

**SACRAMENTO METROPOLITAN
AIR QUALITY MANAGEMENT DISTRICT**

STAFF REPORT

**PROPOSED AMENDMENTS TO:
RULE 101 – GENERAL PROVISIONS AND DEFINITIONS**

**Proposed Amendments
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RULE JUSTIFICATION

Health Effects

Ground level ozone is a secondary pollutant formed from photochemical reactions of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight. Ozone is a strong irritant that adversely affects human health and damages crops and other environmental resources. As documented by the U.S. Environmental Protection Agency (EPA) in the most recent science assessment for ozone¹, both short-term and long-term exposure to ozone can irritate and damage the human respiratory system, resulting in:

- increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing;
- decreased lung function;
- aggravated asthma;
- development of chronic bronchitis;
- irregular heartbeat;
- nonfatal heart attacks,
- premature death in people with heart or lung disease; and
- increased risk of cardiovascular and cerebrovascular events in post-menopausal women.

Introduction

The Sacramento Metropolitan Air Quality Management District (District) is the agency with primary responsibility for achieving and maintaining clean air standards in Sacramento County. The District is within the Sacramento Federal Ozone Nonattainment Area (SFNA), which is currently designated as nonattainment for the 1979 1-hour and 1997, 2008, and 2015 8-hour ozone National Ambient Air Quality Standards (NAAQS). In addition, the District is designated as nonattainment for the California ozone standard.

Since VOCs are a precursor to ozone, one of the strategies to control ozone pollution is to reduce VOC emissions from existing stationary sources by establishing more stringent VOC emission limits. One method for complying with low VOC emission limits is to use organic compounds with negligible reactivity for ozone formation, also known as exempt compounds.

Purpose of Amendments

Amendments to Rule 101 are being proposed for three reasons 1) to conform to the Federal Nonattainment New Source Review requirements as described later in this statement of reasons 2) to add compounds to the exempt compound list and 3) to expand the provision for disclosure of data to account for information being made available to the public online.

Federal Nonattainment New Source Review Issues

The Clean Air Act requires all ozone nonattainment areas to have a program that implements nonattainment new source review (NNSR). The NNSR requirements for the 2015 8-hour ozone NAAQS of 70 parts per billion are included in the U.S. Environmental Protection agency (EPA)

¹ "Integrated Science Assessment (ISA) for Ozone and Related Photochemical Oxidants", U.S. EPA, April 2020.

“Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements²”. A nonattainment area must submit or revise its NNSR plan to meet the requirements specified in 40 CFR 51.165. Alternatively, if a nonattainment area has a previously approved NNSR plan in force for a previous 8-hour or 1-hour ozone standard covering all portions of the nonattainment area for the 2015 8-hour ozone standard, the existing plan may be sufficient to meet the NNSR requirements for the 2015 ozone standard.

On August 26, 2021, the District’s Board of Director’s adopted a certification stating the District’s existing NNSR plan, consisting of EPA-approved Rule 214 – Federal New Source Review and Rule 217 – Public Notice Requirements for Permits, meets the NNSR requirements of the 2015 ozone NAAQS.

EPA has not yet acted on the District’s NNSR certification. However, in conversations with EPA, they have indicated that the District’s certification isn’t approvable because the emissions offset requirements of Rule 214 do not fully satisfy the federal emissions offset requirements for VOCs under 40 CFR 51.165(a)(3)(ii).

Emission reduction credits (ERCs) are generated by sources that reduce air pollution below mandated levels through enforceable and quantifiable means, usually by shutting down or reducing operations. These sources may apply for ERCs under Rule 204 – Emission Reduction Credits and, if all requirements are met, are granted ERCs. The ERCs may subsequently be used by sources as emissions offsets under Rule 214.

VOCs are compounds containing at least one atom of carbon, but “exempt” compounds, which have been determined to have negligible ozone-forming reactivity are excluded. The federal list of exempt compounds is contained in 40 CFR 51.100(s). EPA continues to add compounds to this list as new reactivity test results become available.

District regulations rely on the definition of Exempt Compound in Section 204 of Rule 101 – General Provisions and Definitions. The District’s list of exempt compounds does not include all those on the federal list; some compounds with the potential for adverse health and environmental effects have not been added to the District’s list. Many District prohibitory rules limit the amount of VOC emissions from various operations. Because exempt compounds are used as a means of complying with VOC limits, adding an exempt compound to the District’s list has the potential to increase its use.

When the District grants ERCs for VOC under Rule 204, no credits are issued for reduction in the emissions of organic compounds on the District’s exempt compound list. However, because of the differences in the federal and District exempt compound lists, it is possible that the District could grant ERCs for compounds that are considered VOCs under District rules but are exempt compounds under federal regulations. In conversations with EPA, they have stated that the possibility of a source offsetting emissions using VOC ERCs that were issued for federally exempt compounds will prevent EPA from approving the District’s NNSR certification.

Staff is proposing to amend Rule 101 to add a provision stating that, for the purposes of Rule 204 – Emission Reduction Credits only, exempt compounds will be those listed in 40 CFR 51.100(s).

² 83 FR 62998, December 6, 2018.

Disclosure of Data Available Online

The current provision for disclosure of data requires that the District give “due notice” to the source before making information available to the public and other government agencies. The information in the current provision includes “air pollution data” and data required under the Air Toxics “Hot Spots” Information and Assessment Act. Staff recognizes that “air pollution data” is a broad term and includes a range of items such as permit information, emissions data, and source tests.

The District plans to launch a new database system that will include several features for sources to submit and check the status of permit applications, pay permit fees, and submit emission inventory data. In addition, state regulations for Reporting of Criteria Air Pollutant and Toxic Air Contaminants (CTR) requires the District to report annual emissions data from sources and the data is submitted to the California Air Resources Board (CARB) and will be accessible on the District and other websites. Requiring notice to the source unnecessarily impedes and complicates that process. Consequently, Staff is proposing to amend the provision of “Disclosure of Data” to eliminate the notice requirement when the source is required by laws or regulations to submit the information at issue to the District.

Additional VOC-Exempt Compounds Added By EPA

Different organic compounds have different levels of reactivity for forming ground level ozone. EPA has a policy to exempt organic compounds from the definition of VOC if the compounds have negligible levels of reactivity. Exempting compounds helps states and districts focus their efforts on compounds that significantly affect ozone concentrations, and creates an incentive for industry to use negligibly reactive compounds in place of more highly reactive compounds that are regulated as VOC.

EPA uses credible, peer-reviewed information in its review of VOC exemption petitions. The reactivity of a candidate compound is compared to the reactivity levels of ethane. Compounds with reactivity levels less than or equal to the reactivity levels of ethane are deemed negligibly reactive and exempted from the federal definition of VOC. EPA uses three methods to determine if a compound is negligibly reactive³. These are based on:

- 1) The reaction rate constant of hydroxyl radical (known as K_{oh}) in the air. This reaction is the first step in a series of chemical reactions in the formation of ozone. If this reaction is slow (smaller K_{oh} value), then the compound will not likely form ozone at a fast rate.
- 2) The maximum incremental reactivity (MIR) expressed either on a reactivity per gram basis (grams of ozone formed per gram of VOC) or
- 3) on a reactivity per mole basis (grams of ozone formed per mole of VOC). The MIR methods consider the activities from all steps in the ozone formation process from a specific organic compound as opposed to just the first step of the chemical reaction.

Since Rule 101 was last amended on October 27, 2011, EPA has revised the federal definition of volatile organic compound (VOC) in 40 CFR 51.100(s) several times to include an additional eleven exempt compounds that negligibly contribute to the formation of ozone. Staff periodically

³ Interim Guidance on Control of Volatile Organic Compounds in Ozone State Implementation Plans, 2005, US Environmental Protection Agency, Document # 05-18015 (70 FR 54046). <https://www.govinfo.gov/content/pkg/FR-2005-09-13/pdf/05-18015.pdf>

reviews new compounds that EPA has added to the federal list of exempt compounds and, if appropriate, adds them to the list of exempt compounds in Rule 101. In doing so, the District considers a number of factors, including potential uses, impacts on human health, and environmental concerns.

Table 1 lists the eleven compounds that EPA has added to their exempt list and compares the reactivity levels of each compound to that of ethane.

Table 1: Compounds Exempted by EPA Since Last Revision of Rule 101

Federal Register Reference	EPA Exempt Compound	K_{oh}	MIR (mole basis)	MIR (mass basis)	100-yr Global Warming Potential (GWP)
	Ethane	2.40 x 10⁻¹³	8.12	0.27	5.5
88 FR 8226	(2E)-1,1,1,4,4,4-hexafluorobut-2-ene (HFO-1336mzz(E))	1.72 x 10 ⁻¹³	1.8	0.011	16
83 FR 61127	cis-1,1,1,4,4,4-hexafluorobut-2-ene (HFO-1336mzz-Z)	4.91 x 10 ⁻¹³	6.6	0.04	9
81 FR 50330	1,1,2,2-tetrafluoro-1-(2,2,2-trifluoroethoxy) ethane (HFE-347pcf2)	9.16 x 10 ⁻¹⁵	0.14 - 0.26	0.0007 - 0.0013	889
79 FR 17037	2-amino-2-methyl-1-propanol (AMP)	2.8 x 10 ⁻¹¹	22.25	0.25	<1
78 FR 62451	2,3,3,3- tetrafluoropropene (HFO-1234yf)	9.16 x 10 ⁻¹⁵	ND	0.28	4
78 FR 53029	trans-1-chloro-3,3,3-trifluoropropene (HFO-1233zd)	4.4 x 10 ⁻¹³	5.22	0.04	4.7-7
77 FR 37610	trans-1,3,3,3-tetrafluoropropene (HFO-1234ze)	9.28 x 10 ⁻¹³	11.2	0.098	<1
78 FR 9823	HCF ₂ OCF ₂ H (HFE-134)	2.3 x 10 ⁻¹⁵	ND	ND	6320
78 FR 9823	HCF ₂ OCF ₂ OCF ₂ H (HFE-236cal2)	2.4 x 10 ⁻¹⁵	ND	ND	2800
78 FR 9823	HCF ₂ OCF ₂ CF ₂ OCF ₂ H (HFE-338ppc13)	4.7 x 10 ⁻¹⁵	ND	ND	1500
78 FR 9823	HCF ₂ OCF ₂ OCF ₂ CF ₂ OCF ₂ H (H-Galden 1040X or H-Galden ZT 130 (or 150 or 180)	4.6 x 10 ⁻¹⁵	ND	ND	1870

ND = Not Determined

Each compound is discussed in detail below:

cis-1,1,1,4,4,4-hexafluorobut-2-ene (HFO-1336mzz-Z)

On November 16, 2018, EPA exempted this compound from the federal definition of VOC because the MIRs of HFO-1336mzz-Z are less than the MIRs of ethane on both a mass and mole basis and therefore considered negligibly reactive. HFO-1336mzz-Z may be used as a refrigerant or foam-blowing agent⁴. HFO-1336mzz-Z is classified as a hydrofluoroolefin (HFO). The data in Table 1 show that HFO-1336mzz-Z has a higher k_{OH} value than ethane; however, studies cited within EPA's final rule exempting this compound⁵ conclude that the resulting unsaturated fluorinated compounds in the atmosphere are short lived and do not contribute to O₃ formation. In general, HFOs, are more reactive in the atmosphere with the OH radical, which results in shorter lifetimes than chlorofluorocarbons (CFCs). Under Section 612(c) of the Clean Air Act (CAA), EPA is required to identify and publish lists of acceptable and unacceptable substitutes for class I and class II ozone-depleting substances, which is one reason EPA's Significant New Alternatives Policy (SNAP) program has identified HFOs as possible substitutes for chlorofluorocarbons (CFCs). HFO-1336mzz-Z has an ozone depletion potential (ODP) of zero, and an estimated 100-year global warming potential (GWP) of 9. This is a much lower GWP value than hydrochlorofluorocarbons (HCFCs) and CFCs. A comparison of HFE-1336mzz-Z with the compounds it may replace is summarized in Table 2.

Table 2: Comparison of HFO-1336mzz-Z with compounds it may replace.

Compound	GWP (100-yr) ^a	ODP ^b	8-hour Exposure Guideline ^c
cis-1,1,1,4,4,4-hexafluorobut-2-ene (HFO-1336mzz-Z)	9	0	500ppm
HFC-4310mee	1650	0	225ppm
HFC-365mfc	804	0	500ppm
CFC-11	4460	1	1000ppm
CFC-113	5820	0.85	1000ppm ^d

- 100-yr GWP values found on Federal Register notice or adapted from the IPCC Fifth Assessment Report, 2014 (AR5)
- Ozone Depletion Potential (ODP) for alternative substitutes are listed under EPA's SNAP program: <https://www.epa.gov/snap/snap-substitutes-sector>. ODP for Class I and Class II ozone depleting substances (e.g. CFCs and HCFCs) listed on EPA website: [Ozone-Depleting Substances | US EPA](https://www.epa.gov/ozone-depleting-substances)
- Occupational Alliance for Risk Science (OARS-WEELs): <https://tera.org/OARS/#reservations>
- Centers for Disease Control and Prevention – DHHS (NIOSH) Publication Number 89-109

As noted by EPA, there are potential health effects from inhalation of HFO-1336mzz-Z; however, it is not expected to be carcinogenic or mutagenic⁶. EPA anticipates that HFO-1336mzz-Z will be used consistent with the recommendations and safety precautions listed in the material safety data sheet provided to EPA by the petitioner.

Staff is proposing to exempt HFO-1336mzz-Z from the District's definition of VOC because, in addition to being negligibly reactive, this compound is not expected to have an adverse impact on human health or the environment. If used as an alternative to other compounds that can be used for the same purposes, HFO-1336mzz-Z may help mitigate to stratospheric ozone depletion and global warming.

⁴ 83 FR 61127, November 28, 2018

⁵ *Ibid.*

⁶ 83 FR 61127, November 28, 2018

1,1,2,2-tetrafluoro-1-(2,2,2-trifluoroethoxy) ethane (HFE-347pcf2)

On July 20, 2016, EPA exempted this compound from the federal definition of VOC because the MIRs, on both the mass and mole basis, and the K_{OH} value of HFE- 347pcf2 are less than the MIRs and K_{OH} value of ethane. HFE-347pcf2 may be used as a precision cleaning agent to remove contaminants from medical devices, electronic components, and aerospace items⁷. The SNAP program found HFE-347pcf2 has an ODP of zero, and therefore is listed as an acceptable substitute in electronics and precision cleaning and as an aerosol solvent. HFE-347pcf2 has an estimated GWP of 889, which is lower than some of the substitutes listed as acceptable in similar end uses but higher than some other substitutes such as HFE-7100. A comparison of HFE-347pcf2 and the compounds it may replace are summarized in Table 3.

Table 3: Comparison of HFE-347pcf2 with compounds it may replace.

Compound	GWP (100-yr) ^a	ODP ^b	8-hour Exposure Guideline ^c
1,1,2,2-Tetrafluoro-1-(2,2,2-trifluoroethoxy) ethane (HFE-347pcf2)	889	0	50ppm
HFC-4310mee	1650	0	200ppm
HFC-365mfc	804	0	500ppm
HFE-7100	421	0	600ppm ^d

- 100-year GWP values found on Federal Register notice or adapted from the IPCC Fifth Assessment Report, 2014 (AR5)
- Ozone Depletion Potential (ODP) for alternative substitutes are listed under EPA's SNAP program: <https://www.epa.gov/snap/snap-substitutes-sector>. ODP for Class I and Class II ozone depleting substances (e.g. CFCs and HCFCs) listed on EPA website: [Ozone-Depleting Substances | US EPA](https://www.epa.gov/ozone-depleting-substances)
- Occupational Alliance for Risk Science (OARS-WEELS): <https://tera.org/OARS/#reservations>
- 61 FR 47016, September 5, 1996

As noted by EPA, HFE-347pcf2 is toxic by inhalation with mortality observed at levels of 2000 ppm and above.⁸ Potential health effects at lower concentrations include coughing, dizziness, headache, and drowsiness. HFE-347pcf2 is not commonly used outside of industrial settings, and other compounds in the same industrial uses have similar health and environmental risks. It is mostly replacing chemicals with higher GWP and the SNAP program will continue to evaluate its acceptability as an alternative in electronics and precision cleaning.⁹ EPA does not expect significant use of HFE-347pcf2 in applications not covered by the SNAP program. However, the Significant New Use Rule (SNUR) in place under the Toxic Substances Control Act (TSCA)¹⁰ requires that any significant new use of the chemical be reported to EPA using a Significant New Use Notice (SNUN).¹¹ The required notification will give EPA the opportunity to evaluate the intended end use and to prohibit or limit that activity, if necessary, before it occurs. Staff does not expect a significant increase in health risks from the use of this compound.

Staff is proposing to exempt HFE-347pcf2 from the District's definition of VOC because, in addition to being negligibly reactive, this compound is not expected to have increased adverse

⁷ 81 FR 50330, August 01, 2016

⁸ 81 FR 50330, August 01, 2016

⁹ *Ibid.*

¹⁰ *Ibid.*

¹¹ *Ibid.*

impacts on health or the environment over other available substitutes. If used as an alternative to other compounds for the same purposes, HFE-347pcf2 may help mitigate stratospheric ozone depletion and global warming.

2-amino-2-methyl-1-propanol (AMP)

On March 21, 2014, EPA exempted this compound from the federal definition of VOC because the mass-based MIR is less than ethane. AMP may be used in a variety of applications, including in the manufacture or use of pigments in water-based coatings, as an additive in metalworking fluids, in food contact paper, as a neutralizer in personal care products, and as an intermediate in chemical synthesis¹². As shown in Table 1, AMP has a larger k_{OH} value than ethane, meaning that it initially reacts more quickly in the atmosphere than ethane. However, the early reactivity of AMP is short lived because the reaction pathway is terminated by the formation of nitramine, that is assumed to be inert.¹³ AMP has an ODP of 0 and is estimated to have a GWP of less than one. According to the reference material provided to EPA from the petitioner, AMP has low toxicity, is not considered carcinogenic or mutagenic and has no irritation or skin sensitization¹⁴. AMP is a reasonably strong base and forms salts with acids, which means very little AMP will evaporate and will be available for atmospheric reaction. Therefore, exposure levels are expected to be minimal due to its low volatility at room temperature.¹⁵

As noted by EPA, AMP has not been evaluated under the SNAP program and is not listed as a substitute for class I or class II ozone-depleting chemicals. However, AMP's performance as a multifunctional neutralizer combined with its reduced ozone potential and favorable toxicity data makes this product a preferred one compared to more toxic chemicals used for the same purpose.¹⁶

Staff is proposing to exempt AMP from the District's definition of VOC because, in addition to being negligibly reactive, this compound is not expected to have an adverse impact on human health or the environment. If used as an alternative to other compounds for the same purposes, AMP may help mitigate stratospheric ozone depletion and global warming.

2,3,3,3- tetrafluoropropene (HFO-1234yf)

On October 22, 2013, EPA exempted this compound from the federal definition of VOC because the k_{OH} value of HFO-1234yf was less than the k_{OH} value of ethane. The MIR of HFO-1234yf is also equal to the MIR of ethane on a mass basis, which is considered negligibly reactive.¹⁷ HFO-1234yf may be used as an aerosol propellant, blowing agent, or refrigerant. HFO-1234yf has an ODP of 0 and is estimated to have a GWP of 4. In EPA's SNAP program, HFO-1234yf has been identified as a possible substitute for CFCs and HCFCs; however, this compound has only been approved as an acceptable substitute for the motor vehicle air conditioning (MVAC) end-use¹⁸. The GWP of HFO-1234yf is substantially lower than the GWP for HFC-134a, a compound it replaces. The comparison results of replacement compounds with HFO-1234yf are summarized in Table 4.

¹² 79 FR 17037, March 27, 2014

¹³ *Ibid.*

¹⁴ *Ibid.*

¹⁵ *Ibid.*

¹⁶ *Ibid.*

¹⁷ 78 FR 62451, October 22, 2013

¹⁸ 76 FR 17488, March 29, 2011

Table 4: Comparison of HFO-1234yf with compounds it may replace

Compound	GWP (100-yr) ^a	ODP ^b	8-hour Exposure Guideline
2,3,3,3-tetrafluoropropene (HFO-1234yf)	4	0	500ppm ^c
HFC-134a	1300	0	1000ppm ^c
HFC-152a	138	0	1000ppm ^d
CFC-12	10200	1	1000ppm ^d

- 100-year GWP values found on Federal Register notice or adapted from the IPCC Fifth Assessment Report, 2014 (AR5)
- Ozone Depletion Potential (ODP) for alternative substitutes are listed under EPA's SNAP program: <https://www.epa.gov/snap/snap-substitutes-sector>. ODP for Class I and Class II ozone depleting substances (e.g. CFCs and HCFCs) listed on EPA website: [Ozone-Depleting Substances | US EPA](https://www.epa.gov/ozone-depleting-substances)
- Occupational Alliance for Risk Science (OARS-WEELS): <https://tera.org/OARS/#reservations>
- 71 FR 55140, September 21, 2006

Data provided to EPA by the petitioner indicates that HFO-1234yf is low toxicity and is not considered carcinogenic or mutagenic. In the SNAP review of HFO-1234yf, EPA found that use of this chemical in currently allowed applications pose a lower or comparable overall risk to human health and the environment than other acceptable options¹⁹. EPA's confidence that the SNAP program and the requirements under TSCA²⁰ will prevent the use of this chemical in any additional applications where such use would pose a significant risk to human health or the environment²¹.

Staff is proposing to exempt HFO-1234yf from the District's definition of VOC because, in addition to being negligibly reactive, this compound would not have an adverse impact on human health or the environment. If used as an alternative to other compounds for MVAC, HFO-1234yf may help mitigate stratospheric ozone depletion and global warming.

trans-1-chloro-3,3,3-trifluoropropene (HFO-1233zd(E) or Solstice™1233zd(E))

On May 16, 2013, EPA exempted this compound from the federal definition of VOC because both the mass and molar based MIRs of HFO-1233zd(E) are lower than the MIRs of ethane. HFO-1233zd(E) may be used as a refrigerant, a blowing agent, and a solvent and is classified as a hydrofluoroolefin²². HFO-1233zd(E) has an ODP of 0 and GWP between 4.7 and 7. In EPA's SNAP program, HFO-1233zd(E) has been identified as a possible substitute for CFC-11 as a refrigerant²³ and HFC-245fa as a foam blowing agent²⁴. The GWP of HFO-1233zd(E) is very low compared to CFCs it replaces, making it advantageous in helping mitigate global warming. The comparison results of replacement compounds with HFO-1233zd(E) are summarized in Table 5.

¹⁹ 76 FR 17488, March 29, 2011

²⁰ The Toxics Substances Control Act (TSCA) requires EPA to assess and prevent any unreasonable risks to human health and the environment before a new chemical substance is introduced into commerce. HFO-1234yf is subject to a reporting requirement according to a significant new use rule (SNUR) under TSCA.

²¹ 78 FR 62451, September 19, 2013

²² 78 FR 11101, February 15, 2013

²³ *Ibid.*

²⁴ 77 FR 47768, August 10, 2012.

Table 5: Comparison of HFO-1233zd(E) and the compounds it may replace.

Compound	GWP (100-yr) ^a	ODP ^b	8-hour Exposure Guideline ^c
Trans-1-chloro-3,3,3-trifluoropropene (HFO-1233zd(E))	4.7-7 ^d	0	300ppm ^d
HFC-134a	1300	0	1000ppm
HFC-245fa	858	0	350ppm
CFC-11	4660	1	1000ppm
CFC-113	5820	0.85	1000ppm

- 100-year GWP values found on Federal Register notice or adapted from the IPCC Fifth Assessment Report, 2014 (AR5)
- Ozone Depletion Potential (ODP) for alternative substitutes are listed under EPA's SNAP program: <https://www.epa.gov/snap/snap-substitutes-sector>. ODP for Class I and Class II ozone depleting substances (e.g. CFCs and HCFCs) listed on EPA website: [Ozone-Depleting Substances | US EPA](https://www.epa.gov/ozone-depleting-substances)
- Occupational Alliance for Risk Science (OARS-WEELS): <https://tera.org/OARS/#reservations>
- 77 FR 47768, August 10, 2012.

Data provided to EPA by the petitioner states that HFO-1233zd(E) is low toxicity and is not considered carcinogenic or mutagenic²⁵. Potential health effects include serious eye irritation, skin irritation, and frostbite²⁶. Additionally, EPA's SNAP program described the potential health effects of HFO-1233zd(E) as being common to many refrigerants, including many already listed as acceptable under SNAP. Thus, EPA anticipates users will be able to meet the recommended workplace exposure limits and any other safety precautions common to the refrigeration and air conditioning industry, the foam blowing industry, the solvent-based cleaning industry and when using adhesives and coatings.²⁷

Staff is proposing to exempt HFO-1233zd(E) from the District's definition of VOC because, in addition to being negligibly reactive, this compound would not have an adverse impact on human health or the environment. If used as an alternative to other compounds for the same purposes, HFO-1233zd(E) may help mitigate stratospheric ozone depletion and global warming.

trans-1,3,3,3-tetrafluoropropene (HFO-1234ze)

On July 23, 2012, EPA exempted this compound from the federal definition of VOC because the mass-based MIR of HFO-1234ze is lower than the mass-based MIR of ethane. HFO-1234ze may be used as a refrigerant, a blowing agent and an aerosol propellant²⁸. EPA's SNAP program has determined HFO-1234ze is an acceptable substitute for certain ozone depleting substances in foam blowing, as a refrigerant in non-mechanical heat transfer, and propellant, as previously mentioned²⁹. HFO-1234ze is estimated to have a GWP of less than one and an ODP of 0. The GWP of HFO-1234ze is very low compared to the CFCs and HCFCs it replaces, such as HFC-134a and HFC-152a. The comparison results of replacement compounds with HFO-1234ze are summarized in Table 6.

²⁵ Honeywell. Safety Data Sheet Solstice 1233zd (E). August 2019

²⁶ 78 FR 11101, February 15, 2013

²⁷ 78 FR 53029, August 28, 2013.

²⁸ 77 FR 37610, June 22, 2012.

²⁹ *Ibid.*

Table 6: Comparison HFO-1234ze and the compounds it may replace.

Compound	GWP (100-yr) ^a	ODP ^b	8-hour Exposure Guideline ^c
Trans-1,3,3,3-tetrafluoropropene (HFO-1234ze)	<1	0	800ppm
HFC-134a	1300	0	1000ppm
HFC-152a	138	0	1000ppm ^d

- 100-year GWP values found on Federal Register notice or adapted from the IPCC Fifth Assessment Report, 2014 (AR5)
- Ozone Depletion Potential (ODP) for alternative substitutes are listed under EPA's SNAP program: <https://www.epa.gov/snap/snap-substitutes-sector>. ODP for Class I and Class II ozone depleting substances (e.g. CFCs and HCFCs) listed on EPA website: [Ozone-Depleting Substances | US EPA](https://www.epa.gov/ozone-depleting-substances)
- Occupational Alliance for Risk Science (OARS-WEELS): <https://tera.org/OARS/#reservations>
- 71 FR 55140 (August 21, 2006).

Data provided to EPA by the petitioner³⁰ show that HFO-1234ze is low toxicity and is not considered carcinogenic or mutagenic. EPA's SNAP program reviewed HFO-1234ze for potential risks to human health and the environment and did not find any unreasonable risks from its expected end-use.³¹

Staff is proposing to exempt HFO-1234ze from the District's definition of VOC because, in addition to being negligibly reactive, this compound would not have an adverse impact on human health or the environment. If used as an alternative to other compounds for the same purposes, HFO-1234ze may help mitigate stratospheric ozone depletion and global warming.

Four Hydrofluoropolyether (HFPEs) Compounds

- HCF2OCF2H (HFE-134)
- HCF2OCF2OCF2H (HFE-236ca12)
- HCF2OCF2CF2OCF2H (HFE-338pcc13)
- HCF2OCF2OCF2CF2OCF2H (H-Galden 1040X)

On February 12, 2013, EPA exempted these compounds from the federal definition of VOC because the k_{OH} values of HFE-134, HFE-236ca12, HFE-338pcc13, and H-Galden 1040x were less than the k_{OH} value of ethane. These four compounds are in the family of products known by the trade name H-Galden. EPA's SNAP program has evaluated the use of these four H-Galden HFPEs and found acceptable their use as fire suppressants in non-residential applications, in place of Halon 1211.³² However, the H-Galden HFPE's have not been approved as an acceptable substitute for other uses such as solvent, aerosol propellant, foam blowing, and refrigeration.³³ H-Galden HFPE's have an ODP of 0 and a GWP ranging from 1500 – 6320. The comparison results of replacement compounds with the H-Galden HFPEs are summarized in Table 7.

³⁰ Honeywell. Safety Data Sheet Solstice ZE Refrigerant. May 2016

³¹ 77 FR 37610, June 22, 2012.

³² 78 FR 9823, February 12, 2013.

³³ *Ibid.*

Table 7: Comparison of the four H-Galden HFPEs and the compounds they may replace.

Compound	GWP (100-yr) ^a	ODP ^b	8-hour Exposure Guideline ^c
HFE-134	6320	0	1163ppm
HFE-236ca12	2800	0	1163ppm
HFE-338pcc13	1500	0	1163ppm
HFE-43-10-pccc	1870	0	1163ppm
Halon 1211	1750	3	NR ^d

- 78 FR 9823 (February 12, 2013)
- Ozone Depletion Potential (ODP) for alternative substitutes are listed under EPA's SNAP program: <https://www.epa.gov/snap/snap-substitutes-sector>. ODP for Class I and Class II ozone depleting substances (e.g. CFCs and HCFCs) listed on EPA website: [Ozone-Depleting Substances | US EPA](#)
- 68 FR 4004 (January 27, 2003)
- Not Regulated – Amerex. Safety Data Sheet Halon 1211. March 2019

Reference material provided to EPA by the petitioner indicates that the four HFPEs have low toxicity, no irritation or skin sensitization, no detectible genotoxic activity, and low potential for developmental toxicity. EPA noted that the use of H Galden HFPEs was anticipated to have a smaller to comparable impact on global warming than the hydrofluorocarbons historically used in the same fire suppression application despite their relatively high GWP values.³⁴ Overall, EPA concluded the H-Galden HFPE's reduce risk compared to halon 1211, the ODS they replace.

Staff is proposing to exempt all four H-Galden HFPE's from the District's definition of VOC because, in addition to being negligibly reactive, these compounds would not have an adverse impact on human health or the environment as fire-suppressants. If used as alternatives to other compounds for the same purposes, the H-Galden compounds may help mitigate stratospheric ozone depletion and global warming.

(2E)-1,1,1,4,4,4-hexafluorobut-2-ene (HFO-1336mzz(E))

On January 31, 2023, EPA exempted this compound from the federal definition of VOC because the mass-based and molar-based MIR of HFO-1336mzz(E) are less than the MIR values of ethane on a mass and molar basis. HFO-1336mzz(E) may be used in several applications such as foam blowing, refrigeration, applications in solvents and aerosol propellants³⁵. EPA's SNAP program has listed HFO-1336mzz(E) as an acceptable substitute for a number of foam-blowing end-uses and has an ODP of zero (0).³⁶ HFO-1336mzz(E)'s GWP of about 16 is lower than that of other acceptable substitutes in the listed end-uses, such as HFC-152a with a GWP of 138.

Table 8: Comparison HFO-1336mzz(E) and the compounds it may replace.

Compound	GWP (100-yr) ^a	ODP ^b	8-hour Exposure Guideline ^c
<u>(2E)-1,1,1,4,4,4-hexafluorobut-2-ene (HFO-1336mzz(E))</u>	16	0	400ppm
HFC-134a	1300	0	1000ppm
HFC-152a	138	0	1000ppm ^d

³⁴ 78 FR 9823, February 12, 2013.

³⁵ 88 FR 8227, February 8, 2023.

³⁶ 85 FR 79863, December 11, 2020.

- a. 100-year GWP values found on Federal Register notice or adapted from the IPCC Fifth Assessment Report, 2014 (AR5)
- b. Ozone Depletion Potential (ODP) for alternative substitutes are listed under EPA's SNAP program: <https://www.epa.gov/snap/snap-substitutes-sector>. ODP for Class I and Class II ozone depleting substances (e.g. CFCs and HCFCs) listed on EPA website: [Ozone-Depleting Substances | US EPA](https://www.epa.gov/ozone-depleting-substances)
- c. Occupational Alliance for Risk Science (OARS-WEELS): <https://tera.org/OARS/#reservations>
- d. 71 FR 55140 (August 21, 2006).

Based on the screening assessments under the SNAP program, flammability and toxicity risks are comparable to or lower than flammability and toxicity risks of other available substitutes in the same end-use.³⁷ Potential health effects include skin or eye irritation or frostbite. EPA recognizes that this compound and its atmospheric breakdown product, trifluoroacetic acid (TFA), are members of the broad class of compounds known as per- and poly-fluoroalkyl substances (PFAS)³⁸. There is evidence that exposure to certain PFAS can lead to adverse human health effects; however, numerous states have developed health-based standards for various PFAS to mitigate adverse human health.³⁹ The Environmental Effects Assessment Panel for the Montreal Protocol (EEAP) has considered the production of TFA as a persistent breakdown product of HFCs and HFOs and found that exposure to current and predicted concentrations of TFA in the environment present minimal risk to human health or the environment.

Staff is proposing to exempt HFO-1336mzz(E) from the definition of VOC because, in addition to being negligibly reactive, this compound would not have an adverse impact to human health or the environment. If used as an alternative to other compounds for the same purposes, HFO-1336mzz(E) may help mitigate stratospheric ozone depletion and global warming.

Legal Mandates

Federal Mandates: As previously discussed, the Clean Air Act requires all ozone nonattainment areas to have a program that implements the NNSR requirements of 40 CFR 51.165. EPA's implementation rule for the 2015 ozone NAAQS⁴⁰ required nonattainment areas to submit or revise their NNSR plans to meet the requirements specified in 40 CFR 51.165. On August 26, 2021, the District's Board of Director's adopted a certification stating the District's existing NNSR plan, consisting of EPA-approved Rule 214 – Federal New Source Review and Rule 217 – Public Notice Requirements for Permits, meet the NNSR requirements of the 2015 ozone NAAQS.

EPA has indicated that the District's certification isn't approvable because of their concern that the emissions offset requirements of Rule 214 do not fully satisfy the federal emissions offset requirements for VOCs.

The proposed amendments to Rule 101 will meet the requirements of 40 CFR 51.165 and allow EPA to approve the District's NNSR certification.

³⁷ 85 FR 79863, December 11, 2020.

³⁸ The Office of Pollution Prevention and Toxics' (OPPT) proposed rule defined PFAS as "any chemical substance or mixture that structurally contains the unit R-(CF₂)-C(F)(R')R". Both the CF₂ and CF moieties are saturated carbons. None of the R groups (R, R' or R'') can be hydrogen." Toxic Substances Control Act Reporting and Recordkeeping Requirements for Perfluoroalkyl and Polyfluoroalkyl Substances Posted by the Environmental Protection Agency, 86 FR 33926, 33937 (proposed on June 28, 2021).

³⁹ 88 FR 8227, February 8, 2023.

⁴⁰ 83 FR 62998, December 6, 2018.

State Mandates: The District is designated “serious” nonattainment for the state ozone standard. The California Clean Air Act requires areas designated as “serious” to adopt control measures required in Section 40919 of the California Health and Safety Code (HSC).

- California HSC Section 40919 requires districts with serious nonattainment for ozone to adopt Best Available Retrofit Control Technology (BARCT) for all existing permitted sources. BARCT means an emission limitation that is based on the maximum degree of reduction achievable, considering environmental, energy, and economic impacts by each class or category of sources⁴¹.
- Transport Mitigation Emission Control Requirements: Title 17, Section 70600 of the California Code of Regulations requires that districts within the areas of origin of transported air pollutants, as identified in Section 70500(c), include sufficient emission control measures (including “all feasible measures” and BARCT) in their attainment plans for ozone to mitigate the impact of pollution sources within their jurisdictions on ozone concentrations in downwind areas commensurate with the level of contribution. An upwind district must comply with the transport mitigation planning and implementation requirements set forth in this section regardless of its attainment status, unless the upwind district complies with the requirements of Section 70601.

The proposed amendments to Rule 101 will allow manufacturers and sources more exempt compounds to use in meeting VOC limits, which may result in the development of more stringent and feasible BARCT requirements.

PROPOSED AMENDMENTS

The proposed amendments to Rule 101 are summarized below. A detailed description of the amendments to the rule is included in Appendix A.

Exempt Compounds for ERC Purposes

The proposed amendments will split the definition of Exempt Compound in Section 204 of Rule 101 into two subsections:

- Subsection 204.1 will be added to state that, for purposes of granting Emission Reduction Credits pursuant to Rule 204 – EMISSION REDUCTIONS CREDITS, an exempt compound is a compound which has been excluded from the definition of Volatile Organic Compounds pursuant to 40 CFR 51.100(s). The effect of this change is that the excluded compounds listed in 40 CFR 50.100(s) cannot be banked as ERCs or otherwise used as offsets for VOCs, which will resolve the emissions offset issue identified by EPA in the District’s NNSR plan.
- The current Section 204 will be renumbered as Subsection 204.2 and state that, for all other purposes, the District’s own list of exempt compounds (current Section 204) will apply. Most notably, this will be the applicable list for compliance with VOC emissions limits in the District’s prohibitory rules. The District will continue to review new compounds added by EPA to the federal exempt compounds list before adding them to the District’s list.

⁴¹ California Health and Safety Code Section 40406,

Disclosure of Data Available Online

The proposed amendments will clarify and expand the provision for Disclosure of Data in section 302 of Rule 101 to add a new subsection:

- Subsection 302.3 will be added to state that air pollution data required by District, state, or federal requirements will be made available to the public without prior notice to the source. The effect of this change will make data more readily available when the information at issue is required by laws or regulations to be submitted by the source to the District.
- Section 302 will be revised to state that except as provided in section 302.3, the Air Pollution Control Officer shall provide reasonable notice to the source prior to making the following data and information available to the public and other government agencies. The effect of this change will provide clarification of the notice requirement.

Additional Exempt Compounds

The proposed amendments will add eleven exempt compounds that have been added to the federal list since Rule 101 was last amended:

- $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$ (H-Galden 1040x or H-Galden ZT 130 (or 150 or 180))
- trans-1,3,3,3-tetrafluoropropene (HFO-1234ze)
- trans-1-chloro-3,3,3-trifluoropropene (HFO-1233zd)
- 2,3,3,3- tetrafluoropropene (HFO-1234yf)
- 2-amino-2-methyl-1-propanol (AMP)
- 1,1,2,2-tetrafluoro-1-(2,2,2-trifluoroethoxy) ethane (HFE-347pcf2)
- cis-1,1,1,4,4,4-hexafluorobut-2-ene (HFO-1336mzz-Z)
- 1,1,1',1'-tetrafluorodimethyl ether (HFE-134)
- bis(difluoromethoxy)difluoromethane (HFE-236cal2)
- 1,2-bis(difluoromethoxy)-1,1,2,2-tetrafluoroethane (HFE-338ppc13)
- (2E)-1,1,1,4,4,4-hexafluorobut-2-ene (HFO-1336mzz(E))

SOCIOECONOMIC IMPACT ANALYSIS

The provisions of Section 40728.5 of the California Health and Safety Code require, in part, that:

"Whenever a district intends to propose the adoption, amendment, or repeal of a rule or regulation that will significantly affect air quality or emissions limitations, that agency shall, to the extent that data are available, perform an assessment of the socioeconomic impacts of the adoption, amendment, or repeal of the rule or regulation...This section does not apply to the adoption, amendment, or repeal of any rule or regulation that results in any less restrictive emissions limit if the action does not interfere with the district's adopted plan to attain ambient air quality standards, or does not result in any significant increase in emissions."

The proposed amendments to Rule 101 ensure the District does not issue ERCs for federally

exempt organic compounds, and will update the District's list of exempt compounds to include eleven compounds that were exempted by EPA. These amendments will not establish emission limitations, and because these compounds have negligible reactivity, their exemption will not significantly affect air quality or emissions limitations. The proposed amendments will not interfere with the District's adopted plan to attain the ambient air quality standards. Therefore, the provisions of Section 40728.5 of the Health and Safety Code do not apply to the proposed amendments to Rule 101, and a socioeconomic impact analysis is not required.

PUBLIC COMMENTS

Staff held a public workshop to discuss the proposed amendments to Rule 101 on July 18, 2024. A public notice for the workshop was published on the District's website and was also be sent by e-mail to interested parties, including all those who have requested to receive rulemaking notices. The draft rule and statement of reasons were available for public review at that time. Staff did not receive any comments during the notice period or during the workshop.

ENVIRONMENTAL REVIEW AND COMPLIANCE

California Public Resources Code Section 21159 requires an environmental analysis of the reasonably foreseeable methods of compliance. The proposed amendments to Rule 101 will ensure the District does not issue ERCs for federally exempt organic compounds, and will update the District's list of exempt compounds to include eleven compounds that were exempted by EPA. These amendments will not establish emission limitations, and because these compounds have negligible reactivity, their exemption will not significantly affect air quality or emissions limitations. Staff reviewed the eleven compounds and determined that the compounds have negligible or zero ozone depletion potentials. Also, each compound either has a low GWP or would be used to replace other organic compounds with higher GWPs. The proposed amendments will not cause any other significant adverse effects on the environment and will not increase emissions; therefore, Staff has concluded that no environmental impacts will be caused by the proposed amendments.

Staff finds that the proposed rule amendments are exempt from CEQA because it can be seen with certainty that there is no possibility that the activity in question may have a significant adverse effect on the environment⁴².

FINDINGS

Finding	Finding Determination
Authority: The District must find that a provision of law or of a state or federal regulation permits or requires the District to adopt, amend, or repeal the rule.	The District is authorized to adopt and amend Rule 101 by California Health and Safety Code (HSC) Sections 40001, 40702, and 41010. [HSC Section 40727(b)(2)].

⁴² State CEQA Guidelines, Section 15061(b)(3).

Finding	Finding Determination
Necessity: The District must find that the rulemaking demonstrates a need exists for the rule, or for its amendment or repeal.	The proposed amendments to Rule 101 are necessary to: 1) implement the requirements of nonattainment new source review pursuant to 40 CFR 51.165, and 2) incorporate eleven organic compounds exempted by EPA into the District's list of exempt compounds, giving manufacturers and sources more flexibility in formulating and using products with low VOC limits. [HSC Section 40727(b)(1)].
Clarity: The District must find that the rule is written or displayed so that its meaning can be easily understood by the persons directly affected by it.	Staff has reviewed the proposed rule amendments and determined that they can easily be understood by the affected parties. In addition, the record contains no evidence that the persons directly affected by the rule cannot understand it. [HSC Section 40727(b)(3)].
Consistency: The rule is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or state or federal regulations.	The proposed amendments to the rule do not conflict with and are not contradictory to existing statutes, court decisions, or state or federal regulations. [HSC Section 40727(b)(4)].
Non-Duplication: The District must find that either: 1) The rule does not impose the same requirements as an existing state or federal regulation; or (2) that the duplicative requirements are necessary or proper to execute the powers and duties granted to, and imposed upon, the District.	The proposed amendments to the rule do not duplicate any existing state or federal laws or regulations. [HSC Section 40727(b)(5)].
Reference: The District must refer to any statute, court decision, or other provision of law that the District implements, interprets, or makes specific by adopting, amending, or repealing the rule.	Health and Safety Code Sections 40001, 40702, and 41010 and 40 CFR 51.165. [HSC Section 40727(b)(6)].
Additional Informational Requirements: In complying with HSC Section 40727.2, the District must identify all federal requirements and District rules that apply to the same equipment or source type as the proposed rule or amendments.	The amendments to Rule 101 affect limitations on VOC emissions. Therefore, a written analysis of federal regulations and other District rules is not required. [HSC Section 40727.2(g)].

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APPENDIX A – SUMMARY OF PROPOSED AMENDMENTS

Rule 101 – General Provisions and Definitions

EXISTING SECTION	NEW SECTION	CHANGE
New	302.3	Added new subsection to provision for disclosure of data specifying that emissions reporting data will be made available to the public upon request.
New	204.1	Added new definition of exempt compounds specifying that, for the purposes of ERCs under Rule 204, exempt compounds are those on the federal list (40 CFR 51.100(s).)
204	204.2	Section renumbered, and added that for all other purposes, the definition in Section 204.2 applies.
204.1 – 204.55	204.2.a – 204.2.ccc	Sections renumbered.
New	204.2.ddd	Added $\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$ (H-Galden 1040x or H-Galden ZT 130 (or 150 or 180)) as an exempt compound.
New	204.2.eee	Added trans-1,3,3,3-tetrafluoropropene (HFO-1234ze) as an exempt compound.
New	204.2.fff	Added trans-1-chloro-3,3,3-trifluoropropene (HFO-1233zd) as an exempt compound.
New	204.2.ggg	Added 2,3,3,3- tetrafluoropropene (HFO-1234yf) as an exempt compound.
New	204.2.hhh	Added 2-amino-2-methyl-1-propanol (AMP) as an exempt compound.
New	204.2.iii	Added 1,1,2,2-tetrafluoro-1-(2,2,2-trifluoroethoxy) ethane (HFE-347pcf2) as an exempt compound.
New	204.2.jjj	Added cis-1,1,1,4,4,4-hexafluorobut-2-ene (HFO-1336mzz-Z)
New	204.2.kkk	Added 1,1,1',1'-tetrafluorodimethyl ether (HFE-134) as an exempt compound.
New	204.2.lll	Added bis(difluoromethoxy)difluoromethane (HFE-236cal2)
New	204.2.mmm	Added 1,2-bis(difluoromethoxy)-1,1,2,2-tetrafluoroethane (HFE-338ppc13) as an exempt compound.
New	204.2.nnn	Added (2E)-1,1,1,4,4,4-hexafluorobut-2-ene (HFO-1336mzz(E)) as an exempt compound.
204.56	204.2.ooo	Section renumbered.
204.56.a – 204.56.d	204.2.ooo.A – 204.2.ooo.D	Sections renumbered.
302	Same	Clarified that the District will provide reasonable notice to the source prior to making information described in Sections 302.1 and 302.2 available to the public and other government agencies. Added exception for information described in new Section 302.3.
302.3	New	Specified that air pollution data required by District, state, or federal requirements will be made available to the public without prior notice to the source.