

**ENVIRONMENTAL PROTECTION AGENCY****40 CFR Part 15****[EPA-HQ-OAR-2010-0605; FRL-9480-4]****RIN 2060-AQ38****Air Quality: Revision to Definition of Volatile Organic Compounds—Exclusion of trans-1,3,3,3-tetrafluoropropene and 2,3,3,3-tetrafluoropropene****AGENCY:** Environmental Protection Agency (EPA).**ACTION:** Proposed rule.

**SUMMARY:** The EPA is proposing to revise the agency's definition of volatile organic compounds (VOCs) for purposes of preparing state implementation plans (SIPs) to attain the national ambient air quality standards (NAAQS) for ozone under Title I of the Clean Air Act (CAA). This proposed revision would add 2,3,3,3-tetrafluoropropene (also known as HFO-1234yf) and trans-1,3,3,3-tetrafluoropropene (also known as HFO-1234ze) to the list of compounds excluded from the definition of VOC on the basis that these compounds make a negligible contribution to tropospheric ozone formation.

**DATES:** Comments must be received on or before November 16, 2011.

**Public Hearing:** If anyone contacts us requesting to speak at a public hearing on or before November 1, 2011, we will hold a public hearing. Additional information about the hearing would be published in a subsequent **Federal Register** notice.

**ADDRESSES:** Submit your comments, identified by Docket ID No. EPA-HQ-OAR-2010-0605, by one of the following methods:

- *http://www.regulations.gov.* Follow the on-line instructions for submitting comments.
- *E-mail: a-and-r-Docket@epamail.epa.gov*, Attention Docket ID No. EPA-HQ-OAR-2010-0605.

- *Fax:* 202-566-1541, Attention Docket ID No. EPA-HQ-OAR-2010-0605.

- *Mail:* Docket ID No. EPA-HQ-OAR-2010-0605, Environmental Protection Agency, Mailcode: 6102T, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

- *Hand Delivery:* EPA Docket Center, U.S. Environmental Protection Agency, 1301 Constitution Avenue, NW., Room: 3334, Mail Code: 6102T, Washington, DC 20460, Attention Docket ID No. EPA-HQ-OAR-2010-0605. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

**Instructions:** Direct your comments to Docket ID No. EPA-HQ-OAR-2010-0605. The EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *http://www.regulations.gov*, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through *http://www.regulations.gov*, or e-mail. The *http://www.regulations.gov* Web site is an "anonymous access" system, which means the EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to the EPA without going through *http://www.regulations.gov*, your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, the EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD-ROM you submit. If the EPA cannot read your comment due to technical difficulties and cannot contact

you for clarification, the EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses. For additional information about the EPA's public docket, visit the EPA Docket Center homepage at *http://www.epa.gov/epahome/dockets.htm*.

**Docket:** All documents in the docket are listed in the *http://www.regulations.gov* index. Although listed in the index, some information is not publicly available, i.e., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *http://www.regulations.gov* or in hard copy at the EPA, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave., NW., Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the EPA Docket is (202) 566-1742.

**FOR FURTHER INFORMATION CONTACT:** David Sanders, Office of Air Quality Planning and Standards, Air Quality Policy Division, Mail Code C539-01, Research Triangle Park, NC 27711; telephone: (919) 541-3356; fax number: (919) 541-0824; e-mail address: *sanders.dave@epa.gov*.

**SUPPLEMENTARY INFORMATION:****I. General Information****A. Does this action apply to me?**

Entities potentially affected by this proposed rule include, but are not necessarily limited to, states (typically state air pollution control agencies) that control VOCs, and industries involved in the manufacture or use of refrigerants, aerosol propellants, and blowing agents for insulating foams.

Industry group	SIC <sup>a</sup>	NAICS <sup>b</sup>
Refrigerants .....	2869, 3585 .....	238220, 336111, 336391.
Aerosol propellants .....	2869 .....	325998.
Blowing agents .....	2869, 3086 .....	326140, 326150.

<sup>a</sup> Standard Industrial Classification.

<sup>b</sup> North American Industry Classification System.

This proposed rule is applicable to all manufacturers, distributors, and users of these chemical compounds. The use of these compounds is subject to

restrictions under the CAA and the Toxic Substances Control Act (TSCA). Specifically, the use of these compounds as aerosol propellants,

blowing agents, or refrigerants, or any other use in which they would substitute for chlorofluorocarbons, hydrochlorofluorocarbons, or their

substitutes, is subject to restrictions under the Significant New Alternatives Policy (SNAP) program (CAA § 612; 40 CFR 82 subpart G). The SNAP program has issued a final approval for HFO-1234yf as a substitute for use in the motor vehicle air conditioning end-use as a replacement for ozone depleting substances (76 FR 17488, March 29, 2011), and final approvals for HFO-1234ze as a suitable foam and refrigerant substitute and as a propellant (74 FR 50129, September 30, 2009; 75 FR 34017, June 16, 2010). Furthermore, HFO-1234yf is subject to a Significant New Use Rule (SNUR) under TSCA. (75 FR 65987, October 27, 2010). The implications of these other regulations are discussed in more detail in Section III.

#### *B. What should I consider as I prepare my comments for the EPA?*

**Submitting CBI:** Do not submit this information to the EPA through <http://www.regulations.gov> or e-mail. Clearly mark the part or all of the information that you claim to be CBI. For CBI information in a disk or CD-ROM that you mail to the EPA, mark the outside of the disk or CD-ROM as CBI and then identify electronically within the disk or CD-ROM the specific information that is claimed as CBI. In addition to one complete version of the comment that includes information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket. Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR part 2.

#### *C. How can I find information about a possible public hearing?*

**Public Hearing:** To request a public hearing or information pertaining to a public hearing on this document, contact Ms. Pamela S. Long, Air Quality Policy Division, Mail code C504-01, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, telephone (919) 541-0641, facsimile number (919) 541-5509, e-mail address: [long.pam@epa.gov](mailto:long.pam@epa.gov).

#### *D. How is this preamble organized?*

The information presented in this preamble is organized as follows:

##### I. General Information

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- C. How can I find information about a possible public hearing?
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## II. Background

Tropospheric ozone, commonly known as smog, is formed when VOCs and nitrogen oxides (NO<sub>x</sub>) react in the atmosphere in the presence of sunlight. Because of the harmful health effects of ozone, the EPA and state governments limit the amount of VOCs that can be released into the atmosphere. The VOCs are those organic compounds of carbon which form ozone through atmospheric photochemical reactions. Different VOCs have different levels of reactivity—that is, they do not react to form ozone at the same speed or do not form ozone to the same extent. Some VOCs react slowly, or form less ozone; therefore, changes in their emissions have limited effects on local or regional ozone pollution episodes. It has been the EPA's policy that organic compounds with a negligible level of reactivity should be excluded from the regulatory definition of VOC so as to focus VOC control efforts on compounds that do significantly increase ozone concentrations. The EPA also believes that exempting such compounds creates an incentive for industry to use negligibly reactive compounds in place of more highly reactive compounds that are regulated as VOCs. The EPA lists these negligibly reactive compounds in its regulations (at 40 CFR 51.100(s)) and excludes them from the definition of VOC.

The CAA requires the regulation of VOCs for various purposes. Section 302(s) of the CAA specifies that the EPA

has the authority to define the meaning of "VOC," and hence what compounds shall be treated as VOCs for regulatory purposes. The policy of excluding negligibly reactive compounds from the VOC definition was first laid out in the "Recommended Policy on Control of Volatile Organic Compounds" (42 FR 35314, July 8, 1977) and was supplemented most recently with the "Interim Guidance on Control of Volatile Organic Compounds in Ozone State Implementation Plans" (Interim Guidance) (70 FR 54046, September 13, 2005). The EPA uses the reactivity of ethane as the threshold for determining whether a compound has negligible reactivity. Compounds that are less reactive than, or equally reactive to, ethane under certain assumed conditions may be deemed negligibly reactive and therefore suitable for exemption from the regulatory definition of VOC. Compounds that are more reactive than ethane continue to be considered VOCs for regulatory purposes and therefore subject to control requirements. The selection of ethane as the threshold compound was based on a series of smog chamber experiments that underlay the 1977 policy.

The EPA has used three different metrics to compare the reactivity of a specific compound to that of ethane: (i) the reaction rate constant (known as  $k_{OH}$ ) with the hydroxyl radical (OH); (ii) the maximum incremental reactivities (MIR) of ethane and the compound in question expressed on a reactivity per unit mass basis; and (iii) the MIR of ethane and the compound in question expressed on a reactivity per mole basis. Differences between these three metrics are discussed below.

The  $k_{OH}$  is the reaction rate constant of the compound with the OH radical in the air. This reaction is typically the first step in a series of chemical reactions by which a compound breaks down in the air and participates in the ozone-forming process. If this step is slow, the compound will likely not form ozone at a very fast rate. The  $k_{OH}$  values have long been used by the EPA as a measure of photochemical reactivity and ozone-forming activity, and they have been the basis for most of the EPA's previous exemptions of negligibly reactive compounds from the regulatory definition of VOC. The  $k_{OH}$  metric is inherently a molar comparison, *i.e.*, it measures the rate at which molecules react.

The MIR values, both by mole and by mass, are a more recently developed measure of photochemical reactivity derived from a computer-based photochemical model. This

measurement considers the complete ozone forming activity of a compound, not merely the first reaction step.

Further explanation of the MIR metric can be found in: W. P. L. Carter, "Development of Ozone Reactivity Scales for Volatile Organic Compositions," Journal of the Air & Waste Management Association, Vol. 44, 881–899, July 1994.

The MIR values for compounds are typically expressed as grams of ozone formed per gram of VOC (mass basis), but may also be expressed as grams of ozone formed per mole of VOC (molar basis). For comparing the reactivities of two compounds, using the molar MIR values considers an equal number of molecules of the two compounds. Alternatively, using the mass MIR values compares an equal mass of the two compounds, which will involve different numbers of molecules, depending on the relative molecular weights. The molar MIR comparison is consistent with the original smog chamber experiments that underlie the original selection of ethane as the threshold compound and compared equal molar concentrations of individual VOCs. It is also consistent with previous reactivity determinations based on inherently molar  $k_{OH}$  values. By contrast, the mass MIR comparison is more consistent with how MIR values and other reactivity metrics have been applied in reactivity-based emission limits, such as the national VOC emissions standards for aerosol coatings (73 FR 15604). Many other VOC regulations contain limits based upon a weight of VOC per volume of product, such as the EPA's regulations for limiting VOC emissions from architectural and industrial maintenance coatings (65 FR 7736). However, the fact that regulations are structured to measure VOC content by weight for ease of implementation and enforcement does not necessarily control whether VOC exemption decisions should be made on a weight basis as well.

The choice of the molar basis versus the mass basis for the ethane comparison can be significant. Given the relatively low molecular weight of ethane, use of the mass basis tends to result in more VOCs being classified as "negligibly reactive" than in the case of the molar basis. In some cases, a compound might be considered less reactive than ethane and eligible for VOC exemption under the mass basis but not under the molar basis. The compounds considered in this proposal, HFO–1234yf and HFO–1234ze, fall into this category, where the molar MIR value is greater than that of ethane, but

the mass MIR value is equal to or less than that of ethane. However, for both compounds, both MIR values fall in the lower portion of the very wide range of VOC reactivities.

The EPA has considered the choice between a molar or mass basis for the comparison to ethane in past rulemakings and guidance. Most recently, in the Interim Guidance, the EPA stated:

[A] comparison to ethane on a mass basis strikes the right balance between a threshold that is low enough to capture compounds that significantly affect ozone concentrations and a threshold that is high enough to exempt some compounds that may usefully substitute for more highly reactive compounds.

When reviewing compounds that have been suggested for VOC-exempt status, EPA will continue to compare them to ethane using  $k_{OH}$  expressed on a molar basis and MIR values expressed on a mass basis.

In this action, the EPA is proposing to exempt these compounds using the comparison to ethane on the mass basis MIR value, because MIR values are available for these compounds and the EPA believes that this comparison is appropriate.

The EPA's 2005 Interim Guidance also notes that concerns have sometimes been raised about the potential impact of a VOC exemption on environmental endpoints other than ozone concentrations, including fine particle formation, air toxics exposures, stratospheric ozone depletion, and climate change. The EPA has recognized, however, that there are existing regulatory and non-regulatory programs that are specifically designed to address these issues, and the agency continues to believe that the impacts of VOC exemptions on environmental endpoints other than ozone formation will be adequately addressed by these programs. The VOC exemption policy is intended to facilitate attainment of the ozone NAAQS, and questions have been raised as to whether the agency has authority to use its VOC exemption policy to address concerns that are unrelated to ground-level ozone. Thus, in general, VOC exemption decisions will continue to be based solely on consideration of a compound's contribution to ozone formation. However, if the agency determines that a particular VOC exemption is likely to result in a significant increase in the use of a compound and that the increased use would pose a significant risk to human health or the environment that would not be addressed adequately by existing programs or policies, the EPA reserves the right to exercise its

judgment in deciding whether to grant an exemption.

In this case, the agency has examined available information on the risks to human health and the environment and applicability of other regulatory programs; that information for the two compounds considered here is discussed further in Section III.

#### *A. Petition to List HFO–1234yf*

Honeywell, Inc. submitted a petition to the EPA on June 29, 2009, requesting that HFO–1234yf (CAS 754–12–1) be exempted from VOC control based on its low reactivity relative to ethane. The petitioner indicated that HFO–1234yf may be used as a refrigerant for refrigeration and air-conditioning. Honeywell also indicated that it expects HFO–1234yf to be widely used as a replacement for HFC–134a in motor vehicle air-conditioners (MVAC), and that HFO–1234yf has been specifically developed for this purpose. Honeywell argues that as a replacement for use in motor vehicle air conditioners there will be an environmental advantage in that the global warming potential (GWP) of HFO–1234yf is 4, which is substantially lower than the GWP for HFC–134a (100-year GWP = 1430) which HFO–1234yf is designed to replace. Honeywell submitted several documents, including several peer-reviewed journal articles, to support this petition that have been added to the docket for this action.

#### *B. Petition to List HFO–1234ze*

Honeywell, Inc. also submitted a petition to the EPA on December 2, 2009, requesting that HFO–1234ze (CAS 29118–24–9) be exempted from VOC control based on its low reactivity relative to ethane. The petitioner indicated that HFO–1234ze may be used in a variety of applications including as a refrigerant, an aerosol propellant, and a blowing agent for insulating foam. Honeywell submitted several documents, including several peer-reviewed journal articles, to support its petition, all of which have been added to the docket for this action.

### **III. The EPA's Proposed Responses to the Petitions**

Consistent with the Interim Guidance, the EPA's proposed responses to the petitions are based on a consideration of the contribution that each chemical makes to tropospheric ozone formation based on a comparison of reactivity metrics, and our assessment that existing programs or policies already adequately address the possibility that granting each petition would pose a significant risk to human health or the environment. We also believe that the

much lower global warming potential of HFO-1234yf compared to the compound HFC-134a for which it will substitute, as described in Section III.B, is an additional reason to approve the HFO-1234yf petition in particular, given that applying the Interim

Guidance itself supports such approval. Information on these topics is given below.

#### A. Contribution to Tropospheric Ozone

Table 1 presents three reactivity metrics for ethane (the benchmark

compound) and for HFO-1234yf and HFO-1234ze which are proposed for exemption from the VOC definition in this proposed rule.

TABLE 1—REACTIVITIES OF ETHANE, HFO-1234ZE AND HFO-1234YF

Compound	$k_{OH}$ (cm <sup>3</sup> /molecule-sec)	MIR (g O <sub>3</sub> /mole VOC)	MIR (g O <sub>3</sub> /gram VOC)
Ethane .....	$2.4 \times 10^{-13}$ .....	8.4	0.28
HFO-1234yf .....	$10.5 \times 10^{-13}$ .....	31.92	0.28
HFO-1234ze .....	$9.25 \times 10^{-13}$ .....	11.2	0.098

#### Notes:

1.  $k_{OH}$  value for ethane is from: R. Atkinson, D. L. Baulch, R. A. Cox, J. N. Crowley, R. F. Hampson, Jr., R. G. Hynes, M. E. Jenkin, J. A. Kerr, M. J. Rossi, and J. Troe (2004), Summary of evaluated kinetic and photochemical data for atmospheric chemistry.

2.  $k_{OH}$  value for HFO-1234ze is from: R. Sondergaard, O. J. Nielsen, M. D. Hurley, T. J. Wallington, and R. Singh, "Atmospheric chemistry of *trans*-CF<sub>3</sub>CH=CHF: kinetics of the gas-phase reactions with Cl atoms, OH radicals, and O<sub>3</sub>," Chemical Physics Letters, 443 (2007) 199–204.

3.  $k_{OH}$  value for HFO-1234yf is from: O.J. Nielson, M.S. Javadi, M.P. Sulbaek Anderson, M.D. Hurley, T.J. Wallington, R. Singh, "Atmospheric Chemistry of CF<sub>3</sub>CF=CH<sub>2</sub>: kinetics and mechanisms of gas-phase reactions with Cl atoms, OH Radicals, and O<sub>3</sub>," Chemical Physical Letters, 439 (2007) 18–22.

4. Maximum incremental reactivity or MIR (g O<sub>3</sub>/g VOC) values of ethane, HFO-1234ze and HFO-1234yf are from: William P. L. Carter, "Development of the SAPRC-07 chemical mechanism and updated ozone reactivity scales" (updated 1/27/10). <http://www.engr.ucr.edu/carter/SAPRC/saprc07.pdf>.

5. Molar MIR (g O<sub>3</sub>/mole VOC) values were calculated from the mass MIR (g O<sub>3</sub>/g VOC) values by determining the number of moles per gram of the relevant organic compound.

From the data in Table 1, it can be seen that HFO-1234yf has a higher  $k_{OH}$  value than ethane, meaning that it initially reacts more quickly in the atmosphere than ethane. A molecule of HFO-1234yf is also more reactive than a molecule of ethane, as shown by the molar MIR (g O<sub>3</sub>/mole VOC) values, because equal numbers of moles have equal numbers of molecules. However, a gram of HFO-1234yf has the same reactivity as a gram of ethane. This is because HFO-1234yf has a molecular weight (114) that is more than three times that of ethane (molecular weight 30), and thus requires less than a third the number of molecules of HFO-1234yf per gram than the number of molecules of ethane per gram.

From the data in Table 1, it also can be seen that HFO-1234ze has a higher  $k_{OH}$  value than ethane, meaning that it initially reacts more quickly in the atmosphere than ethane. A molecule of HFO-1234ze is also more reactive than a molecule of ethane, as shown by the molar MIR (g O<sub>3</sub>/mole VOC) values, since equal numbers of moles have equal numbers of molecules. However, a gram of HFO-1234ze is less reactive, or creates less ozone on the day of its emission to the atmosphere, than a gram of ethane. This is because HFO-1234ze has a molecular weight (114) that is more than three times that of ethane (molecular weight 30), and thus requires less than a third the number of molecules of HFO-1234ze per gram than the number of molecules of ethane needed per gram.

Thus, for both of the petitions submitted by Honeywell, the data supports the contention that the reactivity of the compound in the petition is equal to or lower than that of ethane on a mass MIR basis.

We anticipate that one of these compounds, HFO-1234yf, will be used in automobiles as a replacement for the current refrigerant HFC-134a, which is the only use for which HFO-1234yf has been approved to date under the SNAP program. Given this one-for-one substitution situation, it is informative to compare the ozone forming potential of HFO-1234yf to that of HFC-134a, which has a gram MIR of only 0.0007 and thus contributes very little to ozone formation. The EPA has considered the results of a recent peer-reviewed study of the increase in ozone that may occur as result of the substitution of HFO-1234yf for HFC-134a.<sup>1</sup> Based on air quality modeling, this study found that if HFO-1234yf was used in all automobiles but not in any other application, the incremental amount of ozone formed from its degradation in the atmosphere was only 0.01% of total ozone formed during the simulation due to emissions from all sources. This portion of ozone formation due to automobiles is slightly more than the current baseline, where the refrigerant

used is HCF-134a.<sup>2</sup> Thus, the additional information from this study shows that, under the assumptions used in the air quality modeling, the use of HFO-1234yf would produce more ozone than continued use of HFC-134a, but the increase is unlikely to have a significant impact on local air quality. One of the assumptions used in the modeling was that the substitution of one refrigerant for the other would not affect meteorological conditions that also influence ozone formation.

However, as stated in Section II.A, HFO-1234yf has a much lower GWP than HFC-134a. Global warming is predicted to exacerbate high ozone concentrations<sup>3,4</sup>, so directionally the lower GWP of HFO-1234yf will offset at least some of the ozone increase predicted by the modeling that assumed identical meteorological conditions. The EPA believes the very small increase in ozone concentrations that may result from encouraging the use of HFO-1234yf via an exemption from the

<sup>2</sup> The study also noted that if 2,3,3,3-tetrafluoropropene were used in additional applications that are currently not legal in the U.S., e.g., non-vehicle refrigerant applications, its contribution to ozone formation would be greater, but did not quantify this potential contribution.

<sup>3</sup> U.S. EPA. *Assessment of the Impacts of Global Change on Regional U.S. Air Quality: A Synthesis of Climate Change Impacts on Ground-Level Ozone* (An Interim Report of the U.S. EPA Global Change Research Program). U.S. Environmental Protection Agency, Washington, D.C., EPA/600/R-07/094F, 2009.

<sup>4</sup> Jacob, Daniel J. and Darrell A. Winner (2009). Effect of climate change on air quality. *Atmospheric Environment*, 43:51–63.

<sup>1</sup> D. Luecken, R. Waterland, S. Papasavva, K. Taddonio, W. Hutzell, J. Rugh, and S. Andersen. Ozone and TFA Impacts in North America from Degradation of 2,3,3,3-Tetrafluoropropene (HFO-1234yf). A Potential Greenhouse Gas Replacement. *Environ. Sci. Technol.* 44, pp. 343–349.

definition of VOC does not constitute a sufficient reason to depart from the Interim Guidance's reliance on MIR comparisons to ethane as the basis for approving VOC exemption requests.

In summary, for both HFO-1234yf and HFO-1234ze, the EPA believes that these chemicals qualify as negligibly reactive with respect to their contribution to tropospheric ozone formation.

#### *B. Likelihood of Risk to Human Health or the Environment*

Additionally, we examined and present available information on the likelihood of risk to human health or the environment from increased use of the chemicals considered here. We believe that current regulation of these compounds under other EPA programs adequately protects human health and the environment.

The only currently known or potential uses for the chemicals being considered here are as substitutes for stratospheric ozone-depleting substances (ODS), and any such use is regulated under the SNAP program. Under SNAP, the EPA reviews all new substitutes for ODS and allows their use in specific applications where the overall risks to human health and the environment associated with their use are comparable to or less than those of other compounds used in the same manner.

After reviewing available information and public comments regarding its safety, health, and environmental risks and benefits under the SNAP program, the EPA issued a final approval on March 29, 2011 (76 FR 174888) for HFO-1234yf as an acceptable ODS substitute for use in MVAC, subject to specific use conditions, in place of CFC-12 and HFC-134a.<sup>5</sup> The use conditions in the SNAP approval have the effect of making it illegal to use HFO-1234yf in the air conditioning systems of heavy-duty trucks, refrigerated transport, or off-road vehicles such as agricultural or construction equipment. The use restrictions also have the effect of making use of the compound other than by manufacturers of automobiles and light-duty trucks or by commercial automotive service centers either illegal or highly unlikely.<sup>6</sup>

<sup>5</sup> HFC-134a, which is not an ozone depleting substance, has already largely replaced CFC-12 in motor vehicle air conditioners.

<sup>6</sup> While use by vehicle owners is not illegal, the SNAP conditions prevent the sale of HFO-1234yf in containers of the size that would be attractive to individual vehicle owners, and also include requirements for special connecting equipment for the large containers that are legal for sale. In addition, as described later in this notice, under a recent Significant New Use Rule anyone planning

In the SNAP review, the EPA found that the use of HFO-1234yf in new passenger vehicle and light-duty truck MVAC systems, subject to the use conditions, does not present a significantly greater risk to human health and the environment compared to the currently approved MVAC alternatives. In summary, the EPA's SNAP review reached the following conclusions in support of this finding.

- Substituting HFO-1234yf for HFC-134a is environmentally beneficial from a climate change perspective as the global warming potential of HFO-1234yf is much lower (100 year GWP of 4 for HFO-1234yf vs. 100 year GWP of 1430 for HFC-134a). The EPA received a petition on May 7, 2010, (with a follow up petition on November 16, 2010) from the Natural Resources Defense Council, the Institute for Governance & Sustainable Development, and the Environmental Investigation Agency (a non-governmental organization) asking the EPA to remove HFC-134a from the list of acceptable substitutes under the SNAP program for use in motor vehicle air conditioners. The petitioners cited this difference in GWP as a reason for the EPA to approve their request.

- The use conditions of the final SNAP approval for HFO-1234yf provide protection against potential safety hazards related to the flammability of the compound, including potential exposure to hydrogen fluoride arising from thermal decomposition during a fire.

- Like HFC-134a, HFO-1234yf is not an ODS, so the substitution of the latter for the former will not affect stratospheric ozone concentrations.

- HFO-1234yf will not create significant impacts on ground level ozone or on local air quality.<sup>7</sup>

- The production of trifluoroacetic acid from the atmospheric degradation of HFO-1234yf does not pose a significant risk of aquatic toxicity or ecosystem impacts.

- When used in accordance with the SNAP use restrictions, HFO-1234yf does not result in significantly greater risks to human health than the use of other available or potentially available substitutes.

The EPA conclusion in the final SNAP action regarding human health risks of HFO-1234yf was based on an

to distribute HFO-1234yf for use by a consumer would be required to notify the EPA before doing so.

<sup>7</sup> In support of this conclusion, the final SNAP rule preamble cited two air quality modeling studies in addition to Luecken *et al.* These studies focused on air quality in Los Angeles, as a worst case scenario.

extensive risk assessment and review of public comments. The EPA also noted that under the TSCA, the EPA had recently performed a pre-manufacture review for HFO-1234yf and adopted the SNUR (75 FR 65987, Oct. 27, 2010). The SNUR for HFO-1234yf requires reporting of additional information to the EPA before sale may begin for uses beyond air conditioning in new automobiles or commercial servicing of new automobiles built using HFO-1234yf, *i.e.*, the EPA must be given 90-days notice before HFO-1234yf products can be sold directly to consumers for the purpose of servicing, maintenance, and disposal. During these 90 days, the EPA can take further action to stop that marketing. This precautionary step was taken because of certain animal data indicating toxicity, and the possibility that home mechanics might accidentally expose themselves. Auto plant workers and repair shop professionals were expected to avoid exposure through work practices.<sup>8</sup>

Under the SNUR, the agency will: (a) Receive a Significant New Use Notice, or SNUN, of any person's intent to manufacture, import, or process HFO-1234yf for sale directly to consumers; (b) have an opportunity to review and evaluate data submitted with the SNUN; and (c) be able to regulate HFO-1234yf consumer products, if warranted. Any other potential applications beyond air conditioning in new automobiles or commercial servicing of new automobiles built using HFO-1234yf that may lead to significant exposures will also trigger the requirement for a SNUN, and would likely trigger further review under SNAP. The EPA believes these processes will provide adequate opportunity to address any health effects issues associated with possible increased use of HFO-1234yf.

The EPA's SNAP program has also issued determinations of acceptability for HFO-1234ze as an acceptable substitute for certain ODS in a number of foam blowing end uses, as a refrigerant in non-mechanical heat transfer, and as a propellant as stated in Section I. In this action, the EPA noted that HFO-1234ze is not ozone

<sup>8</sup> The EPA considered the results of developmental testing available at the time of the final SNUR action to be of some concern, but not a sufficient basis to find HFO-1234yf unacceptable under the SNUR determination. As a result, The EPA requested additional toxicity testing and issued the SNUR for HFO-1234yf. The EPA has received and is presently reviewing the results of the additional toxicity testing. The EPA continues to believe that HFO-1234yf, when used in new automobile air conditioning systems in accordance with the use conditions under the SNAP rule, does not result in significantly greater risks to human health than the use of other available substitutes.

depleting, the GWP for HFO-1234ze is significantly lower than the GWPs for the ozone-depleting substances it will replace, HFO-1234ze is not flammable, and the toxicity risks of HFO-1234ze are low. For these reasons, the EPA found that HFO-1234ze will not pose a greater overall risk to human health and the environment than the other substitutes acceptable in these end uses.

#### C. Conclusions

In summary, for both HFO-1234yf and HFO-1234ze, the EPA believes that (a) these chemicals qualify as negligibly reactive with respect to their contribution to tropospheric ozone formation, and (b) any non-tropospheric ozone related risks associated with potential increased use are adequately addressed by other existing programs and policies. We also believe that the much lower global warming potential of HFO-1234yf compared to the compound HFC-134a for which it will substitute, as described in Section III.B, is an additional reason to approve the HFO-1234yf petition in particular, given that applying the Interim Guidance itself supports such approval. We invite the public to submit comments and additional information relevant to the issue of these compounds' overall risks and benefits to human health and the environment, and on whether such information should be considered in connection with the decision to grant an exemption from the regulatory definition of VOC.

#### IV. Proposed Action

The EPA is responding to the petitions by proposing to revise its definition of VOC at 40 CFR 51.100(s) to add HFO-1234yf and HFO-1234ze to the list of compounds that are exempt from the regulatory definition of VOC because they are negligibly reactive on the basis that they are less reactive than ethane on a mass MIR basis. If an entity uses or produces any of these two compounds and is subject to the EPA regulations limiting the use of VOC in a product, limiting the VOC emissions from a facility, or otherwise controlling the use of VOC for purposes related to attaining the ozone NAAQS, then these two compounds will not be counted as a VOC in determining whether these regulatory obligations have been met. This action may also affect whether any of these two compounds are considered as VOCs for state regulatory purposes to reduce ozone formation, if a state relies on the EPA's definition of VOC. States are not obligated to exclude from control as a VOC those compounds that the EPA has found to be negligibly reactive. However, if this action is made

final, states may not take credit for controlling these compounds in their ozone control strategies.

#### V. Statutory and Executive Order Reviews

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

Under Executive Order (EO) 12866 (58 FR 51735, October 4, 1993), this action is treated as a significant regulatory action because some may view it as raising novel legal or policy issues arising out of legal mandates. Accordingly, the EPA submitted this action to the Office of Management and Budget (OMB) for review under EO 12866 and 13563 (76 FR 3821, January 21, 2011) and any changes made in response to OMB recommendations have been documented in the docket for this action.

##### B. Paperwork Reduction Act

This action does not impose an information collection burden under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* Burden is defined at 5 CFR 1320.3(b). It does not contain any recordkeeping or reporting requirement.

##### C. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the proposed rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions. For purposes of assessing the impacts of this notice on small entities, small entity is defined as: (1) A small business that is a small industrial entity as defined in the U.S. Small Business Administration (SBA) size standards. (See 13 CFR 121.); (2) A governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) A small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of this proposed rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities.

This proposed rule will not impose any requirements on small entities.

We continue to be interested in the potential impacts of the proposed rule on small entities and welcome comments on issues related to such impacts.

##### D. Unfunded Mandates Reform Act

This action contains no Federal mandates under the provisions of Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), 2 U.S.C. 1531–1538 for state, local, or Tribal governments or the private sector. The action imposes no enforceable duty on any state, local or Tribal governments, or the private sector. Therefore, this action is not subject to the requirements of sections 202 and 205 of the UMRA.

This action is also not subject to the requirements of section 203 of UMRA because it contains no regulatory requirements that might significantly or uniquely affect small governments.

##### 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, as specified in Executive Order 13132. This action addresses the exemption of a set of chemical compounds from the VOC definition. Thus, Executive Order 13132 does not apply to this rule. In the spirit of Executive Order 13132, and consistent with the EPA policy to promote communications between the EPA and state and local governments, the EPA specifically solicits comment on this proposed rule from state and local officials.

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

This action does not have Tribal implications, as specified in Executive Order 13175 (65 FR 67249, November 9, 2000). 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 rule.

Although Executive Order 13175 does not apply to this proposed rule, the EPA specifically solicits additional comment on this proposed rule from Tribal officials.

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

This action is not subject to EO 13045 (62 FR 19885, April 23, 1997) because it is not economically significant as defined in EO 12866. While this proposed rule is not subject to the Executive Order, the EPA has reason to believe that ozone has a disproportionate effect on active children who play outdoors (62 FR 38856; 38859, July 18, 1997). The EPA has not identified any specific studies on whether or to what extent these chemical compounds may affect children's health. The EPA has placed the available data regarding the health effects of HFO-1234yf in Docket No. EPA-HQ-OAR-2003-0032 which is the docket for the SNUR for this compound.

The public is invited to submit comments or identify peer-reviewed studies and data, of which the EPA may not be aware, that assess results of early life exposure to the chemical compounds herein.

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

This action is not a "significant energy action" as defined in Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use" (66 FR 28355, May 22, 2001) because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. This action proposes to revise the EPA's definition of VOCs for purposes of preparing SIPs to attain the NAAQS for ozone under title I of the CAA.

*I. National Technology Transfer and Advancement Act*

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 ("NTTAA"), Public Law 104-113, section 12(d), (15 U.S.C. 272 note) directs the EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs the EPA to provide Congress, through OMB, explanations when the agency decides not to use available and applicable voluntary consensus standards. This rulemaking does not involve technical standards. Therefore,

the EPA is not considering the use of any voluntary consensus standards.

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

Executive Order (EO) 12898 (59 FR 7629, Feb. 16, 1994) establishes Federal executive policy on environmental justice. Its main provision directs Federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States.

The EPA has determined that this proposed rule will not have disproportionately high and adverse human health or environmental effects on minority or low-income populations because it will not affect the level of protection provided to human health or the environment.

**List of Subjects in 40 CFR Part 51**

Environmental protection, Administrative practice and procedure, Air pollution control, Ozone, Reporting and recordkeeping requirements, Volatile organic compounds.

Dated: October 11, 2011.

**Lisa P. Jackson,**  
Administrator.

For reasons set forth in the preamble, part 51 of chapter I of title 40 of the Code of Federal Regulations is proposed to be amended as follows:

**PART 51—REQUIREMENTS FOR PREPARATION, ADOPTION, AND SUBMITTAL OF IMPLEMENTATION PLANS**

1. The authority citation for Part 51, Subpart F, continues to read as follows:

**Authority:** 42 U.S.C. 7401, 7411, 7412, 7413, 7414, 7470-7479, 7501-7508, 7601, and 7602.

**§ 51.100 [Amended]**

2. Section 51.100 is amended at the end of paragraph (s)(1) introductory text by removing the words "and perfluorocarbon compounds which fall into these classes:" and adding in their place a semi-colon and the words "trans-1,3,3,3-tetrafluoropropene; 2,3,3,3-tetrafluoropropene and perfluorocarbon compounds which fall into these classes:".

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**ENVIRONMENTAL PROTECTION AGENCY**

**40 CFR Part 52**

[EPA-R06-OAR-2007-0314; FRL-9479-9]

**Approval and Promulgation of Implementation Plans; Oklahoma; Interstate Transport of Pollution**

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Proposed rule.

**SUMMARY:** EPA is proposing to take action on portions of State Implementation Plan (SIP) revisions submitted by the State of Oklahoma to address Clean Air Act requirements that prohibit air emissions which will contribute significantly to nonattainment in, or interfere with maintenance by, any other State for the 1997 8-hour ozone National Ambient Air Quality Standards (NAAQS or standards), the 1997 fine particulate matter (PM<sub>2.5</sub>) NAAQS and the 2006 24-hour PM<sub>2.5</sub> NAAQS. EPA is basing these proposed actions on the final determinations concluded within the Cross State Air Pollution Rule (CSAPR or Transport Rule) and proposed determination within the Supplemental Notice of Proposed Rulemaking (SNPR). EPA is proposing to disapprove, or in the alternative, approve the portion of the submittal demonstrating Oklahoma does not interfere with maintenance of the ozone NAAQS in other states. EPA intends to finalize approval or disapproval based on its final determination for the SNPR regarding Oklahoma for the ozone NAAQS. EPA is also proposing to approve the portion of the submittal demonstrating Oklahoma does not contribute significantly to nonattainment of the ozone NAAQS in other states. Finally, EPA is proposing to approve the portions of the submittals addressing Oklahoma's impacts for the PM<sub>2.5</sub> NAAQS in other states. This action is being taken under section 110 of the CAA.

**DATES:** Written comments must be received on or before November 16, 2011.

**ADDRESSES:** Submit your comments, identified by Docket No. EPA-R06-OAR-2007-0314, by one of the following methods:

- *Federal e-Rulemaking Portal:*  
<http://www.regulations.gov>.
- Follow the online instructions for submitting comments.
- *E-mail:* Mr. Guy Donaldson at [donaldson.guy@epa.gov](mailto:donaldson.guy@epa.gov). Please also send a copy by e-mail to the person listed in the **FOR FURTHER INFORMATION CONTACT** section below.