR part 82, subpart G. SNAP decisions and the appropriate **Federal Register** citations are found at: *https://www.epa.gov/snap/snap-regulations.* Substitutes listed as unacceptable; acceptable, subject to narrowed use limits; or acceptable, subject to use conditions, are also listed in the appendices to 40 CFR part 82, subpart G.

In this action, EPA refers to listings made in a final rule issued on December 1, 2016, at 81 FR 86778 (''2016 Rule'') in which the Agency listed HFO–1234yf as acceptable, subject to use conditions, in new MDPV, HD pickup trucks, and complete HD vans. The 2016 Rule also changed the listings for certain hydrofluorocarbons (HFCs) and blends from acceptable to unacceptable in various end-uses in the refrigeration and air conditioning, foam blowing, and fire suppression sectors. After a challenge to the 2016 Rule, the United States Court of Appeals for the District of Columbia Circuit (''the court'') issued a partial vacatur of the 2016 Rule ''only to the extent it requires manufacturers to replace HFCs that were previously and lawfully installed as substitutes for ozone-depleting substances.'' [6] The court's decision on the 2016 Rule did not vacate the listing of HFO-1234yf for certain types of vehicles, and this final rule is not EPA's response to the court's decision on the 2016 Rule.

C. Does this action apply to me?

The following list identifies types of regulated entities that may be affected by this action and their respective North American Industrial Classification System (NAICS) codes:

- All Other Basic Organic Chemical Manufacturing (NAICS 325199)
- All Other General Merchandise Stores (NAICS 452990)
- All Other Miscellaneous Chemical Product and Preparation Manufacturing (NAICS 325998)
- Automotive Parts and Accessories Stores (NAICS 441310)
- Automotive Repair Shops Not Elsewhere Classified, Including Air Conditioning and Radiator Specialty Shops (NAICS 811198)
- Gasoline Stations with Convenience Stores (NAICS 447110)
- General automotive repair shops (NAICS 811111)
- Heavy Duty Truck Manufacturing (NAICS 336120)
- Industrial Gas Manufacturing (NAICS 32512)
- Motor Vehicle Body Manufacturing (NAICS 336211)
- Motor Vehicle Parts Manufacturing (NAICS 3363)
- Other Automotive Repair and Maintenance (NAICS 81119)
- Other Motor Vehicle Parts Manufacturing (NAICS 336390)
- Recyclable Material Merchant Wholesalers (NAICS 423930)
- Refrigeration Equipment and Supplies Merchant Wholesalers (NAICS 423740)

This list is not intended to be exhaustive but provides a guide for readers regarding types of entities likely to be regulated by this action. This list includes the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed above could also be regulated. To determine whether your facility, company, business, or organization could be affected by this action, you should carefully examine the regulations at 40 CFR part 82, subpart G. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the **FOR FURTHER INFORMATION CONTACT** section.

introduce a substitute into interstate commerce 90 days prior to such introduction.''

[6] *Mexichem Fluor, Inc.* v. *EPA,* No. 17–1024, 760 Fed. Appx. 6, 9 (D.C. Cir., April 5, 2019).

D. What acronyms and abbreviations are used in the preamble?

Below is a list of acronyms and abbreviations used in the preamble of this document:

AIHA—American Industrial Hygiene Association
AC—Air Conditioning
ACH—Air Changes Per Hour
AEM—Association of Equipment Manufacturers
ANSI—American National Standards Institute
ASHRAE—American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASTM—American Society for Testing and Materials
ATEL—Acute Toxicity Exposure Limit
CAA—Clean Air Act
CAS Reg. No.—Chemical Abstracts Service Registry Identification Number
CBI—Confidential Business Information
CFC—Chlorofluorocarbon
CFD—Computational Fluid Dynamics
CFR—Code of Federal Regulations
CGA—Compressed Gas Association
CO_2—Carbon Dioxide
CRP—Cooperative Research Project
DIY—Do-It-Yourself
E.O.—Executive Order
EPA—United States Environmental Protection Agency
FCL—Flammability Concentration Limit
FMEA—Failure Mode and Effects Analysis
FR—Federal Register
GHG—Greenhouse Gas
GWP—Global Warming Potential
GVWR—Gross Vehicle Weight Rating
HCFC—Hydrochlorofluorocarbon
HD—Heavy-Duty
HD GHG—Heavy-Duty Greenhouse Gas
HF—Hydrogen Fluoride
HFC—Hydrofluorocarbon
HFO—Hydrofluoroolefin
HP—Horsepower
ICF—ICF International, Inc.
IPCC—Intergovernmental Panel on Climate Change
LD—Light-Duty
LD GHG—Light-Duty Greenhouse Gas
LFL—Lower Flammability Limit
MDPV—Medium-Duty Passenger Vehicle
MVAC—Motor Vehicle Air Conditioning
MY—Model Year
NAAQS—National Ambient Air Quality Standards
NAICS—North American Industrial Classification System
NOAEL—No Observed Adverse Effect Level
NRC—National Research Council
OEM—Original Equipment Manufacturer
ODP—Ozone Depletion Potential
ODS—Ozone-depleting Substance
OMB—Office of Management and Budget
OSHA—Occupational Safety and Health Administration
PPE—Personal Protective Equipment
ppm—Parts Per Million
PRA—Paperwork Reduction Act
RCL—Reference Concentration Limit
RFA—Regulatory Flexibility Act
SAE—SAE International
SDS—Safety Data Sheet
SIP—State Implementation Plan
SNAP—Significant New Alternatives Policy
SNUN—Significant New Use Notice
SNUR—Significant New Use Rule
STEL—Short-term Exposure Limit
TFA—Trifluoroacetic Acid
TLV—Threshold Limit Value
TSCA—Toxic Substances Control Act
TWA—Time Weighted Average
UFL—Upper Flammability Limit
UMRA—Unfunded Mandates Reform Act
USGCRP—U.S. Global Change Research Program
VOC—Volatile Organic Compounds
WEEL—Workplace Environmental Exposure Limit

II. What is EPA finalizing in this action?

A. Listing of HFO-1234yf as Acceptable, Subject to use Conditions, for MVAC Systems in Certain new Nonroad Vehicles

As proposed, (86 FR at 68968; December 6, 2021), EPA is listing HFO-1234yf as acceptable, subject to use conditions, for MVAC systems in several types of new nonroad vehicles, specifically: Agricultural tractors greater than 40 HP; self-propelled agricultural machinery; compact equipment; construction, forestry, and mining equipment; and commercial utility vehicles. All MVAC refrigerants listed as acceptable are subject to use conditions requiring labeling and the use of unique fittings as described in Appendix B to subpart G of part 82—Substitutes Subject to Use Restrictions and Unacceptable Substitutes. EPA is listing HFO-1234yf as acceptable, subject to use conditions, in the five nonroad vehicle types. The use conditions require that MVAC systems designed to use HFO-1234yf meet the requirements of SAE J639, SAE J1739, and SAE J2844 to help ensure that use of HFO-1234yf does not have a significantly greater overall impact on human health and the environment than other alternatives for use in those vehicles. EPA is updating the existing use conditions that are currently required for the use of HFO-1234yf in MVAC systems in new LD vehicles, MDPVs, HD pickup trucks, and complete HD vans and applying them to all the MVAC systems addressed in this action. The use conditions are detailed below in section II.A.4, ''What are the use conditions?''

1. What is the affected end-use?

Under SNAP, MVAC systems cool the passenger compartment of LD passenger vehicles and trucks, HD vehicles (*e.g.,* large pickups, delivery trucks, and semi-trucks), off-road vehicles, buses, and passenger rail vehicles. These systems are typically charged during vehicle manufacture, and the main components are connected by flexible refrigerant lines. Nonroad vehicles can be grouped into several categories (*i.e.,* agriculture, construction, recreation, and many other purposes).[7] The vehicle types addressed in this action include certain types of new nonroad vehicles, specifically:

- Agricultural tractors greater than 40 HP (including two-wheel drive (2WD), mechanical front-wheel drive (MFD), four-wheel drive (4WD), and track tractors) that are used for a number of agricultural applications such as farm work, planting, landscaping, and loading; [8] [9]
- Self-propelled agricultural machinery (including combines, grain and corn harvesters, sprayers, windrowers, and floaters) that are primarily used for harvesting, fertilizer, and herbicide operations; [10]
- Compact equipment (including mini excavators, turf mowers, skid-steer loaders, and tractors less than 40 HP) that are primarily used for agricultural operations and residential, commercial, and agricultural landscaping; [11]
- Construction, forestry, and mining equipment (including excavators, bulldozers, wheel loaders, feller bunchers, log skidders, road graders, articulated trucks, sub-surface machines, horizontal directional drill, trenchers, and tracked crawlers) that are primarily used to excavate surface and subsurface materials during construction, landscaping, and road maintenance and building; [12] and
- Commercial utility vehicles that are primarily used for ranching, farming, hunting/fishing, construction, landscaping, property maintenance, railroad maintenance, forestry, and mining.[13]

These nonroad vehicles are almost exclusively used and operated by professionals (*e.g.,* agricultural owners or skilled employees/operators) and vary by size, weight, use, and/or

[7] EPA, 2021. Basic Information about the Emission Standards Reference Guide for On-road and Nonroad Vehicles and Engines. Available online at *https://www.epa.gov/emission-standards-reference-guide/basic-information-about-emission-standards-reference-guide-road* and in the docket for this rulemaking at *https://nepis.epa.gov/Exe/ZyPDF.cgi/P100K5U2.PDF?Dockey=P100K5U2.PDF.*

[8] Wagner, 2021. May 24, 2021, email from John Wagner of the Association of Equipment Manufacturers to EPA. Available in the docket for this rulemaking.

[9] AEM, 2021. Appendix A: Machine Forms as Classified by AEM Membership. Available in the docket for this rulemaking.

[10] Ibid.

[11] Ibid.

[12] Ibid.

[13] Ibid.

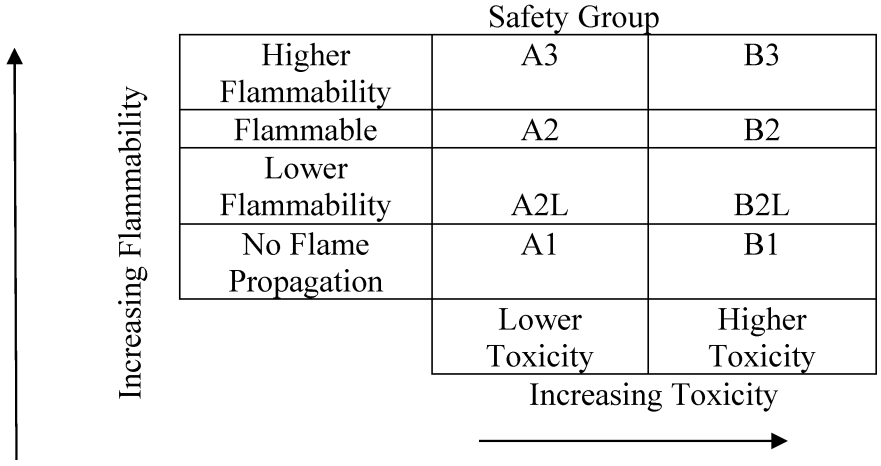
horsepower.[14] For example, commercial utility vehicles typically weigh between 1,200 and 2,400 pounds, while agricultural tractors >40 HP typically weigh between 39,000 and 50,000 pounds.[15] [16] MVAC systems in these nonroad vehicles can have charge sizes ranging from 650 grams (23 ounces) to 3,400 grams (120 ounces) depending on the manufacturer and cab size, compared to a range of 390 grams (14 ounces) to 1,600 grams (56 ounces) for MVAC systems in light and medium duty passenger vehicles, HD pickups, and complete HD vans.[17] Additionally, unlike onroad passenger vehicles, for example, nonroad vehicles are limited to non-highway terrain (*e.g.,* fields, construction sites, forests, and mines), have more robust components, are operated at low working speeds, and there are typically a limited number of vehicles in the same location.

2. What are the ANSI/ASHRAE classifications for refrigerant flammability?

The American National Standards Institute/American Society of Heating, Refrigerating and Air Conditioning Engineers (ANSI/ASHRAE) Standard 34–2019 assigns a safety group classification for each refrigerant which consists of two to three alphanumeric characters (*e.g.,* A2L or B1). The initial capital letter indicates the toxicity, and the numeral denotes the flammability. ASHRAE classifies Class A refrigerants as refrigerants for which toxicity has not been identified at concentrations less than or equal to 400 ppm by volume, based on data used to determine threshold limit value-time-weighted average (TLV–TWA) or consistent indices. Class B signifies refrigerants for which there is evidence of toxicity at concentrations below 400 ppm by volume, based on data used to determine TLV–TWA or consistent indices.

Refrigerants are also assigned a flammability classification of 1, 2, 2L, or 3. Tests for flammability are conducted in accordance with American Society for Testing and Materials (ASTM) E681 using a spark ignition source at 140 °F (60 °C) and 14.7 psia (101.3 kPa) [18] . The flammability classification ''1'' is given to refrigerants that, when tested, show no flame propagation. The flammability classification ''2'' is given to refrigerants that, when tested, exhibit flame propagation, have a heat of combustion less than 19,000 kJ/kg (8,169 Btu/lb.), and have a lower flammability limit (LFL) greater than 0.10 kg/m^3. The flammability classification ''2L'' is given to refrigerants that, when tested, exhibit flame propagation, have a heat of combustion less than 19,000 kJ/kg (8,169 BTU/lb.), have an LFL greater than 0.10 kg/m^3, and have a maximum burning velocity of 10 cm/s or lower when tested in dry air at 73.4 °F (23.0 °C) and 14.7 psia (101.3 kPa). The flammability classification ''3'' is given to refrigerants that, when tested, exhibit flame propagation and that either have a heat of combustion of 19,000 kJ/kg (8,169 BTU/lb.) or greater or have an LFL of 0.10 kg/m^3 or lower. Using these safety group classifications, ANSI/ASHRAE Standard 34–2019 categorizes HFO-1234yf in the A2L Safety Group.

Figure 1. Refrigerant Safety Group Classification



3. How does HFO-1234yf compare to other refrigerants for these MVAC applications with respect to SNAP criteria?

When reviewing a substitute under SNAP, EPA compares the risk posed by that substitute to the risks posed by other alternatives and considers whether that specific substitute under review poses significantly more risk than other available or potentially available alternatives for the same use. In the proposed rule (86 FR 68962; December 6, 2021), EPA provided information on the environmental and health properties of HFO-1234yf and other substitutes in these MVAC applications and described the Agency's comparative risk analysis, based on our criteria for review, including an

[14] EPA, 2021. Basic Information about the Emission Standards Reference Guide for On-road and Nonroad Vehicles and Engines. Available online at *https://www.epa.gov/emission-standards-reference-guide/basic-information-about-emission-standards-reference-guide-road* and in the docket for this rulemaking.

[15] Heavy-duty vehicles are often subdivided by vehicle weight classifications, as defined by the vehicle's gross vehicle weight rating (GVWR), which is a measure of the combined curb (empty) weight and cargo carrying capacity of the truck. Heavy-duty vehicles have GVWRs above 8,500. See *https://www.epa.gov/emission-standards-reference-guide/vehicle-weight-classifications-emission-standards-reference-guide.*

[16] Wagner, 2021. May 24, 2021, email from John Wagner of the Association of Equipment Manufacturers to EPA. Available in the docket for this rulemaking.

[17] ICF, 2016. Technical Support Document for Acceptability Listing of HFO-1234yf for Motor Vehicle Air Conditioning in Limited Heavy-Duty Applications. Available in the public docket for this rulemaking.

[18] ASHRAE, 2019. ANSI/ASHRAE Standard 34–2019: Designation and Safety Classification of Refrigerants.

evaluation of environmental impacts, flammability, and toxicity. Redacted submissions that do not include information claimed as CBI by the submitter and supporting documentation for HFO-1234yf are provided in the docket for this rulemaking (EPA-HQ–OAR–2021–0347 at *https://www.regulations.gov*). EPA's assessments to examine the health and environmental risks of HFO-1234yf in each equipment type are also available in the docket for this rulemaking.[19] [20] [21] [22] [23]

As explained more fully below, to help evaluate environmental, flammability, and toxicity risks resulting from the use of HFO-1234yf in certain types of new nonroad vehicles, EPA considered the Agency's analyses [24] [25] [26] [27] [28] [29] [30] [31] [32] conducted in support of the 2011 (76 FR 17488; March 29, 2011) and 2016 (81 FR 86778; December 1, 2016) listing decisions for HFO-1234yf in MVAC systems, including information submitted during the public comment period of the proposal for the 2011 final decision (October 19, 2009; 74 FR 53445), such as the SAE Cooperative Research Project's (CRP) risk assessments.[33] [34] [35] [36] [37] These risk assessments are available in the docket for this rulemaking. The refrigerants to which HFO-1234yf was compared in the 2011 action for LD vehicles are the same refrigerants available for use in the nonroad vehicle types included in this action. In addition, EPA considered risk assessments [38] [39] [40] [41] [42] conducted by the Association of Equipment Manufacturers (AEM), an industry consortium of construction and agriculture equipment manufacturers, and found these were consistent with the Agency's assessments to examine the health and environmental risks of HFO-1234yf in each vehicle type.

a. Environmental Impacts

The SNAP program considers a number of environmental criteria when evaluating substitutes: Ozone depleting potential (ODP); climate effects, primarily based on global warming potential (GWP); local air quality impacts, particularly potential impacts on smog formation from emissions of volatile organic compounds (VOC); and ecosystem effects, particularly from negative impacts on aquatic life. These and other environmental and health risks are discussed below.

HFO-1234yf is chemical substance identified as 2,3,3,3-tetrafluoroprop-1-ene (CAS Reg. No. 754–12–1). HFO-1234yf has a GWP of four, [43] [44] which is similar to or lower than the GWP of other alternatives for the nonroad vehicles addressed in this final rule. For example, its GWP is significantly lower than that of HFC-134a, the refrigerant most widely used in these vehicles today, which has a GWP of 1,430. As shown in Table 1, two other alternatives, HFC-152a [45] and CO_2,[46] have GWPs of 124 and 1, respectively.

Other acceptable refrigerants for the nonroad vehicles addressed in this action have GWPs ranging from 933 to 3,337. These include several blend refrigerants that are listed as acceptable, subject to use conditions, for these nonroad vehicles, including the HFC blends SP34E and R-426A (also known as RS-24) and the HCFC blends R-416A (also known as HCFC Blend Beta or FRIGC FR12), R-406A, R-414A (also known as HCFC Blend Xi or GHG-X4), R-414B (also known as HCFC Blend Omicron), HCFC Blend Delta (also known as Free Zone), Freeze 12, GHG-X5, and HCFC Blend Lambda (also known as GHG-HP). In a final rule issued July 20, 2015, at 80 FR 42870 (''2015 Rule''),[47] EPA listed the use of certain refrigerant blends, including the ones mentioned above, as unacceptable in new LD vehicles starting in MY 2017. EPA did not propose and is not finalizing a change of status for use of these refrigerant blends in MVACs in nonroad vehicles. Although EPA is not aware of the use of these refrigerant blends, they remain acceptable, subject to use conditions, for the nonroad vehicles addressed in this action. Also,

[19] ICF, 2021a. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles—Agricultural Tractors Greater than 40 Horsepower) (New Equipment).

[20] ICF, 2021b. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles—Self-Propelled Agricultural Machinery) (New Equipment).

[21] ICF, 2021c. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles—Compact Equipment) (New Equipment).

[22] ICF, 2021d. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles—Construction, Forestry, and Mining Equipment) (New Equipment).

[23] ICF, 2021e. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles—Commercial Utility Vehicles) (New Equipment).

[24] EPA, 2005. Risk Analysis for Alternative Refrigerant in Motor Vehicle Air Conditioning.

[25] ICF, 2008a. Air Conditioning Refrigerant Charge Size to Passenger Compartment Volume Ratio Analysis.

[26] ICF, 2008b. Revised Characterization of U.S. Hybrid and Small Car Sales (Historical and Predicted) and Hybrid Vehicle Accidents.

[27] ICF, 2009a. Revised Final Draft Assessment of the Potential Impacts of HFO-1234yf and the Associated Production of TFA on Aquatic Communities and Local Air Quality.

[28] ICF, 2009b. Risk Screen on Substitutes for CFC–12 in Motor Vehicle Air Conditioning: Substitute: HFO–1234yf.

[29] ICF, 2010a. Summary of HFO-1234yf Emissions Assumptions.

[30] ICF, 2010b. Summary of Updates to the Vintaging Model that Impacted HFO-1234yf Emissions Estimates.

[31] ICF, 2010c. Revised Assessment of the Potential Impacts of HFO-1234yf and the Associated Production of TFA on Aquatic Communities, Soil and Plants, and Local Air Quality.

[32] ICF, 2010d. Sensitivity Analysis CMAQ results on projected maximum TFA rainwater concentrations and maximum 8-hr ozone concentrations.

[33] CRP, 2008. Risk Assessment for Alternative Refrigerants HFO-1234yf Phase II. Prepared for SAE International Cooperative Research Program 1234 by Gradient Corporation.

[34] CRP, 2009. Risk Assessment for Alternative Refrigerants HFO-1234yf and R-744 (CO_2) Phase III. Prepared for SAE International Cooperative Research Program 1234 by Gradient Corporation.

[35] DuPont and Honeywell. Guidelines for Use and Handling of HFO-1234yf (v8.0).

[36] Exponent. 2008. HFO-1234yf Refrigerant Concentration and Ignition Tests in Full-Scale Vehicle Passenger Cabin and Engine Compartment.

[37] CRP, 2013.SAE International Cooperative Research Project CRP1234–4 on R-1234yf Safety, Finishes Work and Presents Conclusions. Available online at: *http://www.sae.org/servlets/pressRoom?OBJECT_TYPE=PressReleases&PAGE=showRelease&RELEASE_ID=2146*.

[38] AEM, 2019. Risk Assessment for HFO-1234yf in Agricultural Tractors ≥ 40 HP including 2WD, MFD, 4WD and Track Type Equipment.

[39] AEM, 2020a. Risk Assessment for HFO-1234yf in Self-Propelled Agricultural Machinery including Combines, Forage Harvesters, Sprayers, and Windrowers.

[40] AEM, 2020b. Risk Assessment for HFO-1234yf in Compact Equipment (Examples include Tractors <40HP, Turf Equipment, Skid Steer, Mini-Excavators and Track Loaders)

[41] AEM, 2020c. Risk Assessment for HFO-1234yf in Construction, Forestry and Mining Equipment.

[42] AEM, 2020d. Risk Assessment for HFO-1234yf in Commericial Utility Vehicles.

[43] Nielsen *et al.,* 2007. Atmospheric chemistry of CF3CF=CH2: Kinetics and mechanisms of gas-phase reactions with Cl atoms, OH radicals, and O3. *Chemical Physics Letters* 439, 18–22. Available online at: *http://www.cogci.dk/network/OJN_CF3CF=CH2.pdf*.

[44] Papadimitriou *et al.,* 2007. CF3CF=CH2 and (Z)-CF3CF=CHF: temperature dependent OH rate coefficients and global warming potentials. *Phys. Chem. Chem. Phys.,* 2007, Vol. 9, p. 1–13. Available online at: *http://pubs.rsc.org/en/Content/ArticleLanding/2008/CP/b714382f*.

[45] HFC-152a is listed as acceptable, subject to use conditions, for new vehicles only at 40 CFR part 82 subpart G; final rule published June 12, 2008 (73 FR 33304).

[46] CO_2 is listed as acceptable, subject to use conditions, for new vehicles only at 40 CFR part 82 subpart G; final rule published June 6, 2012 (77 FR 33315).

[47] The 2015 Rule, among other things, changed the listings for certain HFCs and blends from acceptable to unacceptable in various end-uses in the aerosols, refrigeration and air conditioning, and foam blowing sectors. After a challenge to the 2015 Rule, the United States Court of Appeals for the District of Columbia Circuit (''the court'') issued a partial vacatur of the 2015 Rule ''to the extent it requires manufacturers to replace HFCs with a substitute substance'' (see *Mexichem Fluor, Inc.* v. *EPA,* 866 F.3d 451, 462 (D.C. Cir. 2017) and remanded the rule to the Agency for further proceedings. The court also upheld EPA's listing changes as being reasonable and not ''arbitrary and capricious.'' See *Mexichem Fluor,* 866 F.3d at 462–63.

although they are listed as acceptable, subject to use conditions, EPA is not aware of the use or development of HFC-152a, CO_2, or any of the refrigerant blends above in new nonroad vehicles.[48] Additionally, all MVAC refrigerants are subject to use conditions requiring labeling and the use of unique fittings, and the two lower-GWP alternatives currently approved for use in nonroad vehicles (*i.e.,* HFC-152a and CO_2) are subject to additional use conditions mitigating flammability and toxicity as appropriate to the alternative.

TABLE 1: GWP, ODP, AND VOC STATUS OF HFO-1234YF COMPARED TO OTHER REFRIGERANTS IN MVAC SYSTEMS OF NONROAD VEHICLES [1]

Refrigerants	GWP	ODP	VOC status	Final decision
HFO-1234yf	4	0	No	Acceptable, subject to use conditions.
CO_2, HFC-152a, HFC-134a	1–1,430	0	No	No change.
Other refrigerants, including IKON A, R-414B, R-416A, R-426A, SP34E.	933–3,337	0–0.098	Yes [2]	No change.

[1] The table does not include not-in-kind technologies listed as acceptable for the stated end-use.
[2] One or more constituents of the blend are VOC.

HFO-1234yf does not deplete the ozone layer. Similarly, HFC-134a, HFC-152a, CO_2, and the HFC blends SP34E and R-426A do not deplete the ozone layer; however, the HCFC blends have ODPs ranging from 0.012 to 0.056.

HFO-1234yf, HFC-134a, HFC-152a, and CO_2 are exempt from the EPA's regulatory definition of VOC (see 40 CFR 51.100(s)) addressing the development of state implementation plans (SIPs) to attain and maintain the National Ambient Air Quality Standards (NAAQS). The HFC blends and some of the HCFC blends have one or more components that are VOC.

Another potential environmental impact of HFO-1234yf is its atmospheric decomposition to trifluoroacetic acid (TFA, CF_3COOH). TFA is a strong acid that may accumulate in soil, plants, and aquatic ecosystems over time and may have the potential to adversely impact plants, animals, and ecosystems.[49] For information on recent analyses and research that has been conducted on TFA, including EPA's 2011 analysis, which was based on conservative emissions assumptions and a transition from HFC-134a to HFO-1234yf for all MVAC systems (not limited to LD vehicles), see section II.A.3.a of the proposed rule (86 FR at 68968; December 6, 2021). Taking into consideration the 2011 analysis and the research that has been conducted since, as discussed in section II.A.3.a in the proposed rule, EPA concludes that the use of HFO-1234yf in the nonroad vehicles addressed in this action does not pose a significant risk to the environment from atmospheric decomposition to TFA.

Therefore, based on the consideration of all of these environmental impacts, EPA concludes that HFO-1234yf does not pose significantly greater risk to the environment than the other alternatives for use in new nonroad vehicles addressed in this action, and it poses significantly less risk than several of the alternatives with higher GWPs and ODPs.

b. Flammability

HFO-1234yf is a flammable refrigerant classified as A2L under ASHRAE 34–2013. HFC-134a, CO_2, and the refrigerant blends SP34E and R-426A (also known as RS-24) and the HCFC blends R-416A (also known as HCFC Blend Beta or FRIGC FR12), R-414A (also known as HCFC Blend Xi or GHG-X4), R-414B (also known as HCFC Blend Omicron), HCFC Blend Delta (also known as Free Zone), Freeze 12, GHG-X5, and HCFC Blend Lambda (also known as GHG-HP) are nonflammable refrigerants, while HFC-152a and R-406A are slightly more flammable than HFO-1234yf with an ASHRAE classification of A2. HFO-1234yf is flammable when its concentration in air is in the range of 6.2 percent to 12.3 percent by volume (62,000 ppm to 123,000 ppm).[50] In the presence of an ignition source (*e.g.,* static electricity, a spark resulting from a switch malfunction, or a cigarette), an explosion or a fire could occur when the concentration of HFO-1234yf exceeds its LFL of 62,000 ppm, posing a significant safety concern for workers and consumers if it is not handled carefully. However, HFO-1234yf is difficult to ignite and, in the event of ignition, the flames would propagate slowly.[51]

With regards to flammability risks to workers, EPA's risk screens evaluated the potential for a fire from release and ignition in workplace situations and work-site operations, such as during equipment manufacture, servicing and disposal or recycling of vehicle end-of-life for the five nonroad vehicles. EPA considered the characteristics that could be different from LD and other HD vehicles, such as differences in the engine compartment size, passenger cabins, and operating conditions, and how those might impact risks. In order to determine the potential flammability risks during servicing of the vehicle or in case of a release of refrigerant into the cab, concentrations of HFO-1234yf immediately following a 60 percent release of refrigerant over a period of one minute into the cab were compared to the LFL and upper flammability limit (UFL) for HFO-1234yf reported by ASHRAE Standard 34 (*i.e.,* 62,000 ppm and 123,000 ppm, respectively). The one-minute time duration is most appropriate for determining the risks of flammable refrigerants because the potential maximum instantaneous concentration can be estimated and compared to the LFL. Two key inputs to the models were the cab volume (*i.e.,* the space into which the refrigerant would leak) and the refrigerant charge size. Because passenger compartment volumes and refrigerant charge sizes can vary widely from model to model, the highest ratio of charge size to

[48] The CAA and EPA's ODS regulations restrict the permissible uses of virgin HCFCs. With respect to refrigerants, virgin HCFC-22, HCFC-142b and blends containing HCFC-22 or HCFC-142b may now only be used to service existing appliances. Consequently, virgin HCFC-22, HCFC-142b and blends containing virgin HCFC-22 or HCFC-142b may no longer be used as a refrigerant to manufacture new pre-charged appliances or appliance components or to charge new appliances assembled onsite.

[49] Other fluorinated compounds also decompose into TFA, including HFC-134a.

[50] Chemours, 2019. HFO-1234yf for Use as a Refrigerant. Significant New Alternatives Policy Program Submission to the U.S. Environmental Protection Agency.

[51] HFO-1234yf has a high minimum ignition energy of 5,000–10,000 mJ and a low burning velocity of 1.5 cm/s (Koban, 2011).

compartment volume identified was used as the input into the models.

In the event of a leak, SAE Standard J2772 specifies that nonroad vehicles be manufactured such that the pressure differential between the air conditioning system and the cab allows only up to 60 percent of the refrigerant charge to be released into the cab.[52] Independent testing of refrigerant releases from nonroad vehicles, according to SAE Standard J2772, found that the amount of refrigerant released following a line leak was much lower than 60 percent.

To represent a plausible worst-case scenario, EPA's box modeling assumed that 60 percent of the charge of the air conditioning systems for the five nonroad vehicles is released into the cab of the vehicles over a period of one minute. EPA's worst-case scenario box modeling resulted in the concentration of HFO-1234yf in the cab exceeding the LFL of 62,000 ppm by 2,100 ppm at the typical charge size (*i.e.,* 1.3 kilograms) and exceeding both the LFL (by 95,900 ppm) and the UFL (by 34,900 ppm) at the maximum charge size (*i.e.,* 3.2 kilograms), for the five nonroad vehicles. However, the estimated exposures were derived using conservative assumptions and represent worst-case scenarios with a low probability of occurrence, as the analyses assume a rapid release of refrigerant (*i.e.,* one minute), assume the minimum required fresh air intake, and do not consider the air recirculation rate for the nonroad vehicles or other variables that would potentially reduce the concentration levels in the air to below the flammable range for HFO-1234yf. Additionally, flammability concerns are further reduced due to the design of MVAC systems for the five vehicle types as described above in section II.A.1 and the low probability of collisions for these nonroad vehicles.

MVAC systems in the nonroad vehicles are robust and made to withstand strenuous operation, which lowers the potential for line leaks due to wear. According to AEM,[53] [54] [55] [56] [57] the operator's compartment in agricultural tractors greater than 40 HP; self-propelled agricultural machinery; compact equipment; and construction, forestry, and mining equipment is a completely self-contained unit which provides an additional level of safety in a collision event. For commercial utility vehicles, which are smaller than the other four nonroad vehicle types, AEM noted that the engine compartment is contained in the rear of the vehicle, under the cargo bed, with the main components of the MVAC system in the front of the cabin with only the compressor and two lines near the engine. The potential for collisions is also less likely because most of the vehicles are operated by trained professionals, typically at low speed, and are only driven on the highway to move from one site or nonroad location to another.

In addition to the plausible worst-case scenario analysis, which employs a simple box model, EPA's risk screens reference modeling conducted by AEM in the flammability assessments. The AEM consortium used two different models in its assessments: (1) A box model to examine worst-case scenarios for a wide variety of nonroad vehicles addressed in this proposal and (2) a computational fluid dynamics (CFD) [58] [59] [60] [61] [62] [63] model to more realistically represent the behavior of the leaked refrigerant in an nonroad vehicle. The AEM box model modeled the release of 60 percent of the refrigerant charge in the vehicles with varying charge and cab sizes and assumed a near-instantaneous leak of refrigerant over a period of 10 seconds. Six of the scenarios modeled in the box model resulted in the concentration of HFO-1234yf in the cab being equal to or exceeding the LFL; the concentrations from the remaining six scenarios were below the LFL. Similar to EPA's box modeling, the estimated exposures were derived using conservative assumptions and represent worst-case scenarios with a low probability of occurrence, as the analyses assume a rapid release of refrigerant, assume the minimum required fresh air intake (*i.e.,* 43 m^3/hour), and do not consider the air recirculation rate for the nonroad vehicles or other variables that would potentially reduce the concentration levels in the air to below the flammable range for HFO-1234yf.

Conversely, the maximum concentration reached in the AEM CFD model, which models a realistic leak scenario with the release of 60 percent of the refrigerant charge released in the nonroad vehicles for 1000 seconds of simulation, was significantly below the LFL for HFO-1234yf of 62,000 ppm. Construction, forestry, and mining vehicles were modeled to represent the five nonroad vehicles as they had the highest ratio of refrigerant charge to cabin volume among the five nonroad vehicles. AEM found that the maximum concentration of HFO-1234yf reached in the cab (*i.e.,* 25,700 ppm) is not likely to exceed the LFL for the five nonroad vehicles. The AEM CFD model reflects the real-world behavior of refrigerant in the cab given a worst-case leak scenario because it considers the refrigerant entry and exit points and assumes worst-case scenario conditions, including the most likely scenario where an operator is likely to ignite a cigarette, the highest charge-to-cab ratio, minimal fresh air flow, and maximum air velocity and refrigerant penetration. Additionally, the CFD modeling demonstrates the conservativeness of the worst-case scenario box modeling and how unlikely its results are; therefore, the worst-case scenario box models may be overstating the true risks associated with the use of HFO-1234yf in MVAC systems in the nonroad vehicles compared to real-world conditions as presented in the CFD model.

For these reasons, EPA concludes that the currently available assessments on the use of HFO-1234yf in new nonroad vehicles addressed in this action are sufficiently conservative to account for all probable flammability risks from the use of HFO-1234yf. Relying on a similar analysis considered in support of the 2011 and 2016 SNAP listings of HFO-1234yf in certain MVAC systems, verifying that more recent information is consistent with that analysis, and considering unique factors for the nonroad vehicle types, EPA concludes that the use of HFO-1234yf in the new nonroad vehicles addressed in this action does not pose significantly greater flammability risk than the other alternatives when used in accordance with the use conditions described below

[52] SAE, 2019. Standard J2772: Measurement of Passenger Compartment Refrigerant Concentrations Under System Refrigerant Leakage Conditions. SAE International.

[53] AEM, 2019. Risk Assessment for HFO-1234yf in Agricultural Tractors ≥ 40 HP including 2WD, MFD, 4WD and Track Type Equipment.

[54] AEM, 2020a. Risk Assessment for HFO-1234yf in Self-Propelled Agricultural Machinery including Combines, Forage Harvesters, Sprayers, and Windrowers.

[55] AEM, 2020b. Risk Assessment for HFO-1234yf in Compact Equipment (Examples include Tractors <40HP, Turf Equipment, Skid Steer, Mini-Excavators and Track Loaders).

[56] AEM, 2020c. Risk Assessment for HFO-1234yf in Construction, Forestry, and Mining Equipment.

[57] AEM, 2020d. Risk Assessment for HFO-1234yf in Commercial Utility Vehicles.

[58] AEM, 2019. Risk Assessment for HFO-1234yf in Agricultural Tractors ≥ 40 HP including 2WD, MFD, 4WD and Track Type Equipment.

[59] AEM, 2020a. Risk Assessment for HFO-1234yf in Self-Propelled Agricultural Machinery including Combines, Forage Harvesters, Sprayers, and Windrowers.

[60] AEM, 2020b. Risk Assessment for HFO-1234yf in Compact Equipment (Examples include Tractors <40HP, Turf Equipment, Skid Steer, Mini-Excavators and Track Loaders).

[61] AEM, 2020c. Risk Assessment for HFO-1234yf in Construction, Forestry, and Mining Equipment.

[62] AEM, 2020d. Risk Assessment for HFO-1234yf in Commercial Utility Vehicles.

[63] AEM, 2020e. CFD Leak Modeling-Supplemental Information to Compliment AEM Machine Form RAs.

in section II.A.4, which are intended to mitigate flammability risks, and recommendations in the safety data sheet (SDS) and EPA's risk screens.

c. Toxicity

Potential health effects of exposure to HFO-1234yf include drowsiness or dizziness. HFO-1234yf may also irritate the skin or eyes or cause frostbite, and at sufficiently high concentrations, HFO-1234yf may cause irregular heartbeat. HFO-1234yf could cause asphyxiation if air is displaced by vapors in a confined space. These potential health effects are common to many refrigerants.

The American Industrial Hygiene Association (AIHA) has established a Workplace Environmental Exposure Level (WEEL) of 500 ppm as an 8-hr TWA for HFO-1234yf. HFO-1234yf also has an acute toxicity exposure limit (ATEL) of 100,000 ppm and a refrigerant concentration limit (RCL) of 16,000 ppm, which are both established by ASHRAE. EPA anticipates that users will be able to meet the AIHA WEEL and ASHRAE ATEL and RCL, limits intended to reduce the risks of flammability in normally occupied, enclosed spaces, and address potential health risks by following requirements and recommendations in the manufacturer's SDSs and other safety precautions common to the refrigerant industry.

To evaluate human health and safety impacts, including asphyxiation and toxicity risks, from the use of HFO-1234yf in the five types of nonroad vehicles, the Agency estimated the potential exposures to HFO-1234yf in the event of a 60 percent release of refrigerant from the vehicles under reasonable worst-case scenarios described in the risk screens. In the event of a leak, SAE Standard J2772 specifies that nonroad vehicles be manufactured such that the pressure differential between the air conditioning system and the cab allows only up to 60 percent of the refrigerant charge to be released into the cab.[64] The analysis of asphyxiation risks considered whether a worst-case release of refrigerant under the cab would result in oxygen concentrations of 12 percent or less. The analysis found that impacts on oxygen concentrations did not present a significant risk of asphyxiation at the typical charge sizes, and that a 60 percent leak of refrigerant at the maximum charge sizes could result in an oxygen concentration below 19.5 percent but above 12 percent. The estimated exposures were derived using conservative assumptions, however, and conditions resulting in oxygen levels under 12 percent[65] are only predicted to occur with charge sizes that are significantly larger than the maximum charge sizes provided by the submitter or cab sizes that are unlikely for the applications. Additionally, the worst-case scenarios did not consider conditions that are likely to occur that would increase oxygen levels to which individuals would be exposed, such as fresh air flow into the cab.

To assess the toxicity risks to end-users, 15-minute and 30-minute TWA exposures were estimated and compared to the standard toxicity limits. The estimated TWA exposures were fairly conservative as the analyses assume a rapid release of refrigerant (*i.e.,* one minute and 10 seconds for EPA's and AEM's box models, respectively), assume the minimum required ventilation rate (*i.e.,* 43 m^3/hour), and do not consider the air recirculation rate for the vehicles or other variables that would potentially reduce the concentration levels in the air. EPA found that the estimated 15-minute and 30-minute TWA exposures for HFO-1234yf in MVAC systems in the nonroad vehicles are not likely to exceed the ATEL for HFO-1234yf of 100,000 ppm in a one-minute release scenario under EPA's worst-case scenario modeling assumptions. The end-use exposures estimated by AEM across all scenarios were also well below the ATEL for HFO-1234yf. Furthermore, these exposure estimates were derived using conservative assumptions that do not necessarily reflect a real-world leak scenario or the larger cab size where MVAC systems using HFO-1234yf would typically be installed.

Additionally, the estimated TWA exposure for HFO-1234yf determined from AEM's CFD modeling, which models a realistic leak scenario for the nonroad vehicles, was significantly below the ATEL for HFO-1234yf of 100,000 ppm. Construction, forestry, and mining vehicles were modeled to represent the five nonroad vehicles. As noted above, these vehicles are a more conservative and an approximately equivalent proxy for the other four nonroad vehicle types because they have the highest ratio of refrigerant charge to cabin volume among the five nonroad vehicles. Therefore, the toxicity risks from using HFO-1234yf in the five nonroad vehicles is not likely to exceed the ATEL for the five nonroad vehicles.

Concerning workplace exposure during charging, servicing, and disposal of the nonroad vehicles addressed in this proposal, we expect that professional technicians have proper training and certification and have the proper equipment and knowledge to minimize their risks due to exposure to refrigerant from an MVAC system. Thus, worker exposure to HFO-1234yf is expected to be low. The vehicles are typically charged by the OEM. During air conditioning system manufacture (*i.e.,* charging at OEM location), points of release would be from connection/disconnection of temporary lines for charging and recovery equipment, although exposure during these activities is expected to be minimal due to the use of left-hand threaded fittings on storage cylinders, as specified in SAE Standard J2844, intended to help mitigate any releases and restrict the possibility of cross-contamination with other refrigerants.[66] [67] [68] [69] [70] Furthermore, equipment containing HFO-1234yf is expected to be equipped with unique fittings for the low-side and high-side service ports of the MVAC system, according to SAE Standard J639, also intended to help mitigate any releases and restrict the possibility of cross-contamination with other refrigerants.[71]

Servicing of the vehicles is expected to take place in high-bays and/or outside (*e.g.,* out in the field or other outdoor site)[72] rather than at a typical servicing center for LD vehicles, for example; therefore, exposure during servicing is expected to be less than during charging the MVAC system during manufacture. Therefore, occupational exposure during these activities was conservatively modeled based on charging. The modeled maximum 15-minute TWA exposures

[64] SAE, 2019. Standard J2772: Measurement of Passenger Compartment Refrigerant Concentrations Under System Refrigerant Leakage Conditions. SAE International.

[65] Twelve percent oxygen in air (*i.e.,* 120,000 ppm) is the No-Observed-Adverse-Effect-Level (NOAEL) for hypoxia (ICF, 1997).

[66] ICF, 2021a. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles—Agricultural Tractors Greater than 40 Horsepower) (New Equipment).

[67] ICF, 2021b. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles—Self-Propelled Agricultural Machinery) (New Equipment).

[68] ICF, 2021c. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles—Compact Equipment) (New Equipment).

[69] ICF, 2021d. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles—Construction, Forestry, and Mining Equipment) (New Equipment).

[70] ICF, 2021e. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles—Commercial Utility Vehicles) (New Equipment).

[71] Ibid.

[72] Chemours, 2019. HFO-1234yf for Use as a Refrigerant. Significant New Alternatives Policy Program Submission to the U.S. Environmental Protection Agency.

for HFO-1234yf during charging were compared to the short-term exposure limit (STEL) of 1,500 ppm. EPA's modeling indicated that the short-term (15-minute) worker exposure concentrations of HFO-1234yf are not likely to exceed its STEL for the typical or maximum charge size in the vehicles during charging or servicing. Additionally, these exposure estimates are significantly lower than the RCL and ATEL of 16,000 ppm and 100,000 ppm, respectively, for HFO-1234yf, which are limits intended to reduce the risks of asphyxiation and acute toxicity hazards in normally occupied, enclosed spaces according to ASHRAE Standard 34.

EPA also determined that occupational exposure during disposal of all the vehicles, except for construction, forestry, and mining equipment, at the typical and maximum charge sizes is not likely to exceed the long-term (8-hour) WEEL for HFO-1234yf (*i.e.,* 500 ppm). Under the disposal release scenarios for construction, forestry, and mining equipment, the modeling showed that occupational exposure during disposal of MVAC systems containing HFO-1234yf at the maximum charge size (*i.e.,* 3.4 kilograms (120 ounces)) could potentially exceed the 8-hour long-term exposure limit by 10 ppm. The estimated exposures, however, were well below the RCL of 16,000 ppm for HFO-1234yf and were derived using conservative assumptions and represent a worst-case scenario with a low probability of occurrence. These MVAC systems are also disposed of by CAA section 608-certified personnel using proper industrial hygiene techniques while wearing PPE to maximize recovery efficiency and limit releases. EPA concludes that the manufacture, use, servicing, or disposal of HFO-1234yf MVAC systems in the new nonroad vehicles addressed in this action does not pose greater toxicity risk to workers than the other alternatives when used in accordance with the use conditions.

Additionally, EPA's review of potential toxicity risks of HFO-1234yf to the general population indicated that HFO-1234yf is not expected to pose significantly greater toxicity risk than other alternatives for the MVAC systems in the new nonroad vehicles addressed in this action. The general population is defined as non-personnel who are subject to exposure of the substitute near industrial facilities, including manufacturing or equipment production factories, equipment operating locations, or recycling centers, rather than personnel at end-use. EPA concludes that the use of HFO-1234yf in the new nonroad vehicles addressed in this action does not pose significantly greater toxicity risk than the other alternatives when used in accordance with the use conditions described below in section II.A.4, which are intended to mitigate toxicity risks, and recommendations in the SDS and EPA's risk screens.

4. What are the use conditions?

All MVAC refrigerants listed as acceptable are subject to use conditions requiring labeling and the use of unique fittings. HFC-152a and CO_2 are subject to additional use conditions mitigating flammability and toxicity as appropriate to the alternative. Neither HFC-152a nor CO_2 can simply be ''dropped'' into existing MVAC systems because they are listed as acceptable only for new vehicles.

EPA is listing HFO-1234yf as acceptable, subject to use conditions, in MVAC systems in certain new nonroad vehicles because the use conditions are necessary to ensure that use of HFO-1234yf will not have a significantly greater overall impact on human health and the environment than other alternatives. EPA is updating the existing use conditions that are currently required for the use of HFO-1234yf in MVAC systems in new LD passenger cars and trucks, MDPVs, HD pickup trucks, and complete HD vans and then applying them to all the MVAC systems addressed in this action. Manufacturing and service personnel or consumers may not be familiar with refrigeration or AC equipment containing a flammable refrigerant. These use conditions will be sufficiently protective to ensure use of HFO-1234yf in these nonroad vehicles does not pose significantly greater risk than use of other alternatives.

The first use condition requires that HFO-1234yf may be used only in new MVAC systems which have been designed to address concerns unique to flammable refrigerants—*i.e.,* HFO-1234yf may not be used as a conversion or ''retrofit'' refrigerant for existing MVACs designed for other refrigerants. HFO-1234yf was not submitted under the SNAP program for use in retrofitted MVAC systems, and no information was provided on how to address hazards if HFO-1234yf were to be used in MVAC systems that were not designed for a flammable refrigerant. Therefore, under this use condition, HFO-1234yf may be used only in new MVACs that have been properly designed for its use.

The second use condition requires that MVAC systems designed to use HFO-1234yf in new agricultural tractors greater than 40 HP; self-propelled agricultural machinery; compact equipment; construction, forestry, and mining equipment; and commercial utility vehicles must meet the requirements of SAE J639 (revised November 2020), ''Safety Standards for Motor Vehicle Refrigerant Vapor Compression Systems.'' This standard sets safety standards that include unique fittings; a warning label indicating the refrigerant's identity and that it is a flammable refrigerant; and requirements for engineering design strategies that include a high-pressure compressor cutoff switch and pressure relief devices. This use condition also requires that for connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844 (revised January 2013), ''R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems,'' which specifies quick-connect fittings that are different from those for any other refrigerant. The low-side service port and connections will have an outside diameter of 14 mm (0.551 inches), and the high-side service port will have an outside diameter of 17 mm (0.669 inches), both accurate to within 2 mm. Under SAE J2844 (revised January 2013), containers of HFO-1234yf for use in professional servicing of MVAC systems must have a left-handed screw valve with a diameter of 0.5 inches and Acme (trapezoidal) thread with 16 threads per inch.

HFO-1234yf is mildly flammable (A2L classification) and, like other fluorinated refrigerants, can decompose to form the toxic compound hydrogen fluoride (HF) when exposed to flame or to sufficient heat. Consistent with the conclusion EPA drew at the time of the Agency's listing decision for HFO-1234yf in LD vehicles, EPA believes that the safety requirements that are included in SAE J639 sufficiently mitigate risks of both HF generation and refrigerant ignition (March 29, 2011; 76 FR 17488) for the nonroad vehicles addressed in this action. For example, SAE J639 provides for a pressure relief device designed to minimize direct impingement of the refrigerant and oil on hot surfaces and for design of the refrigerant circuit and connections to avoid refrigerant entering the passenger cabin. The pressure release device ensures that pressure in the system will not reach an unsafe level that might cause an uncontrolled leak of refrigerant, such as if the MVAC system is overcharged. The pressure release device will reduce the likelihood that refrigerant leaks would reach hot surfaces that might lead to either

ignition or formation of HF. These elements of the refrigerant circuit and connections are designed to prevent refrigerant from entering the passenger cabin if there is a leak. Keeping refrigerant out of the passenger cabin minimizes the possibility that there would be sufficient levels of refrigerant to reach flammable concentrations or that HF would be formed and transported where passengers might be exposed.

The third use condition requires the manufacturer of MVAC systems and vehicles to conduct Failure Mode and Effects Analysis (FMEA) as provided in SAE J1739 (revised January 2021), ''Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA–MSR, and Process FMEA,'' and keep records of the FMEA on file for three years from the date of creation. SAE J1739 (revised January 2021) describes a FMEA as ''a systematic group of activities intended to: (a) Recognize and evaluate the potential failure of a product/process and the effects and causes of that failure, (b) identify actions that could eliminate or reduce the change of the potential failure occurring, and (c) document the process.'' Through the FMEA, OEMs determine the appropriate protective strategies necessary to ensure the safe use of HFO-1234yf across their vehicle fleet. It is standard industry practice to perform the FMEA and to keep it on file while the vehicle is in production and for several years afterwards. As with the previous use condition, this use condition is intended to ensure that agricultural tractors greater than 40 HP; self-propelled agricultural machinery; compact equipment; construction, forestry, and mining equipment; and commercial utility vehicles manufactured with HFO-1234yf MVACs are specifically designed to minimize release of the refrigerant into the passenger cabin or onto hot surfaces that might result in ignition or in generation of HF.

B. Modifications to Use Conditions for MVAC Systems in Other Vehicle Types

For the previous listings of HFO-1234yf in the March 29, 2011 (76 FR 17488), and December 1, 2016 (81 FR 86778), final rules for MVAC systems in certain new vehicles, EPA is modifying the use conditions to replace the reference to older versions of SAE J639, SAE J1739, and SAE J2844.

First, EPA is replacing the reference to SAE J639 (revised 2011) in the March 2011 and December 2016 final rules with a reference to the 2020 version of the standard, ''Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems.'' This is the most recent version of the SAE J639 standard, which was updated to include system design and safety-related requirements for secondary loop HFC-152a MVAC systems and to make general improvements for clarity.

Second, EPA is replacing the reference to SAE J1739 (adopted 2009) in the March 2011 and December 2016 final rules with a reference to the 2021 version of the standard, ''Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA–MSR, and Process FMEA.'' The 2021 version is the most recent version of the SAE J1739 standard; it was revised to emphasize the process of FMEA selection, creation, documentation, reporting, and change management.

Finally, EPA is replacing the reference to SAE J2844 (revised 2011) in the March 2011 final rule with a reference to the 2013 version of the standard, ''R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems.'' This is the most recent version of the SAE J2844 standard; it was updated to add the requirements for certification according to SAE J2911, ''Procedure for Certification that Requirements for Mobile Air Conditioning System Components, Service Equipment, and Service Technician Training Meet SAE J Standards.''

C. Servicing Fittings for Small Cans of HFO-1234yf

EPA is including a use condition for HFO-1234yf to provide for servicing air conditioning systems. The use condition would require unique servicing fittings for use with small cans (two pounds or less) for servicing of MVAC systems containing HFO-1234yf in the nonroad vehicles addressed in this action, as well as servicing of the MVAC systems in the vehicles for which HFO-1234yf has already been listed as acceptable, subject to use conditions (*i.e.,* new LD passenger cars and trucks and new MDPVs, HD pickup trucks, and complete HD vans). The use condition is discussed below in section II.C.3, ''What is the use condition?''

EPA previously listed HFO-1234yf as acceptable, subject to use conditions, for large containers of HFO-1234yf for professional servicing of MVAC systems (76 FR 17488, March 29, 2011; 77 FR 17344, March 26, 2012). Redacted submissions and supporting documentation for HFO-1234yf in small cans are provided in the docket for this rulemaking (EPA–HQ–OAR–2021–0347) at *https://www.regulations.gov.* As explained in the proposed rule (86 FR 68962; December 6, 2021) and below, to help evaluate environmental, flammability, and toxicity risks resulting from the use of HFO-1234yf in small cans for MVAC servicing, EPA conducted a risk screen which is available in the docket for this rulemaking.[73]

Servicing of MVAC systems containing HFO-1234yf with small refrigerant cans is expected to take place in a variety of locations, including professional and residential garages with differing sizes and ventilation rates. As discussed below in section II.C.3 regarding the use condition, small refrigerant cans must be equipped with a Standard Compressed Gas Association (CGA) 166 left-hand thread outlet connection valve in accordance with SAE Standard J2844.[74] The hose connected to the vehicle must also use the low side service port per SAE J639.

For additional context, we further note that separate from the requirements in this action, the sale of such small refrigerant cans would be subject to the regulatory requirements under CAA section 608, codified at 40 CFR 82.154. These regulations restrict the sale, distribution, and offer for sale or distribution of refrigerants, including non-exempt substitute refrigerants, like HFO-1234yf, to circumstances where certain requirements are met. Specific to the sale of small cans of refrigerant, 40 CFR 82.154(c)(1)(ix) provides that non-exempt substitute refrigerant for use in an MVAC, *e.g.,* HFO-1234yf, may be sold, including to DIYers, if it is in a container designed to hold two pounds or less of refrigerant which has a unique fitting, and, if manufactured or imported on or after January 1, 2018, has a self-sealing valve that complies with the self-sealing valve specifications codified at 40 CFR 82.154(c)(2). EPA is not modifying the existing CAA section 608 provisions under 40 CFR 82.154, including the restriction on sale of substitute refrigerants and requirements for self-sealing valves. For additional information, EPA directs readers to 40 CFR 82.152, where EPA defines a self-sealing valve as ''a valve affixed to a container of refrigerant that automatically seals when not actively dispensing refrigerant and that meets or exceeds established performance criteria as identified in § 82.154(c)(2).''

[73] ICF, 2021f. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Small Cans). Substitute: HFO-1234yf.

[74] SAE J2844 container valve requirements are for HFO-1234yf service cylinders with a volume less than or equal to 23 kilograms.

1. What is the affected end-use?

As proposed, EPA is listing HFO-1234yf as acceptable, subject to a use condition, in small cans (two pounds or less) for servicing of MVAC systems in the nonroad vehicles addressed in this action, as well as in MVAC systems in the vehicles for which HFO-1234yf has already been listed as acceptable, subject to use conditions. For the existing listings in the March 29, 2011 (76 FR 17488), and December 1, 2016 (81 FR 86778), final rules, EPA is revising the use conditions to require unique servicing fittings for use with small cans.

2. How does HFO-1234yf compare to other refrigerants for these MVAC applications with respect to SNAP criteria?

a. Environmental Impacts

HFO-1234yf has a GWP of four,[75] [76] which is similar to or lower than the GWP of the other acceptable alternatives for use in small cans (*i.e.,* HFC-134a and CO_2). HFO-1234yf, HFC-134a, and CO_2 do not deplete the ozone layer, and are all exempt from the regulatory definition of VOC (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the NAAQS. For additional information on the environmental impacts of HFO-1234yf, see the discussion above in section II.A.3.a.

b. Flammability

As discussed above in section II.A.3.b, HFO-1234yf is classified as A2L under ASHRAE 34–2013, while HFC-134a and CO_2 are nonflammable refrigerants. HFO-1234yf is flammable when its concentration in air is in the range of 6.2 percent and 12.3 percent by volume (62,000 ppm to 123,000 ppm). Due to its flammability, small cans of HFO-1234yf for MVAC system servicing could pose a safety concern for workers and service personnel or consumers if they are not properly handled.

Servicing of MVAC systems with small refrigerant cans containing HFO-1234yf is expected to take place in either a professional garage bay or a residential garage. To determine the potential flammability risks of a catastrophic release of refrigerant during professional and DIY MVAC system servicing using a small refrigerant can, EPA analyzed plausible worst-case scenarios to model a catastrophic release of HFO-1234yf[77] compared with the LFL of 62,000 ppm for HFO-1234yf.[78] Under these plausible worst-case scenarios, the full charge of the refrigerant can is assumed to be emitted into the professional garage bay and residential garage with 4.0 and 3.1 air changes per hour (ACH),[79] respectively, over the course of 15 minutes, which represents the approximate amount of time required to charge the MVAC system.[80] EPA found that the maximum instantaneous concentrations of HFO-1234yf in the lower 0.4 meters of the room did not exceed the LFL for HFO-1234yf (*i.e.,* 62,000 ppm) for small refrigerant cans (charge size of around 1kg (2 pounds) or less). [81] EPA also found that the maximum instantaneous concentration exceeded 25 percent (15,500 ppm) of the LFL for HFO-1234yf for DIY servicing under one of the scenarios.[82] However, the scenario was derived using conservative assumptions (*e.g.,* minimum room volume, vertical concentration gradient). Furthermore, small refrigerant cans are not likely to be used in spaces significantly smaller than those modeled in EPA's assessment, which are expected to be large enough to accommodate a vehicle and adequate space surrounding the vehicle for the user to access the MVAC unit. Finally, HFO-1234yf is difficult to ignite and, in the event of ignition, the flames would propagate slowly.[83] Therefore, the risk of fire is minimal if small refrigerant cans containing HFO-1234yf meet and are used to service vehicles in rooms with volumes in accordance with relevant safety standards as described below in section II.C.3.

Additionally, EPA considered the submitters' detailed assessments of the probability of events that might create a fire and approaches to mitigate risks. A CFD modeling was conducted by a submitter to simulate a severe refrigerant line leak from a 600-gram MVAC system in a garage bay of 84 m^3 without forced ventilation and found that the flammable region of the refrigerant plume under the hood of the vehicle was small, ranging from 2 inches to a maximum of 10 inches, which quickly dispersed. Similarly, leaks from a small refrigerant can containing HFO-1234yf during MVAC servicing are not expected to accumulate under the vehicle hood in concentrations above the LFL for HFO-1234yf.

EPA concludes that the currently available assessments on the use of HFO-1234yf in small cans for professional and DIY servicing of MVAC systems are sufficiently conservative to account for all probable flammability risks from the use of HFO-1234yf. Therefore, the use of HFO-1234yf in small cans does not pose significantly greater flammability risk than the other alternatives when used in accordance with the use condition described below in section II.C.3, which is intended to mitigate flammability risks, and recommendations in the SDS and EPA's risk screen.

c. Toxicity

For a discussion of the potential health effects of HFO-1234yf, see the section II.A.3.c above. In evaluating potential asphyxiation and toxicity impacts of HFO-1234yf in small cans on human health, EPA considered both occupational risk and risk to the general population. EPA investigated the risk of asphyxiation and of exposure to toxic levels of HFO-1234yf for plausible worst-case scenarios. According to the results of EPA's asphyxiation assessment, the use of HFO-1234yf in small refrigerant cans does not present a significant risk of asphyxiation.[84] Conditions resulting in oxygen levels under 12 percent [85] would only occur with charge sizes that are significantly larger than the maximum charge size for

[75] Nielsen *et al.,* 2007. Atmospheric chemistry of CF3CF=CH2: Kinetics and mechanisms of gas-phase reactions with Cl atoms, OH radicals, and O3. *Chemical Physics Letters* 439, 18–22. Available online at: *http://www.cogci.dk/network/OJN_174_CF3CF=CH2.pdf.*

[76] Papadimitriou *et al.,* 2007. CF3CF=CH2 and (Z)-CF3CF=CHF: temperature dependent OH rate coefficients and global warming potentials. *Phys. Chem. Chem. Phys.,* 2007, Vol. 9, p. 1–13. Available online at: *http://pubs.rsc.org/en/Content/ArticleLanding/2008/CP/b714382f.*

[77] In order to simulate the vertical concentration gradient of refrigerant following release, it is assumed that 95 percent of the leaked refrigerant mixes evenly into the lower 0.4 meters (1.3 feet) of the room, and the rest of the refrigerant mixes evenly in the remaining volume (Kataoka 2000).

[78] ICF, 2021f. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Small Cans). Substitute: HFO-1234yf.

[79] The air exchange rates were derived from the requirements in ANSI/ASHRAE Standard 62.1–2019, Table 6.1 (ANSI/ASHRAE 2019c). Ventilation requirements (presented as cubic feet per minute in the standard) were converted to ACH using the assumed room size in the residential garage scenario.

[80] Perrin Quarles Associates, Inc. (2007) suggests charging for up to 15 minutes to fully empty the contents of the refrigerant can is a best practice for DIY servicing of an MVAC system. This study also indicates that the transfer procedure used for a small refrigerant can (*e.g.,* holding upright, rotation method, and other flow control methods) influences the transfer time and resulting heel remaining in the can.

[81] ICF, 2021f. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Small Cans). Substitute: HFO-1234yf.

[82] Ibid.

[83] HFO-1234yf has a high minimum ignition energy of 5,000–10,000 mJ and a low burning velocity of 1.5 cm/s (Koban, 2011).

[84] ICF, 2021f. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Small Cans). Substitute: HFO-1234yf.

[85] Twelve percent oxygen in air (*i.e.,* 120,000 ppm) is the NOAEL for hypoxia (ICF 1997).

small refrigerant cans or room sizes that are unlikely for the application. In addition, the charge sizes at which an asphyxiation concern would exist are also significantly larger (about 18 times) than the average charge size of an MVAC system.[86]

To evaluate toxicity risks, EPA estimated 15-minute TWA exposures for HFO-1234yf in small cans and compared them to the standard toxicity limits. The estimated TWA values were conservative as the analysis did not consider opened windows or doors, fans operating, conditioned airflow (either heated or cooled), or other variables that would reduce the levels to which individuals would be exposed. The modeling results showed that the estimated 15-minute TWA exposures ranging from 3,100 ppm to 11,080 ppm are all lower than the RCL (*i.e.,* 16,000 ppm) and ATEL (*i.e.,* 100,000 ppm) for HFO-1234yf.

EPA also considered testing and air sampling conducted by a submitter to determine potential refrigerant exposure to professional servicing technicians or DIY users due to leakage of refrigerant cans in a small, closed garage with the condenser fan off and the vehicle hood partly open.[87] The various scenarios investigated included releases of 170 grams to 680 grams of refrigerant from both an inverted and upright can.[88] Refrigerant samples were taken under the vehicle at 0.15 meters above the floor (representing the potential breathing area of a technician present in that space) and in the engine compartment. The experimentally derived exposure estimates are also significantly lower than the RCL (*i.e.,* 16,000 ppm) and ATEL (*i.e.,* 100,000 ppm) for HFO-1234yf.

Additionally, EPA assessed the potential exposures to workers during disposal (*e.g.,* collection, transportation) of small refrigerant cans containing HFO-1234yf.[89] EPA determined that if proper handling and disposal guidelines are followed in accordance with good industrial hygiene practices and the SDS for HFO-1234yf, there is no significant risk to workers during the disposal of HFO-1234yf from MVAC systems or HFO-1234yf small refrigerant cans.

For potential toxicity risks of HFO-1234yf to the general population, EPA's analysis indicated that HFO-1234yf is not expected to present an unreasonable risk to human health in the general population when used as a refrigerant in small cans for MVAC servicing.

Based upon EPA's analysis, workplace and general population exposure to HFO-1234yf in small cans when used according to the use condition is not expected to exceed relevant exposure limits. Therefore, EPA concludes that the use of HFO-1234yf in small cans does not pose significantly greater toxicity risks than other acceptable refrigerants when used in accordance with the use condition described below in section II.C.3, which is intended to mitigate toxicity risks, and recommendations in the SDS and EPA's risk screen.

3. What is the use condition?

EPA's SNAP program has a longstanding approach of requiring unique fittings for use with each refrigerant substitute in MVAC systems. This is intended to prevent cross contamination of different refrigerants, to preserve the purity of recycled refrigerants, and ultimately to avoid venting of refrigerant consistent with requirements under CAA section 608(c), codified at 40 CFR 82.154(a). In the 1996 SNAP rule requiring the use of fittings on all refrigerants submitted for use in MVAC systems, EPA urged industry to develop mechanisms to ensure that the refrigerant venting prohibition under CAA section 608 and the implementing regulations at 40 CFR 82.154 are observed (61 FR 54032; October 16, 1996). EPA has issued multiple SNAP rules codified in the CFR requiring the use of fittings unique to a refrigerant for use on ''containers of the refrigerant, on can taps, on recovery, recycling, and charging equipment, and on all [motor vehicle] air conditioning system service ports.'' (See appendices C and D to subpart G of 40 CFR part 82).

In this rule, EPA is establishing a use condition requiring that for connections with small cans (two pounds or less) of HFO-1234yf use fittings must be consistent with SAE J2844 (revised January 2013), which specifies quick-connect fittings that are different from those for any other refrigerant. The low-side service port and connections will have an outside diameter of 14 mm (0.551 inches), and the high-side service port will have an outside diameter of 17 mm (0.669 inches), both accurate to within 2 mm. Under SAE J2844 (revised January 2013), small cans of HFO-1234yf (*e.g.,* for use in DIY servicing of MVAC systems) must have a left-handed screw valve with a diameter of 0.5 inches and Acme (trapezoidal) thread with 16 threads per inch.

D. Incorporation by Reference

As proposed, EPA is adopting the current versions of three technical safety standards developed by SAE by incorporating them by reference into the use conditions for the nonroad vehicles addressed in this action. EPA is also modifying the use conditions for the previous listings of HFO-1234yf in certain MVAC systems to incorporate by reference the most current versions of the three standards. The three standards are SAE J639 (revised November 2020), ''Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems;'' SAE J1739 (revised January 2021), ''Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA–MSR, and Process FMEA;'' and SAE J2844 (revised January 2013), ''R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems.'' Section II.A.4 of this preamble discusses these standards in greater detail.

EPA finds, as in past rules, that it is appropriate to reference consensus standards that set conditions to reduce risk. As in past listings of flammable refrigerants, we find that such standards have already gone through a development phase that incorporates the latest findings and research. Likewise, such standards have gone through a vetting and refinement process that provides the affected parties an opportunity to comment. For the U.S. MVAC industry, EPA sees SAE standards in general as a pervasively used body of work to address risks, and these standards are the most applicable and recognized by the U.S. market.

Incorporation by reference allows federal agencies to comply with the requirement to publish rules in the **Federal Register** and the Code of Federal Regulations by referring to material already published elsewhere. The legal effect of incorporation by reference is that the material is treated as if it were published in the **Federal Register** and Code of Federal Regulations.

SAE J639, J1739, and J2844 are available for purchase by mail at: SAE

[86] EPA's Vintaging Model (EPA 2020) assumes the refrigerant charge size for MVACs to be 0.555–1 kilograms in light-duty vehicles and 0.79–1.14 kilograms in light-duty trucks.

[87] Honeywell International, Inc. 2012. Refrigerant exposure to service personnel or DIYers due to leakage of 12 oz charging cans or ''small cans.'' Experiments Conducted at Honeywell's Research Laboratory in Buffalo, NY USA. January 2012.

[88] The orientation of the can during servicing determines the phase (*i.e.,* liquid or gas) of the refrigerant that is being transferred into the MVAC system. When the can is upright, the refrigerant transfers as a gas and when the can is inverted, the refrigerant transfers as a liquid (Perrin Quarles Associates, Inc., 2007). Refrigerant can instructions often direct users to hold the can upright or rotate its position during servicing.

[89] ICF, 2021f. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Small Cans). Substitute: HFO-1234yf.

Customer Service, 400 Commonwealth Drive, Warrendale, PA 15096–0001; Telephone: 1–877–606–7323 in the U.S. or Canada (other countries dial 1–724–776–4970); internet address for SAE J639: *https://www.sae.org/standards/content/j639_201112/;* internet address for SAE J1739: *https://www.sae.org/standards/content/j1739_202101/;* internet address for SAE J2844: *https://www.sae.org/standards/content/j2844_201301/.* The cost of SAE J639, J1739, and J2844 is $85 each for an electronic or hard copy. The cost of obtaining these standards is not a significant financial burden for manufacturers of MVAC systems, and purchase is not required for those selling, installing, or servicing the MVAC systems covered by these standards. Therefore, the EPA concludes that SAE J639, J1739, and J2844 are reasonably available.

E. What is the relationship between this SNAP rule and other federal rules?

1. Significant New Use Rule for HFO-1234yf Under the Toxic Substances Control Act

In a final rule published on March 29, 2011 (76 FR 17488), EPA noted that the listing of HFO-1234yf as acceptable, subject to use conditions, in new passenger cars and trucks did not apply to small cans. EPA stated that the Agency ''would require additional information on consumer risk and a set of unique fittings from the refrigerant manufacturer for use with small cans or containers of HFO-1234yf before we would be able to issue a revised rule that allows for consumer filling, servicing, or maintenance of MVAC systems with HFO-1234yf'' [90] and that use of small cans would need to be consistent with EPA's final SNUR for HFO-1234yf under TSCA (October 27, 2010; 75 FR 65987). EPA has since revised the SNUR (80 FR 37166, June 30, 2015) to require the submission of a significant new use notice (SNUN) for commercial use of HFO-1234yf other than in passenger cars and vehicles in which the original charging of MVAC systems with HFO-1234yf was done by the OEM and use of HFO-1234yf in consumer products other than products used to recharge the MVAC systems in passenger cars and vehicles in which the original charging of MVAC systems with HFO-1234yf was done by the OEM, among other things. Manufacturers of small cans of HFO-1234yf have also submitted a unique fitting specifically for use with small can taps and small refrigerant cans for EPA's review. Today's listing of HFO-1234yf would apply to small cans, weighing two pounds or less, for DIY or professional use. Consistent with the revised June 2015 SNUR for HFO-1234yf, commercial use or use in consumer products to recharge MVAC systems with HFO-1234yf in passenger cars and vehicles may only occur without submission of a SNUN and review by EPA if the OEM originally charged the system with HFO-1234yf.

EPA is including a reference to the June 2015 SNUR (80 FR 37166) in Appendix B subpart G of part 82, under the 'Comments' column, for the listings of HFO-1234yf for the nonroad vehicles addressed in this action. EPA is also modifying the existing listings of HFO-1234yf as acceptable, subject to use conditions, for various vehicle types, by including the reference to the June 2015 SNUR in the Comments column in Appendix B subpart G of part 82.

2. CAA Sections 608 and 609

Today's action will not have any impact on EPA's regulations under sections 608 or 609 of the Clean Air Act. Among other things, CAA section 608 prohibits individuals from knowingly venting or otherwise releasing into the environment any refrigerants except those specifically exempted in certain end uses, while maintaining, servicing, repairing, or disposing of air conditioning or refrigeration equipment. HFO-1234yf is not exempt from the venting prohibition in any application; therefore, knowing release of HFO-1234yf from MVAC systems in the nonroad vehicles addressed in this action, or any other MVAC system, by any person maintaining, servicing, repairing, or disposing of such systems is prohibited. MVAC end-of-life disposal and recycling specifications are also covered under CAA section 608 and EPA's regulations issued under that section of the Act, which are codified at subpart F of 40 CFR part 82. In addition, as mentioned above in sections I.A and II.C, there are additional requirements that concern the sale or offer for sale of refrigerants, including a sales restriction under 40 CFR subpart F and specifically at 82.154(c)(1) and related specifications for self-sealing valves at 82.154(c)(2). This action does not modify the provisions under 40 CFR 82.154, including the restriction on sale of substitute refrigerants and requirements for self-sealing valves. The Agency is not revising regulations promulgated under CAA section 608 in this action.

CAA section 609 establishes standards and requirements regarding the servicing or repair of MVAC systems. EPA has issued regulations implementing this statutory requirement and those regulations are codified at subpart B of 40 CFR part 82. Under section 609 and its implementing regulations, no person repairing or servicing motor vehicles for consideration [91] may perform any service on an MVAC that involves the refrigerant without properly using approved refrigerant recovery or recovery and recycling equipment, and no such person may perform such service unless such person has been properly trained and certified. Refrigerant handling equipment must be certified by EPA or an independent organization approved by EPA. The statutory and regulatory provisions regarding MVAC servicing apply to all refrigerants, including HFO-1234yf.

3. Will this action affect EPA's HD greenhouse gas standards?

The Phase 1 HD Greenhouse Gas (GHG) rule (76 FR 57106; September 15, 2011) set GHG standards for the HD industry in three discrete categories—combination tractors, HD pickups and vans, and vocational vehicles. The Phase 1 rule also set separate standards for engines that power vocational vehicles and combination tractors—based on the relative degree of homogeneity among vehicles within each category. As part of the Phase 1 HD GHG standards, EPA finalized a low leakage standard of 1.50 percent leakage per year for AC systems installed in HD pickup trucks and vans and combination tractors for model years 2014 and later. On October 25, 2016, EPA finalized Phase 2 HD GHG standards that built on the existing Phase 1 HD GHG standards (81 FR 73478). The nonroad vehicles for which EPA is listing HFO-1234yf are not regulated under the Phase 1 or Phase 2 HD GHG standards. Additionally, today's action does not have a direct impact on the HD GHG standards, either for Phase 1 or Phase 2.

F. Response to Comments

EPA received four comments on the proposed rule from refrigerant suppliers and equipment manufacturers. All commenters strongly supported finalizing the rule as proposed, particularly the proposal to list

[90] EPA, 2011. Protection of Stratospheric Ozone: New Substitute in the Motor Vehicle Air Conditioning Sector Under the Significant New Alternatives Policy (SNAP) Program; Final Rule. March 29, 2011 (76 FR 17488). Available online at: *https://www.govinfo.gov/content/pkg/FR-2011-03-29/pdf/2011-6268.pdf.*

[91] Service for consideration means receiving something of worth or value to perform service, whether in money, credit, goods, or services.

HFO-1234yf as acceptable, subject to use conditions, in certain nonroad vehicle air conditioning systems. One commenter noted that the similarities between the proposed use conditions for the nonroad vehicles and those required for certain onroad vehicles ''will prevent confusion and help harmonize the industry as [HFO-]1234yf usage expands to nonroad vehicles.'' Another commenter stated that the proposed listings of HFO-1234yf in the nonroad vehicles would ''provide manufacturers with regulatory certainty so they can design and manufacture new equipment using HFO-1234yf and transition to lower GWP solutions.'' EPA acknowledges the support for the proposed rule and is finalizing the listings and changes as proposed.

In the proposed rule, EPA requested information on the development of HFO-1234yf MVAC systems for types of nonroad or onroad HD vehicles not covered by this rulemaking, particularly onroad trucks (*i.e.,* Class 4–8 trucks between 14,001 and 33,000 or greater pounds). Two commenters supported the expanded use of HFO-1234yf in HD onroad trucks greater than 14,000 pounds. One commenter estimated that manufacturers would need at least five to ten years to fully transition from HFC–134a to HFO-1234yf and noted a few potential technical challenges. However, the commenter stated that ''medium- and heavy-duty truck manufacturers are addressing the challenge with urgency,'' and encouraged EPA to initiate rulemaking to list HFO-1234yf for HD onroad trucks greater than 14,000 pounds. EPA acknowledges the commenters' support for the listing of HFO-1234yf in additional onroad vehicles and will consider these comments as it evaluates possible future actions.

III. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review

This action is not a significant regulatory action and was therefore not submitted to the Office of Management and Budget (OMB) for review.

B. Paperwork Reduction Act (PRA)

This action does not impose any new information collection burden under the PRA. OMB has previously approved the information collection activities contained in the existing regulations and has assigned OMB control number 2060–0226. The approved Information Collection Request includes five types of respondent reporting and recordkeeping activities pursuant to SNAP regulations: Submission of a SNAP petition, filing a TSCA/SNAP Addendum, notification for test marketing activity, recordkeeping for substitutes acceptable subject to use restrictions, and recordkeeping for small volume uses. This rule contains no new requirements for reporting or recordkeeping.

C. Regulatory Flexibility Act (RFA)

I certify that this action will not have a significant economic impact on a substantial number of small entities under the RFA. In making this determination, EPA concludes that the impact of concern for this rule is any significant adverse economic impact on small entities and that the agency is certifying that this rule will not have a significant economic impact on a substantial number of small entities if the rule has no net burden on the small entities subject to the rule. Because the use conditions are consistent with industry consensus standards, no change in business practice is required to meet the use conditions, resulting in no adverse impact compared to the absence of this final rule. Thus, the rule would not impose new costs on small entities.

D. Unfunded Mandates Reform Act (UMRA)

This action does not contain any unfunded mandate as described in UMRA, 2 U.S.C. 1531–1538, and does not significantly or uniquely affect small governments. The action imposes no enforceable duty on any state, local or tribal governments or the private sector.

E. Executive Order 13132: Federalism

This action does not have federalism implications. It will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

This action does not have tribal implications as specified in Executive Order 13175. It will not have substantial direct effects on tribal governments, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes, as specified in Executive Order 13175. Thus, Executive Order 13175 does not apply to this action.

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

This action is not subject to Executive Order 13045 because it is not economically significant as defined in Executive Order 12866, and because EPA does not believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. This action's health and risk assessments are contained in the comparisons of toxicity for HFO-1234yf, as well as in the risk screens for HFO-1234yf. The risk screens are in the docket for this rulemaking.

H. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use

This action is not subject to Executive Order 13211, because it is not a significant regulatory action under Executive Order 12866.

I. National Technology Transfer and Advancement Act

This action involves technical standards. EPA is adopting the current versions of three technical safety standards developed by SAE by incorporating them by reference into the use conditions for the nonroad vehicles addressed in this action. EPA is also modifying the use conditions for the previous listings of HFO-1234yf in MVAC systems to incorporate by reference the most current versions of the three standards. The use conditions ensure that HFO-1234yf does not present significantly greater risk to human health or the environment than other alternatives available for use in MVAC. Specifically, the three standards are:

1. *SAE J639:* Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems (revised November 2020). This document establishes safety standards for HFO-1234yf MVAC systems that include unique fittings; a warning label indicating the refrigerant's identity and that it is a flammable refrigerant; and requirements for engineering design strategies that include a high-pressure compressor cutoff switch and pressure relief devices. This standard is available at *https://www.sae.org/standards/content/j639_201112/.*

2. *SAE J1739:* Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA–MSR, and Process FMEA (revised January 2021). This standard describes potential FMEA in design and potential

FMEA in manufacturing and assembly processes. It requires manufacturers of MVAC systems and vehicles to conduct a FMEA and assists users in the identification and mitigation of risk by providing appropriate terms, requirements, ranking charts, and worksheets. This standard is available at *https://www.sae.org/standards/content/j1739_202101/.*

3. *SAE J2844:* R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems (revised January 2013). This standard sets purity standards and describes container requirements, including fittings for refrigerant cylinders. For connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844 (revised January 2013). For connections with small refrigerant cans for consumer or professional use, use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844. This standard is available at *https://www.sae.org/standards/content/j2844_201301/.*

These standards may be purchased by mail at: SAE Customer Service, 400 Commonwealth Drive, Warrendale, PA 15096–0001; by telephone: 1–877–606–7323 in the United States or 724–776–4970 outside the United States or in Canada. The cost of SAE J639, SAE J1739, and SAE J2844 is $85 each for an electronic or hardcopy. The cost of obtaining these standards is not a significant financial burden for manufacturers of MVAC systems and purchase is not required for those selling, installing, and servicing the systems. Therefore, EPA concludes that the use of SAE J639, SAE J1739, and SAE J2844 are reasonably available.

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

A regulatory action may involve potential environmental justice concerns if it could: (1) Create new disproportionate impacts on people of color, communities of low-income, and/or indigenous peoples; (2) exacerbate existing disproportionate impacts on people of color, communities of low-income, and/or indigenous peoples; or (3) present opportunities to address existing disproportionate impacts on people of color, communities of low-income, and/or indigenous peoples through the action under development.

EPA believes that this action does not have disproportionately high and adverse human health or environmental effects on people of color, communities of low-income and/or indigenous peoples, as specified in Executive Order 12898 (59 FR 7629, February 16, 1994). The listings for HFO-1234yf in the vehicle types addressed in this action would provide additional lower-GWP alternatives for the MVAC end-use. By providing a lower-GWP alternative for this end-use, this final rule is also anticipated to reduce the use and eventual emissions of potent GHGs in this end-use, which could help to reduce the effects of climate change, including the public health and welfare effects on people of color, communities of low-income and/or indigenous peoples. This action's health and environmental risk assessments are contained in the comparison of health and environmental risks for HFO-1234yf, as well as in the risk screens that are available in the docket for this rulemaking. EPA's analysis indicates that other environmental impacts and human health impacts of HFO-1234yf are comparable to or less than those of other substitutes that are listed as acceptable for the same end-use. Based on these considerations, EPA expects that the effects on people of color, communities of low-income and/or indigenous peoples would not be disproportionately high and adverse.

K. Congressional Review Act (CRA)

This action is subject to the CRA, and EPA will submit a rule report to each House of the Congress and to the Comptroller General of the United States. This action is not a ''major rule'' as defined by 5 U.S.C. 804(2).

IV. References

Unless specified otherwise, all documents are available electronically through the Federal Docket Management System, Docket number EPA–HQ–OAR–2021–0347.

AEM, 2019. Risk Assessment for HFO-1234yf in Agricultural Tractors ≥ 40 HP including 2WD, MFD, 4WD and Track Type Equipment.

AEM, 2020a. Risk Assessment for HFO-1234yf in Self-Propelled Agricultural Machinery including Combines, Forage Harvesters, Sprayers, and Windrowers.

AEM, 2020b. Risk Assessment for HFO-1234yf in Compact Equipment (Examples include Tractors <40HP, Turf Equipment, Skid Steer, Mini-Excavators and Track Loaders)

AEM, 2020c. Risk Assessment for HFO-1234yf in Construction, Forestry, and Mining Equipment.

AEM, 2020d. Risk Assessment for HFO-1234yf in Commercial Utility Vehicles.

AEM, 2020e. CFD Leak Modeling-Supplemental Information to Compliment AEM Machine Form RAs.

AEM, 2021. Appendix A: Machine Forms as Classified by AEM Membership.

ASHRAE, 2019. ANSI/ASHRAE Standard 34–2019: Designation and Safety Classification of Refrigerants.

Chemours, 2019. HFO-1234yf for Use as a Refrigerant. Significant New Alternatives Policy Program Submission to the U.S. Environmental Protection Agency.

CRP, 2008. Risk Assessment for Alternative Refrigerants HFO-1234yf Phase II. Prepared for SAE International Cooperative Research Program 1234 by Gradient Corporation.

CRP, 2009. Risk Assessment for Alternative Refrigerants HFO-1234yf and R-744 (CO2) Phase III. Prepared for SAE International Cooperative Research Program 1234 by Gradient Corporation.

CRP, 2013. SAE International Cooperative Research Project CRP1234-4 on R-1234yf Safety, Finishes Work and Presents Conclusions. Available online at: *http://www.sae.org/servlets/pressRoom?OBJECT_TYPE=PressReleases&PAGE=showRelease&RELEASE_ID=2146.*

DuPont and Honeywell, 2008. Guidelines for Use and Handling of HFO-1234yf (v8.0).

EPA, 2005. Risk Analysis for Alternative Refrigerant in Motor Vehicle Air Conditioning.

EPA, 2011. Protection of Stratospheric Ozone: New Substitute in the Motor Vehicle Air Conditioning Sector Under the Significant New Alternatives Policy (SNAP) Program; Final Rule. March 29, 2011 (76 FR 17488). Available online at: *https://www.govinfo.gov/content/pkg/FR-2011-03-29/pdf/2011-6268.pdf.*

EPA, 2016. Protection of Stratospheric Ozone: Update to the Refrigerant Management Requirements Under the Clean Air Act. November 18, 2016. 81 FR 82272. Available online at: *https://www.regulations.gov/document?D=EPA-HQ-OAR-2015-0453-0125.*

EPA, 2021. Basic Information about the Emission Standards Reference Guide for On-road and Nonroad Vehicles and Engines. Available online at *https://www.epa.gov/emission-standards-reference-guide/basic-information-about-emission-standards-reference-guide-road.*

Exponent, 2008. HFO-1234yf Refrigerant Concentration and Ignition Tests in Full-Scale Vehicle Passenger Cabin and Engine Compartment.

ICF, 1997. Physiological Effects of Alternative Fire Protection Agents—Hypoxic Atmospheres Conference. Stephanie Skaggs prepared the proceedings of the conference held May 22, 1997 in New London, CT.

ICF, 2008a. Air Conditioning Refrigerant Charge Size to Passenger Compartment Volume Ratio Analysis.

ICF, 2008b. Revised Characterization of U.S. Hybrid and Small Car Sales (Historical and Predicted) and Hybrid Vehicle Accidents.

ICF, 2009a. Revised Final Draft Assessment of the Potential Impacts of HFO-1234yf and the Associated Production of TFA on Aquatic Communities and Local Air Quality.

ICF, 2009b. Risk Screen on Substitutes for CFC–12 in Motor Vehicle Air Conditioning: Substitute: HFO-1234yf.

ICF, 2010a. Summary of HFO-1234yf Emissions Assumptions.

ICF, 2010b. Summary of Updates to the Vintaging Model that Impacted HFO-1234yf Emissions Estimates.
ICF, 2010c. Revised Assessment of the Potential Impacts of HFO-1234yf and the Associated Production of TFA on Aquatic Communities, Soil and Plants, and Local Air Quality.
ICF, 2010d. Sensitivity Analysis CMAQ results on projected maximum TFA rainwater concentrations and maximum 8-hr ozone concentrations.
ICF, 2016. Technical Support Document for Acceptability Listing of HFO-1234yf for Motor Vehicle Air Conditioning in Limited Heavy-Duty Applications.
ICF, 2021a. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles Agricultural Tractors Greater than 40 Horsepower) (New Equipment).
ICF, 2021b. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles Self-Propelled Agricultural Machinery) (New Equipment).
ICF, 2021c. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles Compact Equipment) (New Equipment).
ICF, 2021d. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles—Construction, Forestry, and Mining Equipment) (New Equipment).
ICF, 2021e. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles Commercial Utility Vehicles) (New Equipment).
ICF, 2021f. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Small Cans). Substitute: HFO-1234yf.
Kataoka, O., Yoshizawa, M., & Hirakawa, T., 2000. Allowable Charge Limit of Flammable Refrigerants and Ventilation Requirements. Daikin Industries. International Refrigeration and Air Conditioning Conference. Paper 506. Available online at: *http://docs.lib.purdue.edu/iracc/506.*
Nielsen, et al., 2007. Atmospheric chemistry of CF3CF=CH2: Kinetics and mechanisms of gas-phase reactions with Cl atoms, OH radicals, and O3. *Chemical Physics Letters* 439, 18–22. Available online at: *http://www.cogci.dk/network/OJN_174_CF3CF=CH2.pdf.*
Papadimitriou, et al., 2007. CF3CF=CH2 and (Z)-CF3CF=CHF: temperature dependent OH rate coefficients and global warming potentials. *Phys. Chem. Chem. Phys.,* 2007, Vol. 9, p. 1–13. Available online at: *http://pubs.rsc.org/en/Content/ArticleLanding/2008/CP/b714382f.*
Perrin Quarles Associates, Inc., 2007. Disposable Container Heel Testing Study Report. Prepared for United States Environmental Protection Agency by Perrin Quarles Associates, Inc. March 21, 2007.
SAE, 2013. Standard J2844: R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems. (Revised January 2013).
SAE, 2019. Standard J2772: Measurement of Passenger Compartment Refrigerant Concentrations Under System Refrigerant Leakage Conditions. SAE International. (Revised September 2019).
SAE, 2020. Standard J639: Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems. (Revised November 2020).
SAE, 2021. Standard J1739: Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA–MSR, and Process FMEA. (Revised January 2021).
Wagner, J., 2021. Email from John Wagner, Association of Equipment Manufacturers to Chenise Farquharson, EPA.

List of Subjects in 40 CFR Part 82

Environmental protection, Administrative practice and procedure, Air pollution control, Incorporation by reference, Recycling, Reporting and recordkeeping requirements, Stratospheric ozone layer, Motor vehicle air conditioning.

Michael S. Regan,

Administrator.

For the reasons set forth in the preamble, EPA amends 40 CFR part 82 as follows:

PART 82—PROTECTION OF STRATOSPHERIC OZONE

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

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

Subpart G—Significant New Alternatives Policy Program

■ 2. Appendix B to subpart G of part 82 is amended by

■ a. In the table titled ''Refrigerants—Acceptable Subject to Use Conditions'',

■ i. Revising the entries for ''CFC–12 Automobile Motor Vehicle Air Conditioning (New equipment in passenger cars and light-duty trucks only)'', ''Motor vehicle air conditioning (newly manufactured medium-duty passenger vehicles)'', ''Motor vehicle air conditioning (newly manufactured heavy-duty pickup trucks)'', and ''Motor vehicle air conditioning (newly manufactured complete heavy-duty vans only)''; and

■ ii. Adding entries, in the following order at the end of the table, for ''Motor vehicle air conditioning (newly manufactured nonroad agricultural tractors with greater than 40 horsepower)'', ''Motor vehicle air conditioning (newly manufactured nonroad self-propelled agricultural machinery)'', ''Motor vehicle air conditioning (newly manufactured nonroad compact equipment)'', ''Motor vehicle air conditioning (newly manufactured nonroad construction, forestry, and mining equipment)'', and ''Motor vehicle air conditioning (newly manufactured nonroad commercial utility vehicles)''; and

■ b. Removing ''Note 1''.

The revisions and additions read as follows:

APPENDIX B TO SUBPART G OF PART 82—SUBSTITUTES SUBJECT TO USE RESTRICTIONS AND UNACCEPTABLE SUBSTITUTES REFRIGERANTS—ACCEPTABLE SUBJECT TO USE CONDITIONS

Application	Substitute	Decision	Conditions	Comments
*	*	*	* *	* *
CFC–12 Automobile Motor Vehicle Air Conditioning (New equipment in passenger cars and light-duty trucks only).	HFO-1234yf as a substitute for CFC–12.	Acceptable subject to use conditions.	As of June 3, 2022: ..... (1) HFO-1234yf MVAC systems must adhere to all of the safety requirements of SAE J639,[47] including requirements for a flammable refrigerant warning label, high-pressure compressor cutoff switch and pressure relief devices, and unique fittings. For connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844.[67] For connections with small refrigerant cans for consumer or professional use, use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844.. (2) Manufacturers must conduct Failure Mode and Effect Analysis (FMEA) as provided in SAE J1739.[57] Manufacturers must keep the FMEA on file for at least three years from the date of creation.	Additional training for service technicians recommended. HFO-1234yf is also known as 2,3,3,3-tetrafluoro-prop-1-ene (CAS. Reg. No. 754–12–1). Consistent with EPA's Significant New Use Rule for HFO-1234yf under the Toxic Substances Control Act, commercial users or consumers can only recharge MVAC systems with HFO-1234yf where the original charging of the system with HFO-1234yf was done by the original equipment manufacturer. Refrigerant containers of HFO-1234yf for use in professional servicing are from 5 lbs. (2.3 L) to 50 lbs. (23 L) in size. Requirements for handling, storage, and transportation of compressed gases apply to this refrigerant, such as regulations of the Occupational Safety and Health Administration at 29 CFR 1910.101 and the Department of Transportation's requirements at 49 CFR 171–179. Requirements for handling, storage, and transportation of compressed gases apply to this refrigerant, such as regulations of the Occupational Safety and Health Administration at 29 CFR 1910.101 and the Department of Transportation's requirements at 49 CFR 171–179.
*	*	*	* *	* *
Motor vehicle air conditioning (newly manufactured medium-duty passenger vehicles).	HFO-1234yf	Acceptable subject to use conditions.	As of June 3, 2022: (1) HFO-1234yf MVAC systems must adhere to all of the safety requirements of SAE J639,[47] including requirements for a flammable refrigerant warning label, high-pressure compressor cutoff switch and pressure relief devices, and unique fittings. For connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844.[67] For connections with small refrigerant cans for consumer or professional use, use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844. (2) Manufacturers must conduct Failure Mode and Effect Analysis (FMEA) as provided in SAE J1739.[57] Manufacturers must keep the FMEA on file for at least three years from the date of creation.	Additional training for service technicians recommended. HFO-1234yf is also known as 2,3,3,3-tetrafluoro-prop-1-ene (CAS. Reg. No. 754–12–1). Consistent with EPA's Significant New Use Rule for HFO-1234yf under the Toxic Substances Control Act, commercial users or consumers can only recharge MVAC systems with HFO-1234yf where the original charging of the system with HFO-1234yf was done by the original equipment manufacturer.
Motor vehicle air conditioning (newly manufactured heavy-duty pickup trucks).	HFO-1234yf	Acceptable subject to use conditions.	As of June 3, 2022: (1) HFO-1234yf MVAC systems must adhere to all of the safety requirements of SAE J639,[47] including requirements for a flammable refrigerant warning label, high-pressure compressor cutoff switch and pressure relief devices, and unique fittings. For connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844.[67] For connections with small refrigerant cans for consumer or professional use, use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844. (2) Manufacturers must conduct Failure Mode and Effect Analysis (FMEA) as provided in SAE J1739.[57] Manufacturers must keep the FMEA on file for at least three years from the date of creation.	Additional training for service technicians recommended. HFO-1234yf is also known as 2,3,3,3-tetrafluoro-prop-1-ene (CAS No. 754–12–1). Consistent with EPA's Significant New Use Rule for HFO-1234yf under the Toxic Substances Control Act, commercial users or consumers can only recharge MVAC systems with HFO-1234yf where the original charging of the system with HFO-1234yf was done by the original equipment manufacturer.

APPENDIX B TO SUBPART G OF PART 82—SUBSTITUTES SUBJECT TO USE RESTRICTIONS AND UNACCEPTABLE SUBSTITUTES REFRIGERANTS—ACCEPTABLE SUBJECT TO USE CONDITIONS—Continued

Application	Substitute	Decision	Conditions	Comments
Motor vehicle air conditioning (newly manufactured complete heavy-duty vans only).	HFO-1234yf	Acceptable subject to use conditions.	As of June 3, 2022: (1) HFO-1234yf MVAC systems must adhere to all of the safety requirements of SAE J639,[47] including requirements for a flammable refrigerant warning label, high-pressure compressor cutoff switch and pressure relief devices, and unique fittings. For connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844.[67] For connections with small refrigerant cans for consumer or professional use, use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844. (2) Manufacturers must conduct Failure Mode and Effect Analysis (FMEA) as provided in SAE J1739.[57] Manufacturers must keep the FMEA on file for at least three years from the date of creation.	Additional training for service technicians recommended. HFO-1234yf is also known as 2,3,3,3-tetrafluoro-prop-1-ene (CAS No. 754–12–1). HFO-1234yf is acceptable for complete heavy-duty vans. Complete heavy-duty vans are not altered by a secondary or tertiary manufacturer. Consistent with EPA's Significant New Use Rule for HFO-1234yf under the Toxic Substances Control Act, commercial users or consumers can only recharge MVAC systems with HFO-1234yf where the original charging of the system with HFO-1234yf was done by the original equipment manufacturer.
Motor vehicle air conditioning (newly manufactured nonroad agricultural tractors with greater than 40 horsepower).	HFO-1234yf	Acceptable subject to use conditions.	As of June 3, 2022: (1) Systems must adhere to all of the safety requirements of SAE J639,[47] including requirements for a flammable refrigerant warning label, high-pressure compressor cutoff switch and pressure relief devices, and unique fittings. For connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844.[67] For connections with small refrigerant cans for consumer or professional use, use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844. (2) Manufacturers must conduct Failure Mode and Effect Analysis (FMEA) as provided in SAE J1739.[57] Manufacturers must keep the FMEA on file for at least three years from the date of creation.	Additional training for service technicians recommended. HFO-1234yf is also known as 2,3,3,3-tetrafluoro-prop-1-ene (CAS No. 754–12–1). Consistent with EPA's Significant New Use Rule for HFO-1234yf under the Toxic Substances Control Act, commercial users or consumers can only recharge MVAC systems with HFO-1234yf where the original charging of the system with HFO-1234yf was done by the original equipment manufacturer.
Motor vehicle air conditioning (newly manufactured nonroad self-propelled agricultural machinery).	HFO-1234yf	Acceptable subject to use conditions.	As of June 3, 2022: (1) HFO-1234yf MVAC systems must adhere to all of the safety requirements of SAE J639,[47] including requirements for a flammable refrigerant warning label, high-pressure compressor cutoff switch and pressure relief devices, and unique fittings. For connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844[67] For connections with small refrigerant cans for consumer or professional use, use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844. (2) Manufacturers must conduct Failure Mode and Effect Analysis (FMEA) as provided in SAE J1739.[57] Manufacturers must keep the FMEA on file for at least three years from the date of creation.	Additional training for service technicians recommended. HFO-1234yf is also known as 2,3,3,3-tetrafluoro-prop-1-ene (CAS No. 754–12–1). Consistent with EPA's Significant New Use Rule for HFO-1234yf under the Toxic Substances Control Act commercial users or consumers can only recharge MVAC systems with HFO-1234yf where the original charging of the system with HFO-1234yf was done by the original equipment manufacturer.

APPENDIX B TO SUBPART G OF PART 82—SUBSTITUTES SUBJECT TO USE RESTRICTIONS AND UNACCEPTABLE SUBSTITUTES REFRIGERANTS—ACCEPTABLE SUBJECT TO USE CONDITIONS—Continued

Application	Substitute	Decision	Conditions	Comments
Motor vehicle air conditioning (newly manufactured nonroad compact equipment).	HFO-1234yf	Acceptable subject to use conditions.	As of June 3, 2022: (1) HFO-1234yf MVAC systems must adhere to all of the safety requirements of SAE J639,[4 7] including requirements for a flammable refrigerant warning label, high-pressure compressor cutoff switch and pressure relief devices, and unique fittings. For connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844.[6 7] For connections with small refrigerant cans for consumer or professional use, use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844). (2) Manufacturers must conduct Failure Mode and Effect Analysis (FMEA) as provided in SAE J1739.[5 7] Manufacturers must keep the FMEA on file for at least three years from the date of creation.	Additional training for service technicians recommended. HFO-1234yf is also known as 2,3,3,3-tetrafluoro-prop-1-ene (CAS No. 754–12–1). Consistent with EPA's Significant New Use Rule for HFO-1234yf under the Toxic Substances Control Act (80 FR 37166, June 30, 2015), commercial users or consumers can only recharge MVAC systems with HFO-1234yf where the original charging of the system with HFO-1234yf was done by the original equipment manufacturer.
Motor vehicle air conditioning (newly manufactured nonroad construction, forestry, and mining equipment).	HFO-1234yf	Acceptable subject to use conditions.	As of June 3, 2022: (1) HFO-1234yf MVAC systems must adhere to all of the safety requirements of SAE J639,[4 7] including requirements for a flammable refrigerant warning label, high-pressure compressor cutoff switch and pressure relief devices, and unique fittings. For connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844.[6 7] For connections with small refrigerant cans for consumer or professional use, use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844. (2) Manufacturers must conduct Failure Mode and Effect Analysis (FMEA) as provided in SAE J1739.[5 7] Manufacturers must keep the FMEA on file for at least three years from the date of creation.	Additional training for service technicians recommended. HFO-1234yf is also known as 2,3,3,3-tetrafluoro-prop-1-ene (CAS No. 754–12–1). Consistent with EPA's Significant New Use Rule for HFO-1234yf under the Toxic Substances Control Act, commercial users or consumers can only recharge MVAC systems with HFO-1234yf where the original charging of the system with HFO-1234yf was done by the original equipment manufacturer.
Motor vehicle air conditioning (newly manufactured nonroad commercial utility vehicles).	HFO-1234yf	Acceptable subject to use conditions.	As of June 3, 2022: (1) HFO-1234yf MVAC systems must adhere to all of the safety requirements of SAE J639,[4 7] including requirements for a flammable refrigerant warning label, high-pressure compressor cutoff switch and pressure relief devices, and unique fittings. For connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844.[6 7] For connections with small refrigerant cans for consumer or professional use, use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844. (2) Manufacturers must conduct Failure Mode and Effect Analysis (FMEA) as provided in SAE J1739.[5 7] Manufacturers must keep the FMEA on file for at least three years from the date of creation.	Additional training for service technicians recommended. HFO-1234yf is also known as 2,3,3,3-tetrafluoro-prop-1-ene (CAS No. 754–12–1). Consistent with EPA's Significant New Use Rule for HFO-1234yf under the Toxic Substances Control Act, commercial users or consumers can only recharge MVAC systems with HFO-1234yf where the original charging of the system with HFO-1234yf was done by the original equipment manufacturer.

[4] SAE, J639 NOV2020, Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems, Revised November 2020.

[5] SAE, J1739 JAN2021, Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA–MSR, and Process FMEA, Revised January 2021.

[6] SAE, J2844 JAN2013, R–1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems, Revised January 2013.

[7] The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. It is available for inspection at the EPA and at the National Archives and Records Administration (NARA). Contact EPA at: U.S. EPA's Air and Radiation Docket; EPA West Building, Room 3334, 1301 Constitution Ave. NW, Washington DC, 202–566–1742. For information on the availability of this material at NARA, email *fr.inspection@nara.gov,* or go to: *www.archives.gov/federal-register/cfr/ibr-locations.html.* Available from SAE International (SAE): SAE Customer Service, 400 Commonwealth Drive, Warrendale, PA 15096–0001; 1–877–606–7323 in the United States or 724–776–4970 outside the United States or in Canada; website: *https://www.sae.org/standards.*

* * * * *

[FR Doc. 2022–08923 Filed 5–3–22; 8:45 am]

BILLING CODE 6560–50–P