



FEDERAL REGISTER

Vol. 90

Monday,

No. 215

November 10, 2025

Pages 50741–50856

OFFICE OF THE FEDERAL REGISTER



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Contents

Federal Register

Vol. 90, No. 215

Monday, November 10, 2025

Commerce Department

See National Oceanic and Atmospheric Administration

Defense Department

NOTICES

Agency Information Collection Activities; Proposals, Submissions, and Approvals, 50745
TRICARE; Calendar Year 2026 TRICARE Prime and TRICARE Select Out-Of-Pocket Expenses, 50745–50747

Defense Nuclear Facilities Safety Board

NOTICES

Senior Executive Service Performance Review Board, 50747

Environmental Protection Agency

RULES

Air Quality State Implementation Plans; Approvals and Promulgations:
Utah; Interstate Transport of Air Pollution for the 2008 8-hour Ozone National Ambient Air Quality Standard, 50742–50743

PROPOSED RULES

National Emission Standards for Hazardous Air Pollutants from Hazardous Waste Combustors:
Residual Risk and Technology Review; Withdrawal of Proposed Revisions to Standards for Periods of Malfunction, 50814–50855
Protection of Stratospheric Ozone:
Listing of Substitutes Under the Significant New Alternatives Policy Program in Refrigeration and Air Conditioning and Fire Suppression, 50766–50811

Health and Human Services Department

See Health Resources and Services Administration

Health Resources and Services Administration

NOTICES

Improving Ryan White HIV/AIDS Program Part A and B Formula Awards Using Most Recent Address Data, 50747–50750

Housing and Urban Development Department

NOTICES

Final Determination:
Adoption of Energy Efficiency Standards for New Construction of HUD- and USDA-Financed Housing; Additional Extension of HUD Compliance Dates, 50750–50751

Interior Department

See Ocean Energy Management Bureau

National Endowment for the Humanities

NOTICES

Hearings, Meetings, Proceedings, etc.:
Humanities Panel, 50760–50761
National Council on the Humanities, 50761

National Foundation on the Arts and the Humanities

See National Endowment for the Humanities

National Oceanic and Atmospheric Administration

RULES

Fisheries of the Northeastern United States:
BlueLine Tilefish Fishery; 2025 BlueLine Tilefish Commercial Quota Harvested, 50743–50744

Nuclear Waste Technical Review Board

NOTICES

Hearings, Meetings, Proceedings, etc., 50761–50762

Ocean Energy Management Bureau

NOTICES

Gulf of America OCS Oil and Gas One Big Beautiful Bill Act Lease Sale 1, 50751–50760
Proposed Notice of Sale:
Cook Inlet Outer Continental Shelf Oil and Gas One Big Beautiful Bill Act Lease Sale 1, 50760

Postal Regulatory Commission

NOTICES

New Postal Products, 50762

Postal Service

RULES

Manifest Mailing System Retired, 50741–50742

Trade Representative, Office of United States

NOTICES

Suspending Section 301 Action for One Year:
China's Targeting of the Maritime, Logistics, and Shipbuilding Sectors for Dominance, 50762–50763

Separate Parts In This Issue

Part II

Environmental Protection Agency, 50766–50811

Part III

Environmental Protection Agency, 50814–50855

Reader Aids

Consult the Reader Aids section at the end of this issue for phone numbers, online resources, finding aids, and notice of recently enacted public laws.

To subscribe to the Federal Register Table of Contents electronic mailing list, go to <https://public.govdelivery.com/accounts/USGPOOFR/subscriber/new>, enter your e-mail address, then follow the instructions to join, leave, or manage your subscription.

CFR PARTS AFFECTED IN THIS ISSUE

A cumulative list of the parts affected this month can be found in the Reader Aids section at the end of this issue.

39 CFR	
111.....	50741
40 CFR	
52.....	50742
Proposed Rules:	
63.....	50814
82.....	50766
50 CFR	
648.....	50743

Rules and Regulations

Federal Register
Vol. 90, No. 215
Monday, November 10, 2025

This section of the FEDERAL REGISTER contains regulatory documents having general applicability and legal effect, most of which are keyed to and codified in the Code of Federal Regulations, which is published under 50 titles pursuant to 44 U.S.C. 1510.

The Code of Federal Regulations is sold by the Superintendent of Documents.

POSTAL SERVICE

39 CFR Part 111

Manifest Mailing System Retired

AGENCY: Postal Service.
ACTION: Final rule.

SUMMARY: The Postal Service is amending *Mailing Standards of the United States Postal Service*, Domestic Mail Manual (DMM) subsection 703.2.0 to retire the manifest mailing system (MMS).

DATES: *Effective Date:* April 1, 2026.
FOR FURTHER INFORMATION CONTACT: James Duffy at (517) 703-4246, Geriann Wakely at (631-913-1116) or Garry Rodriguez at (202) 268-7281.

SUPPLEMENTARY INFORMATION: On September 12, 2025, the Postal Service published a notice of proposed rulemaking (90 FR 44153-44155) to retire the manifest mailing system (MMS). In response to the proposed rule, the Postal Service received one formal comment. The comment and response are as follows:

Comment: The comment was generally in agreement with retiring the manifest mailing system, however, the commenter questioned whether some smaller businesses may face challenges with the technology transition.

Response: The Postal Service has taken proactive steps to support these customers through the Intelligent Mail® for Small Business Tool (IMsb). The IMsb Tool is a free, web-based application designed specifically for small business mailers. It requires no software installation or downloads, making it accessible to businesses with limited technical resources. The tool generates unique Intelligent Mail barcodes (IMb) for use on address labels and mail pieces, and it features a simple, step-by-step interface that guides users through the process. Additional benefits include easy access via standard web browsers (e.g., Google Chrome), no need for specialized

software or technical expertise, and is a cost-effective solution for businesses with limited budgets. For further guidance, users can refer to the IMsb User Guide, located on the IMsb Tool landing page, available on PostalPro at <https://postalpro.usps.com>. This tool represents a meaningful step toward ensuring that small businesses are not left behind in the Postal Service modernization efforts.

The Postal Service is retiring the manifest mailing system, by retiring manifest mail preparation along with the hard copy documentation. The Postal Service is migrating customers to Electronic Documentation (eDoc), Full Service, Seamless, and eInduction, for Letters, Cards and Flats. Options for Package customers are USPS Ship and Click-N-Ship. Mailers of Letters, Cards, and Flats can reference Mail.dat/Mail.XML Technical Specifications posted on PostalPro. Package shippers can reference Publication 199, Publication 205, and USPS Ship documentation on PostalPro.

As a result of retiring MMS, Publication 401, *Guide to the Manifest Mailing System*, will no longer be available on PostalPro after the effective date.

Resources

- HQMailEntry (HQMailEntry@usps.gov)
- USPS Ship (uspsshipsupport@usps.gov or 1-877-264-9693, Opt. 2)
- Click N SHIP (PostalPro or 1-800-344-7779)
- Information about electronic documentation can be found on Postal Pro at <https://postalpro.usps.com/mailing/edoc>
- Publication 199, *Intelligent Mail Package Barcode (IMpb) Implementation Guide for Confirmation Services and Electronic Payment Systems*, (PostalPro)
- Guide to USPS SHIP (PostalPro)

The Postal Service adopts the described changes to *Mailing Standards of the United States Postal Service*, Domestic Mail Manual (DMM), incorporated by reference in the *Code of Federal Regulations*.

We will publish an appropriate amendment to 39 CFR part 111 to reflect these changes.

List of Subjects in 39 CFR Part 111

Administrative practice and procedure, Postal Service.

Accordingly, the Postal Service amends *Mailing Standards of the United States Postal Service*, Domestic Mail Manual (DMM), incorporated by reference in the Code of Federal Regulations as follows (see 39 CFR 111.1):

PART 111—[AMENDED]

■ 1. The authority citation for 39 CFR part 111 continues to read as follows:

Authority: 5 U.S.C. 552(a); 13 U.S.C. 301-307; 18 U.S.C. 1692-1737; 39 U.S.C. 101, 401-404, 414, 416, 3001-3018, 3201-3220, 3401-3406, 3621, 3622, 3626, 3629, 3631-3633, 3641, 3681-3685, and 5001.

■ 2. Revise *Mailing Standards of the United States Postal Service*, Domestic Mail Manual (DMM) as follows:

Mailing Standards of the United States Postal Service, Domestic Mail Manual (DMM)

* * * * *

700 Special Standards

* * * * *

705 Advanced Preparation and Special Postage Payment Systems

* * * * *

[Revise the heading and text of 2.0 to read as follows:]

2.0 Mailing Services

The Postal Service offers customers the following mailing services:

- a. *Letters (cards) and Flats:* 1. Full-Service Automation Option, see 705.23.
- 2. Seamless Acceptance Program, see 705.22.

b. *Packages:* The USPS Ship program is an electronic manifest mailing system for packages that allows mailers to document and pay postage and extra services fees by transmitting electronic files to the Postal Service without generating paper manifests, postage statements, or clearance documents. Business Acceptance Solutions, USPS Headquarters, must approve these systems. Unless authorized by Business Acceptance Solutions, mailers may not commingle USPS Ship mail with non-USPS Ship mail within the same mailing, or place USPS Ship mail and non-USPS Ship mail in or on the same mailing container. For additional

information reference PostalPro
available at <https://postalpro.usps.com>.

* * * * *

Kevin Rayburn,

Attorney, Ethics & Legal Compliance.

[FR Doc. 2025–19834 Filed 11–7–25; 8:45 am]

BILLING CODE 7710–12–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[EPA–R08–OAR–2025–0054; FRL–12595–
02–R8]

Air Plan Approval; Utah; Interstate Transport of Air Pollution for the 2008 8-Hour Ozone National Ambient Air Quality Standard

AGENCY: Environmental Protection
Agency (EPA).

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA) is approving a portion of a Utah State Implementation Plan (SIP) submission addressing interstate transport for the 2008 8-hour ozone national ambient air quality standard (NAAQS). The “interstate transport” provision requires that each state’s SIP contain adequate provisions to prohibit emissions from within the state from significantly contributing to nonattainment or interfering with maintenance of the NAAQS in other states. In this action, the EPA is only addressing the requirement prohibiting interference with maintenance, referred to as “prong 2,” for the 2008 ozone NAAQS.

DATES: This rule is effective on
December 10, 2025.

ADDRESSES: The EPA has established a docket for this action under Docket ID No. EPA–R08–OAR–2025–0054. All documents in the docket are listed on the <https://www.regulations.gov> website. Although listed in the index, some information is not publicly available, *e.g.*, Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the internet and will be publicly available only in hard copy form. Publicly available docket materials are available through <https://www.regulations.gov>, or please contact the person identified in the **FOR FURTHER INFORMATION CONTACT** section for additional availability information.

FOR FURTHER INFORMATION CONTACT:
Adam Clark, Air and Radiation

Division, EPA, Region 8, Mailcode
8ARD–IO, 1595 Wynkoop Street,
Denver, Colorado 80202–1129,
telephone number: (303) 312–7104,
email address: clark.adam@epa.gov.

SUPPLEMENTARY INFORMATION:

Throughout this document whenever “we,” “us,” or “our” is used, we mean EPA.

Table of Contents

- I. Background
- II. Response to Comments
- III. Final Action
- IV. Statutory and Executive Order Reviews

I. Background

The background for this action is discussed in detail in our June 18, 2025 proposal (90 FR 25918). In that document we proposed to approve Utah’s January 29, 2020 SIP submission as meeting the prong 2 interstate transport requirement of Clean Air Act (CAA) section 110(a)(2)(D)(i)(I) for the 2008 ozone NAAQS.

The EPA provided a 30-day review and comment period for the June 18, 2025 proposal. We received two comments. The first commenter was the Utah Division of Air Quality (UDAQ), and the second was anonymous. A summary of these comments and the EPA’s responses are provided in section II. A full copy of the comments is included in the docket for this rule.

II. Response to Comments

Comment: UDAQ expressed support for the proposal and encouraged the EPA to finalize the approval of Utah’s SIP submission as proposed.

Response: The EPA acknowledges and appreciates the comment in support of this rulemaking action.

Comment: UDAQ stated that the pathway leading to the EPA’s proposed approval has been a long and complex history of revisions and disagreements between the state of Utah and the EPA dating back to 2013. UDAQ stated that much of this history could have been avoided had the EPA worked more cooperatively with the state in approving its December 22, 2015 revision, which the commenter asserts demonstrated that the State did not significantly contribute to nonattainment or interfere with the maintenance of the 2008 ozone standard in downwind states. UDAQ asserted that this delay led to an extended period of regulatory uncertainty and risk, and that the action being driven by a court ordered consent decree¹ demonstrates the need for the EPA to work closely

with states and finalize actions more expeditiously.

Response: The EPA agrees that Utah’s interstate transport prong 2 SIP for the 2008 ozone NAAQS has a complex history. That history is discussed in the proposal and will not be restated here.² The EPA also agrees that it is important that we work closely with states and act on SIP submissions in line with the requirements of the CAA.³

Comment: UDAQ stated that the EPA’s inclusion of Utah in the Federal “Good Neighbor Plan” for the 2015 ozone NAAQS was unwarranted and erroneous.

Response: The CAA section 110(a)(2)(D)(i)(I) interstate transport actions addressing the 2015 ozone NAAQS are outside the scope of this action, which only addresses the 2008 ozone NAAQS portion of Utah’s 2020 SIP submission.

Comment: One anonymous commenter recommended the EPA not approve Utah’s air quality plan. The commenter stated that the Utah government had failed to clean the air, and that it is necessary to limit movement for the elderly and keep children indoors during periods of poor air quality.

Response: The EPA acknowledges the comment. However, the EPA does not find the comment sufficiently specific or relevant to the action we are taking today on Utah’s 2020 submission as to warrant a specific response.

III. Final Action

The EPA is approving Utah’s January 29, 2020 SIP submission as meeting the prong 2 interstate transport requirement of CAA section 110(a)(2)(D)(i)(I) for the 2008 ozone NAAQS.

IV. Statutory and Executive Order Reviews

Under the CAA, the Administrator is required to approve a SIP submission that complies with the provisions of the CAA and applicable Federal regulations. 42 U.S.C. 7410(k); 40 CFR 52.02(a). Thus, in reviewing SIP submissions, the EPA’s role is to approve state choices, provided that they meet the criteria of the CAA. Accordingly, this action merely approves state law as meeting Federal requirements and does not impose additional requirements beyond those imposed by state law. For that reason, this action:

- Is not a significant regulatory action subject to review by the Office of Management and Budget under

² 90 FR 25918 (June 18, 2025).

³ CAA section 110(k)(2).

¹ 90 FR 25920 (June 18, 2025).

Executive Order 12866 (58 FR 51735, October 4, 1993);

- Is not subject to Executive Order 14192 (90 FR 9065, February 6, 2025) because SIP actions are exempt from review under Executive Order 12866;

- Does not impose an information collection burden under the provisions of the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*);

- Is certified as not having a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*);

- Does not contain any unfunded mandate or significantly or uniquely affect small governments, as described in the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4);

- Does not have federalism implications as specified in Executive Order 13132 (64 FR 43255, August 10, 1999);

- Is not subject to Executive Order 13045 (62 FR 19885, April 23, 1997) because it approves a state program;

- Is not a significant regulatory action subject to Executive Order 13211 (66 FR 28355, May 22, 2001); and

- Is not subject to requirements of section 12(d) of the National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) because application of those requirements would be inconsistent with the CAA.

In addition, the SIP is not approved to apply on any Indian reservation land or in any other area where the EPA or an Indian Tribe has demonstrated that a Tribe has jurisdiction. In those areas of Indian country, the rule does not have Tribal implications and will not impose substantial direct costs on Tribal governments or preempt Tribal law as specified by Executive Order 13175 (65 FR 67249, November 9, 2000).

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

Under section 307(b)(1) of the CAA, petitions for judicial review of this action must be filed in the United States Court of Appeals for the appropriate circuit by January 9, 2026. Filing a petition for reconsideration by the Administrator of this final rule does not affect the finality of this action for the purposes of judicial review nor does it extend the time within which a petition for judicial review may be filed, and shall not postpone the effectiveness of such rule or action. This action may not be challenged later in proceedings to

enforce its requirements (see section 307(b)(2)).

List of Subjects in 40 CFR Part 52

Environmental protection, Air pollution control, Carbon monoxide, Incorporation by reference, Intergovernmental relations, Lead, Nitrogen dioxide, Ozone, Particulate matter, Reporting and recordkeeping requirements, Sulfur oxides, Volatile organic compounds.

Dated: October 29, 2025.

Cyrus M. Western,

Regional Administrator, Region 8.

For the reasons stated in the preamble, the Environmental Protection Agency is amending 40 CFR part 52 as follows:

PART 52—APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS

■ 1. The authority citation for part 52 continues to read as follows:

Authority: 42 U.S.C. 7401 *et seq.*

Subpart TT—Utah

■ 2. Amend § 52.2354 by adding paragraph (e) to read as follows:

§ 52.2354 Interstate transport.

* * * * *

(e) Addition to the Utah State Implementation Plan regarding the 2008 ozone Standard for CAA section 110(a)(2)(D)(i)(I) prong 2 submitted to EPA on January 29, 2020.

[FR Doc. 2025–19824 Filed 11–7–25; 8:45 am]

BILLING CODE 6560–50–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 648

[Docket No. 250623–0112; RTID 0648–XF223]

Fisheries of the Northeastern United States; Blueline Tilefish Fishery; 2025 Blueline Tilefish Commercial Quota Harvested

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Temporary rule; closure of the blueline tilefish commercial fishery.

SUMMARY: Effective at 0001 hours on November 10, 2025, Federal commercial tilefish permit holders are prohibited

from fishing for, catching, possessing, transferring or landing blueline tilefish in the Tilefish Management Unit for the remainder of the 2025 fishing year. This action is required because NMFS has projected that 100 percent of the 2025 total allowable landings will have been caught. This action is intended to prevent over-harvest of blueline tilefish for the fishing year.

DATES: Effective November 10, 2025 through December 31, 2025.

FOR FURTHER INFORMATION CONTACT:

Matthew Rigdon, Fishery Management Specialist, matthew.rigdon@noaa.gov, 978–281–9336.

SUPPLEMENTARY INFORMATION:

Regulations for the blueline tilefish fishery are at 50 CFR part 648. The regulations at § 648.295(b)(2)(ii) require that when NMFS projects that blueline tilefish catch will reach 100 percent of the total allowable landings (TAL), the Regional Administrator must close the commercial blueline tilefish fishery for the remainder of the fishing year. No vessel may retain or land blueline tilefish in or from the Tilefish Management Unit after the announced closure date. NMFS monitors the blueline tilefish fishery catch based on dealer reports, state data, and other available information. NMFS must publish a notice in the **Federal Register** notifying blueline tilefish vessel and dealer permit holders of the closure date when 100 percent of the TAL is projected to be landed.

The Regional Administrator has determined, based on dealer reports and other available information, that the blueline tilefish commercial fishery has caught 100 percent of the 2025 TAL. Effective 0001 hours, November 10, 2025, vessels may not retain or land blueline tilefish in or from the Tilefish Management Unit through December 31, 2025.

Classification

NMFS issues this action pursuant to section 305(d) of the Magnuson-Stevens Fishery Conservation and Management Act. This action is required by 50 CFR part 648, which was issued pursuant to section 304(b), and is exempt from review under Executive Order 12866.

NMFS finds good cause pursuant to 5 U.S.C. 553(b)(B) and 5 U.S.C. 553(d)(3) to waive prior notice and the opportunity for public comment and the delayed effectiveness period because it would be contrary to the public interest and impracticable. Data and other information indicating the blueline tilefish commercial fishery will have landed 100 percent of the TAL have only recently become available.

Landings data are updated by dealer reports on a weekly basis, and NMFS monitors data as catch increases toward the limit. This action is routine and formulaic. The regulations at § 648.295(b)(2)(ii) require such action to ensure that bluefin tilefish commercial vessels do not exceed the 2025 TAL. If implementation of this action is

delayed, the Annual Catch Limit for the 2025 fishing year may be exceeded, thereby undermining the conservation objectives of the Tilefish Fishery Management Plan. Also, the public had prior notice and full opportunity to comment on this process when the provisions regarding closures and the 2025 quota levels were put in place.

Authority: 16 U.S.C. 1801 *et seq.*

Dated: November 6, 2025.

Samuel D. Rauch III,

*Deputy Assistant Administrator for
Regulatory Programs, National Marine
Fisheries Service.*

[FR Doc. 2025–19837 Filed 11–7–25; 8:45 am]

BILLING CODE 3510–22–P

Notices

Federal Register
Vol. 90, No. 215
Monday, November 10, 2025

This section of the FEDERAL REGISTER contains documents other than rules or proposed rules that are applicable to the public. Notices of hearings and investigations, committee meetings, agency decisions and rulings, delegations of authority, filing of petitions and applications and agency statements of organization and functions are examples of documents appearing in this section.

DEPARTMENT OF DEFENSE

Office of the Secretary

[Docket ID: DoD-2025-OS-0375]

Submission for OMB Review; Comment Request

AGENCY: Office of the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)), Department of Defense (DoD).

ACTION: 30-Day information collection notice.

SUMMARY: The DoD has submitted to the Office of Management and Budget (OMB) for clearance the following proposal for collection of information under the provisions of the Paperwork Reduction Act.

DATES: Consideration will be given to all comments received by December 10, 2025.

ADDRESSES: Written comments and recommendations for the proposed information collection should be sent within 30 days of publication of this notice to www.reginfo.gov/public/do/PRAMain. Find this particular information collection by selecting “Currently under 30-day Review—Open for Public Comments” or by using the search function.

FOR FURTHER INFORMATION CONTACT: Reginald Lucas, (571) 372-7574,

whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil.

SUPPLEMENTARY INFORMATION:

Title; Associated Form; and OMB Number: DLA Energy Request for Customer QR Code; DLA Energy Form 2063; OMB Control Number 0704-0640.
Type of Request: Reinstatement.
Number of Respondents: 2,782.
Responses per Respondent: 1.
Annual Responses: 2,782.
Average Burden per Response: 1 hour.
Annual Burden Hours: 2,782.
Needs and Uses: Entities with a fuel purchase agreement with DLA Energy, including DoD, Federal Agencies, Federal Contractors, and Non-U.S. Government Entities, can request a Customer Quick Response (QR) code to purchase petroleum and aerospace products from DLA Energy via the DLA Form 2063, “DLA Energy Request for Customer QR Code.” DoD Manual 4140.25, “DoD Management of Energy Commodities: Sales Accountability and Documentation Management,” authorizes customers to use several forms of Authorized Purchase Source Media to buy fuel from DLA Energy. One of these methods is via Customer QR codes. DLA Energy Publication P-29, “EPoS Customer QR Codes,” implements policy, assigns responsibilities, and provides procedures for managing Customer QR codes.

Affected Public: Business or other for-profit.

Frequency: On occasion.

Respondent’s Obligation: Voluntary.
DoD Clearance Officer: Mr. Reginald Lucas.

Dated: November 6, 2025.

Aaron T. Siegel,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 2025-19833 Filed 11-7-25; 8:45 am]

BILLING CODE 6001-FR-P

DEPARTMENT OF DEFENSE

Office of the Secretary

TRICARE; Calendar Year (CY) 2026 TRICARE Prime and TRICARE Select Out-of-Pocket Expenses

AGENCY: Office of the Secretary, Department of Defense (DoD).

ACTION: Notice of CY 2026 TRICARE Prime and TRICARE Select out-of-pocket expenses.

SUMMARY: This notice provides the CY 2026 TRICARE Prime and TRICARE Select out-of-pocket expenses.

DATES: The CY 2026 rates contained in this notice are effective January 1, 2026.

ADDRESSES: Defense Health Agency (DHA), TRICARE Health Plan, 7700 Arlington Boulevard, Suite 5101, Falls Church, Virginia 22042-5101.

FOR FURTHER INFORMATION CONTACT: Debra Fisher, 703-275-6224, dha.ncr.healthcare-ops.mbx.thp-policy-and-programs-branch@health.mil.

SUPPLEMENTARY INFORMATION: The National Defense Authorization Acts for Fiscal Years 2012 and 2017, and subsequent implementing regulations (e.g., § 199.17 of Title 32 of the Code of Federal Regulations), established rates for TRICARE beneficiary out-of-pocket expenses and how they may be increased by the annual cost of living adjustment (COLA) percentage used to increase military retired pay or via budget neutrality rules. The CY 2026 retiree COLA increase is 2.8%.

The DHA has updated the CY 2026 out-of-pocket expenses as shown below:

CALENDAR YEAR 2026 TRICARE PRIME AND TRICARE SELECT OUT-OF-POCKET EXPENSES ACTIVE DUTY FAMILY MEMBERS (ADFM) CATEGORY

[Page 1 of 1]

Out of pocket expense	Select Group A CY26	Select Group B CY26	Prime* Group A CY26	Prime* Group B CY26
Annual enrollment fee:				
Individual	\$0	\$0	0	0
Family	\$0	\$0	0	0
Annual deductible:				
E1-E4, individual	\$50	\$66	0	0
E1-E4, family	\$100	\$132	0	0

CALENDAR YEAR 2026 TRICARE PRIME AND TRICARE SELECT OUT-OF-POCKET EXPENSES ACTIVE DUTY FAMILY MEMBERS (ADFM) CATEGORY—Continued

[Page 1 of 1]

Out of pocket expense	Select Group A CY26	Select Group B CY26	Prime * Group A CY26	Prime * Group B CY26
E5 & above, individual	\$150	\$198	0	0
E5 & above, family	\$300	\$397	0	0
Annual catastrophic cap	\$1,000	\$1,324	1,000	1,324
Preventive visit	\$0	\$0	0	0
Primary care	\$28 (IN); 20% (OON)	\$19 (IN); 20% (OON)	0	0
Specialty care	\$39 (IN); 20% (OON)	\$33 (IN); 20% (OON)	0	0
ER visit	\$103 (IN); 20% (OON)	\$52 (IN); 20% (OON)	0	0
Urgent care center visit	\$28 (IN); 20% (OON)	\$26 (IN); 20% (OON)	0	0
Ambulatory surgery	\$25; (IN or OON)	\$33 (IN); 20% (OON)	0	0
Ambulance, outpatient ground	\$88 (IN); 20% (OON)	\$19 (IN); 20% (OON)	0	0
Ambulance, outpatient air	20%; (IN or OON)	20%; (IN or OON)	0	0
Durable medical equipment	15% (IN); 20% (OON)	10% (IN); 20% (OON)	0	0
Inpatient admission	\$24.50 per day; \$25 min. per admission.	\$79 per adm. (IN); 20% (OON)	0	0
Inpatient SNF/rehab facility	\$24.50 per day; \$25 min. per admission.	\$33 per day (IN); \$66 per day (OON)	0	0

*When TRICARE Prime enrollees other than active duty service members self-refer to specialty or non-emergent inpatient care without a referral from a network provider and/or authorization from the regional contractor, the TRICARE Point of Service deductible and copayment applies in lieu of TRICARE Prime copayments.

CALENDAR YEAR 2026 TRICARE PRIME AND TRICARE SELECT OUT-OF-POCKET EXPENSES RETIREE BENEFICIARY CATEGORY

[Page 1 of 2]

Out of pocket expense	Select Group A CY26	Select Group B CY26	Prime * Group A CY26	Prime * Group B CY26
Annual enrollment fee:				
Individual	\$186.96	\$594.96	\$381.96	\$462.96
Family	\$375	\$1,191	765	927
Annual deductible:				
Individual	\$150	\$198 (IN); \$397 (OON)	0	0
Family	\$300	\$397 (IN); \$794 (OON)	0	0
Annual catastrophic cap	\$4,381	\$4,635	3,000	4,635
Preventive visit	\$0	\$0	0	0
Primary care	\$38 (IN); 25% (OON)	\$33 (IN); 25% (OON)	26	26
Specialty care	\$52 (IN); 25% (OON)	\$52 (IN); 25% (OON)	39	39
ER visit	\$138 (IN); 25% (OON)	\$105 (IN); 25% (OON)	79	79
Urgent care center visit	\$38 (IN); 25% (OON)	\$52 (IN); 25% (OON)	39	39
Ambulatory surgery	20% (IN); 25% (OON)	\$125 (IN); 25% (OON)	79	79
Ambulance, outpatient ground	\$117 (IN); 25% (OON)	\$79 (IN); 25% (OON)	52	52
Ambulance, outpatient air	25%; (IN or OON)	25%; (IN or OON)	20	20

Note: The calendar year catastrophic cap for TRICARE Select Group A retirees who are survivors of active duty deceased sponsors or medically retired Uniformed Service members and their dependents is \$3,000.

CALENDAR YEAR 2026 TRICARE PRIME AND TRICARE SELECT OUT-OF-POCKET EXPENSES RETIREE BENEFICIARY CATEGORY

[Page 2 of 2]

Out of pocket expense	Select Group A CY26	Select Group B CY26	Prime * Group A CY26	Prime * Group B CY26
Durable medical equipment	20% (IN); 25% (OON)	20% (IN); 25% (OON)	20%	20%.
Inpatient admission:				
In-network	\$250/day up to 25% of hospital charges, plus 20% of sep. billed services.	\$231 per adm	\$198 per adm	\$198 per adm.
Out of network	‡ \$1,306/day up to 25% of hosp. charges, plus 25% of sep. billed services.	25%	\$198 per adm	\$198 per adm.

CALENDAR YEAR 2026 TRICARE PRIME AND TRICARE SELECT OUT-OF-POCKET EXPENSES RETIREE BENEFICIARY CATEGORY—Continued

[Page 2 of 2]

Out of pocket expense	Select Group A CY26	Select Group B CY26	Prime * Group A CY26	Prime * Group B CY26
Inpatient SNF/rehab facility	\$250/day up to 25% of hospital charges, plus 20% of sep. billed services (IN); 25% (OON).	\$66 per day (IN); lesser of \$397 per day or 20% (OON).	\$39 per day	\$39 per day.

‡ This is the CY25 rate. The CY26 out of pocket expense will be available mid-December once the DRG payment rates are calculated.

* When TRICARE Prime enrollees other than active duty service members self-refer to specialty or non-emergent inpatient care without a referral from a network provider and/or authorization from the regional contractor, the TRICARE Point of Service deductible and copayment applies in lieu of TRICARE Prime copayments.

The CY 2026 rates contained in this notice are effective January 1, 2026.

Dated: November 5, 2025.

Aaron T. Siegel,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 2025–19819 Filed 11–7–25; 8:45 am]

BILLING CODE 6001–FR–P

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Senior Executive Service Performance Review Board

AGENCY: Defense Nuclear Facilities Safety Board.

ACTION: Notice of Members of Senior Executive Service Performance Review Board.

SUMMARY: This notice announces the membership of the Defense Nuclear Facilities Safety Board (DNFSB) Senior Executive Service (SES) Performance Review Board (PRB).

DATES: These appointments are effective on November 7, 2025.

ADDRESSES: Send comments concerning this notice to: Defense Nuclear Facilities Safety Board, 625 Indiana Avenue NW, Suite 700, Washington, DC 20004–2001.

FOR FURTHER INFORMATION CONTACT:

Candice Starks by telephone at (202) 360–9527, or by email at Candice.Starks@dnfsb.gov.

SUPPLEMENTARY INFORMATION: 5 U.S.C. 4314 (c)(1) through (5) requires each agency to establish, in accordance with regulations prescribed by the Office of Personnel Management, one or more performance review boards. The PRB shall review and evaluate the initial summary rating of the senior executives' performance, the executives' responses, and the higher-level officials' comments on the initial summary rating. In addition, the PRB will recommend executive performance bonuses and pay increases.

The DNFSB is a small, independent Federal agency; therefore, the members of the DNFSB SES Performance Review Board listed in this notice are drawn from the SES ranks of other agencies. The following persons comprise a standing roster to serve as members of the Defense Nuclear Facilities Safety Board SES Performance Review Board:

Marguerite C. Garrison, Deputy Inspector General for Administrative Investigations, U.S. Department of Defense, Office of the Inspector General

Theresa Perolini, Assistant Inspector General for Enterprise and External Affairs, U.S. Department of Education, Office of Inspector General

Troy M. Meyer, Deputy Inspector General for Overseas Contingency Operations, U.S. Department of Defense, Office of the Inspector General

Njema Frazier, Associate Technical Director—Nuclear Weapons Program, Defense Nuclear Safety Facilities Board

Omar Lopez-Santiago, Associate Technical Director—Nuclear Materials Processing and Stabilization, Defense Nuclear Safety Facilities Board

James Biggins, Deputy Executive Director for Risk and Strategy, Defense Nuclear Safety Facilities Board

Johnathan Plaue, Technical Director, Defense Nuclear Safety Facilities Board

Katherine Herrera, Deputy Executive Director of Operations, Defense Nuclear Safety Facilities Board
Patricia Lee, Board Member, Defense Nuclear Safety Facilities Board

Authority: 5 U.S.C. 4314.

Dated: November 4, 2025.

Mary Buhler,

Executive Director of Operations.

[FR Doc. 2025–19830 Filed 11–7–25; 8:45 am]

BILLING CODE 3670–01–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Health Resources and Services Administration

Improving Ryan White HIV/AIDS Program Part A and B Formula Awards Using Most Recent Address Data

AGENCY: Health Resources and Services Administration (HRSA), Department of Health and Human Services

ACTION: Notice.

SUMMARY: The Ryan White HIV/AIDS Program (RWHAP) Part A and B funding formulas are defined by the Public Health Service (PHS) Act and rely on the living HIV/AIDS cases reported to and confirmed by the Centers for Disease Control and Prevention (CDC). Advancements in HIV surveillance have improved the mapping of the epidemic, leading to better care strategies. Since 2017, CDC has shifted to using the most recent addresses of people with HIV for reporting, raising questions about whether RWHAP funds follow clients or remain in the jurisdiction of diagnosis. HRSA has analyzed the effects of this updated methodology on formula funding and is now seeking public feedback on proposed changes to better direct resources to where clients currently live and receive care.

DATES: Submit comments no later than December 10, 2025.

ADDRESSES: Written or electronic comments should be submitted to Division of Policy and Data, HRSA, HIV/AIDS Bureau, 5600 Fishers Lane, Rockville, MD 20857, or RyanWhiteComments@hrsa.gov.

FOR FURTHER INFORMATION CONTACT: Paul Mandsager, Senior Public Health Analyst, Division of Policy and Data, HRSA, HIV/AIDS Bureau, 5600 Fishers Lane, Rockville, MD 20857, Phone 301–594–4055, Email RyanWhiteComments@hrsa.gov.

SUPPLEMENTARY INFORMATION: The RWHAP Part A formula is set forth in the RWHAP authorizing statute at § 2603(a) of the PHS Act, 42 U.S.C. 300ff-13(a), and is based on the relative distribution of living HIV/AIDS cases within a statutorily specified metropolitan area reported to and confirmed by CDC. The RWHAP Part B formulas are found in §§ 2618(a)(2) and (a)(2)(F) of the PHS Act, 42 U.S.C. 300ff-28(a)(2) and (a)(2)(F) and use weighted or relative distribution of living HIV/AIDS cases within the state reported to and confirmed by CDC.

Recent advancements in HIV surveillance data have resulted in more accurate mapping of the HIV epidemic, allowing for more efficient and effective HIV care and treatment efforts at the state, local, and national levels. As a result of these advancements, beginning in 2014, CDC began the transition to reporting surveillance data based on the most recent address of a person with HIV, usually reported via CD4/viral load lab reports, rather than residence at HIV diagnosis. Since that time, HRSA has received several inquiries about whether RWHAP funds follow clients as they move or if the funds stay in the jurisdiction in which the clients were originally diagnosed.

HRSA conducted multiple analyses on the impact the updated HIV surveillance data would have on the RWHAP Part A and B formula award funding after maturation of the CDC

methodology and when all jurisdictions were reporting most recent address to CDC. Now that this transition has been fully realized, to better allocate resources to the jurisdictions where clients currently reside and receive care, HRSA is seeking public comment on this proposed change in methodology and timing.

Proposed Methodology

The funding methodology used to calculate RWHAP Part A and B formula awards would use living HIV and AIDS case data based on most recent address, rather than residence at diagnosis, with a phase-in timeline and use of appropriate action to minimize funding fluctuations.

The methodology for determining RWHAP Part A and B eligibility would remain unchanged.

Proposed Timing of Implementation

The statute requires the use of “distribution factor” but the distribution factor requires only that the data be reported to and confirmed by CDC. Once CDC certifies that the data are sufficiently robust to confirm, HRSA has the authority to accept those data based on the most recent address. It does not, however, have the authority to phase in that change without providing the public with notice and an opportunity to comment.

HRSA determined that using most recent address data without a phased approach would lead to a disruption in

the HIV care and treatment system across RWHAP Part A and Part B jurisdictions as some would experience substantial funding increases or decreases. HRSA is therefore proposing a phased approach over a 5-year period (fiscal year (FY) 2026 to FY 2030) to allow for a gradual transition. Any funding increase or decrease that occurs in year one (FY 2026) as a result of the new methodology will be spread out over a 5-year period (see Tables 1 and 2). This will minimize disruption and ensure that recipients and systems of care have the time and resources to adapt. By gradually phasing in the changes, RWHAP recipients can better manage potential increases or decreases in funding and adjust their resource allocation strategies accordingly.

The RWHAP statute included a phased approach for implementation of a similar change from code-based HIV case surveillance reporting to name-based reporting in prior RWHAP reauthorizations. The statutory language permitted a phased approach to minimize disruption, allow for implementation on the local level, and for CDC verification of data. This prior approach is codified at § 2603(a)(3)(C) of the PHS Act, 42 U.S.C. 300ff-13(a)(3)(C), and § 2618(a)(2)(D) of the PHS Act, 42 U.S.C. 300ff-28(a)(2)(D). HRSA proposes to use the same phased approach as was used in the transition from code-based to name-based HIV reporting and seeks public comment on this proposal.

TABLE 1—ESTIMATED FUTURE PART A TOTAL AWARDS, 5-YEAR TRANSITION

[Based on the FY 2025 Appropriation, not any future appropriations]

Part A jurisdiction	FY 2025 final	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	Est. % change FY 2025–FY 2030
Atlanta, GA	\$32,339,493	\$32,974,435	\$33,609,378	\$34,244,320	\$34,879,263	\$35,514,205	10
Austin, TX	5,702,606	5,769,180	5,835,753	5,902,327	5,968,900	6,035,474	6
Baltimore, MD	15,660,695	15,631,048	15,601,402	15,571,755	15,542,109	15,512,462	–1
Baton Rouge, LA	4,551,433	4,540,914	4,530,395	4,519,876	4,509,357	4,498,838	–1
Boston, MA	15,183,838	15,195,167	15,206,495	15,217,824	15,229,152	15,240,481	0
Charlotte, NC	6,913,452	6,897,092	6,880,732	6,864,371	6,848,011	6,831,651	–1
Chicago, IL	27,666,573	27,284,549	26,902,525	26,520,500	26,138,476	25,756,452	–7
Cleveland, OH	4,772,432	4,773,163	4,773,894	4,774,625	4,775,356	4,776,087	0
Columbus, OH	5,006,629	4,994,876	4,983,123	4,971,369	4,959,616	4,947,863	–1
Dallas, TX	21,184,061	21,442,742	21,701,423	21,960,103	22,218,784	22,477,465	6
Denver, CO	7,340,580	7,368,672	7,396,764	7,424,857	7,452,949	7,481,041	2
Detroit, MI	10,075,549	9,998,181	9,920,813	9,843,444	9,766,076	9,688,708	–4
Fort Lauderdale, FL	16,023,456	16,393,018	16,762,580	17,132,143	17,501,705	17,871,267	12
Fort Worth, TX	5,547,578	5,642,526	5,737,474	5,832,422	5,927,370	6,022,318	9
Hartford, CT	2,944,998	2,951,034	2,957,070	2,963,107	2,969,143	2,975,179	1
Houston, TX	27,558,403	27,795,071	28,031,740	28,268,408	28,505,077	28,741,745	4
Indianapolis, IN	4,910,030	4,898,222	4,886,414	4,874,605	4,862,797	4,850,989	–1
Jacksonville, FL	6,108,505	6,117,798	6,127,091	6,136,385	6,145,678	6,154,971	1
Kansas City, MO	4,513,410	4,415,080	4,316,750	4,218,421	4,120,091	4,021,761	–11
Las Vegas, NV	7,551,492	7,755,684	7,959,876	8,164,067	8,368,259	8,572,451	14
Los Angeles, CA	46,295,740	45,729,574	45,163,409	44,597,243	44,031,078	43,464,912	–6
Memphis, TN	6,902,702	6,886,126	6,869,550	6,852,973	6,836,397	6,819,821	–1
Miami, FL	26,788,349	26,566,917	26,345,485	26,124,054	25,902,622	25,681,190	–4
Mineola, NY	5,653,528	5,638,727	5,623,925	5,609,124	5,594,322	5,579,521	–1
Minneapolis, MN	6,129,008	6,180,187	6,231,366	6,282,546	6,333,725	6,384,904	4

TABLE 1—ESTIMATED FUTURE PART A TOTAL AWARDS, 5-YEAR TRANSITION—Continued

[Based on the FY 2025 Appropriation, not any future appropriations]

Part A jurisdiction	FY 2025 final	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	Est. % change FY 2025– FY 2030
Nashville, TN	4,443,640	4,432,440	4,421,239	4,410,039	4,398,838	4,387,638	–1
New Brunswick, NJ	2,803,890	2,764,620	2,725,349	2,686,079	2,646,808	2,607,538	–7
New Haven, CT	5,273,601	5,275,392	5,277,183	5,278,974	5,280,765	5,282,556	0
New Orleans, LA	8,058,405	7,911,429	7,764,453	7,617,477	7,470,501	7,323,525	–9
New York, NY	89,662,231	90,053,722	90,445,213	90,836,703	91,228,194	91,619,685	2
Newark, NJ	12,277,381	12,122,018	11,966,656	11,811,293	11,655,931	11,500,568	–6
Norfolk, VA	5,990,787	5,892,750	5,794,712	5,696,675	5,598,637	5,500,600	–8
Oakland, CA	7,360,883	7,304,436	7,247,989	7,191,542	7,135,095	7,078,648	–4
Orlando, FL	10,939,376	11,032,797	11,126,219	11,219,640	11,313,062	11,406,483	4
Paterson, NJ	3,918,044	3,864,059	3,810,075	3,756,090	3,702,106	3,648,121	–7
Philadelphia, PA	22,766,093	22,594,485	22,422,877	22,251,268	22,079,660	21,908,052	–4
Phoenix, AZ	11,049,463	11,194,456	11,339,448	11,484,441	11,629,433	11,774,426	7
Portland, OR	4,088,295	4,182,057	4,275,820	4,369,582	4,463,345	4,557,107	11
Sacramento, CA	3,832,752	3,919,081	4,005,410	4,091,739	4,178,068	4,264,397	11
Saint Louis, MO	6,388,344	6,243,701	6,099,057	5,954,414	5,809,770	5,665,127	–11
San Antonio, TX	6,221,586	6,228,572	6,235,558	6,242,543	6,249,529	6,256,515	1
San Bernardino, CA	9,283,666	9,971,030	10,658,395	11,345,759	12,033,124	12,720,488	37
San Diego, CA	12,325,778	12,221,689	12,117,599	12,013,510	11,909,420	11,805,331	–4
San Francisco, CA	14,841,000	14,267,393	13,693,786	13,120,180	12,546,573	11,972,966	–19
San Jose, CA	3,496,090	3,418,963	3,341,836	3,264,708	3,187,581	3,110,454	–11
San Juan, PR	10,360,633	10,045,103	9,729,573	9,414,043	9,098,513	8,782,983	–15
Santa Ana, CA	6,679,132	6,523,893	6,368,654	6,213,416	6,058,177	5,902,938	–12
Seattle, WA	7,189,780	7,135,849	7,081,919	7,027,988	6,974,058	6,920,127	–4
Secaucus, NJ	4,797,408	4,797,436	4,561,464	4,443,491	4,325,519	4,207,547	–12
Tampa, FL	10,650,266	10,961,615	11,272,965	11,584,314	11,895,664	12,207,013	15
Washington, DC	32,044,482	31,995,758	31,947,034	31,898,309	31,849,585	31,800,861	–1
West Palm Beach, FL ..	7,428,827	7,419,646	7,410,465	7,401,284	7,392,103	7,382,922	–1

TABLE 2—ESTIMATED FUTURE PART B TOTAL AWARDS, 5-YEAR TRANSITION

[Based on the FY 2025 Appropriation, not any future appropriations]

Part B grantee	FY 2025 final *	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	Est. % change FY 2025– FY 2030
Alabama	\$20,126,410	\$19,941,311	\$19,756,212	\$19,571,114	\$19,386,015	\$19,200,916	–5
Alaska	1,057,741	1,055,218	1,052,695	1,050,173	1,047,650	1,045,127	–1
Arizona	17,593,880	17,802,676	18,011,473	18,220,269	18,429,066	18,637,862	6
Arkansas	8,467,112	8,412,595	8,358,077	8,303,560	8,249,042	8,194,525	–3
California	140,896,380	139,520,418	138,144,456	136,768,493	135,392,531	134,016,569	–5
Colorado	13,159,341	13,301,576	13,443,811	13,586,047	13,728,282	13,870,517	5
Connecticut	10,028,100	10,018,521	10,008,941	9,999,362	9,989,782	9,980,203	0
Delaware	4,559,579	4,643,438	4,727,296	4,811,155	4,895,013	4,978,872	9
District of Columbia	15,877,251	15,577,494	15,277,736	14,977,979	14,678,221	14,378,464	–9
Florida	117,953,889	118,297,990	118,642,091	118,986,193	119,330,294	119,674,395	1
Georgia	65,937,492	66,625,016	67,312,540	68,000,063	68,687,587	69,375,111	5
Hawaii	3,352,217	3,285,288	3,218,358	3,151,429	3,084,499	3,017,570	–10
Idaho	1,567,448	1,639,775	1,712,102	1,784,428	1,856,755	1,929,082	23
Illinois	43,632,706	42,894,324	42,155,943	41,417,561	40,679,180	39,940,798	–8
Indiana	14,826,971	14,923,455	15,019,939	15,116,423	15,212,907	15,309,391	3
Iowa	3,671,105	3,783,456	3,895,806	4,008,157	4,120,507	4,232,858	15
Kansas	3,874,733	3,864,859	3,854,986	3,845,112	3,835,239	3,825,365	–1
Kentucky	10,928,564	11,047,437	11,166,309	11,285,182	11,404,054	11,522,927	5
Louisiana	23,907,778	23,576,125	23,244,472	22,912,820	22,581,167	22,249,514	–7
Maine	1,744,812	1,866,696	1,988,579	2,110,463	2,232,346	2,354,230	35
Maryland	31,501,279	31,596,615	31,691,952	31,787,288	31,882,625	31,977,961	2
Massachusetts	20,049,557	20,111,599	20,173,642	20,235,684	20,297,727	20,359,769	2
Michigan	18,646,797	18,494,389	18,341,980	18,189,572	18,037,163	17,884,755	–4
Minnesota	8,739,953	8,871,333	9,002,713	9,134,092	9,265,472	9,396,852	8
Mississippi*	14,270,758	14,037,073	13,803,388	13,569,703	13,336,018	13,102,333	–8
Missouri	13,771,559	13,679,499	13,587,439	13,495,380	13,403,320	13,311,260	–3
Montana	868,081	897,158	926,235	955,311	984,388	1,013,465	17
Nebraska	3,366,792	3,400,072	3,433,352	3,466,632	3,499,912	3,533,192	5
Nevada	10,233,918	10,494,661	10,755,404	11,016,148	11,276,891	11,537,634	13
New Hampshire	1,408,963	1,453,490	1,498,017	1,542,545	1,587,072	1,631,599	16
New Jersey	36,785,442	36,225,650	35,665,857	35,106,065	34,546,272	33,986,480	–8
New Mexico	4,461,845	4,593,522	4,725,199	4,856,877	4,988,554	5,120,231	15
New York	121,693,828	121,502,862	121,311,896	121,120,931	120,929,965	120,738,999	–1

TABLE 2—ESTIMATED FUTURE PART B TOTAL AWARDS, 5-YEAR TRANSITION—Continued

[Based on the FY 2025 Appropriation, not any future appropriations]

Part B grantee	FY 2025 final*	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	Est. % change FY 2025– FY 2030
North Carolina	36,933,968	37,344,393	37,754,819	38,165,244	38,575,670	38,986,095	6
North Dakota	865,271	870,269	875,267	880,265	885,263	890,261	3
Ohio	25,253,858	25,312,408	25,370,959	25,429,509	25,488,060	25,546,610	1
Oklahoma*	9,505,525	9,559,364	9,613,203	9,667,041	9,720,880	9,774,719	3
Oregon	6,647,795	6,823,869	6,999,943	7,176,016	7,352,090	7,528,164	13
Pennsylvania	41,565,377	42,048,395	42,531,413	43,014,432	43,497,450	43,980,468	6
Puerto Rico	20,773,717	20,155,207	19,536,697	18,918,186	18,299,676	17,681,166	–15
Rhode Island	3,586,062	3,617,595	3,649,129	3,680,662	3,712,196	3,743,729	4
South Carolina	25,101,893	25,026,412	24,950,930	24,875,449	24,799,967	24,724,486	–2
South Dakota	1,018,404	1,028,291	1,038,178	1,048,066	1,057,953	1,067,840	5
Tennessee	19,798,995	19,775,561	19,752,126	19,728,692	19,705,257	19,681,823	–1
Texas	118,321,330	118,926,803	119,532,276	120,137,749	120,743,222	121,348,695	3
Utah	5,084,544	5,130,773	5,177,003	5,223,232	5,269,462	5,315,691	5
Vermont	863,866	895,162	926,459	957,755	989,052	1,020,348	18
Virginia	25,905,308	25,818,054	25,730,801	25,643,547	25,556,294	25,469,040	–2
Washington	15,920,820	16,212,199	16,503,578	16,794,956	17,086,335	17,377,714	9
West Virginia	2,779,989	2,808,260	2,836,530	2,864,801	2,893,071	2,921,342	5
Wisconsin	8,976,297	9,042,676	9,109,055	9,175,435	9,241,814	9,308,193	4
Wyoming	759,202	763,113	767,024	770,936	774,847	778,758	3
Guam	280,781	279,217	277,652	276,088	274,523	272,959	–3
Virgin Islands	966,648	951,454	936,259	921,065	905,870	890,676	–8
American Samoa	50,001	50,004	50,007	50,009	50,012	50,015	0
Marshall Islands	50,702	50,699	50,696	50,694	50,691	50,688	0
Mariana Island	59,834	59,794	59,755	59,715	59,676	59,636	0
Republic of Palau*	56,322	56,297	56,271	56,246	56,220	56,195	0
F. States Micronesia	50,702	50,975	51,247	51,520	51,792	52,065	3

Note: Mississippi, Oklahoma, and Palau FY 2025 amounts are estimates that do not include penalties assessed in FY 2025 and as such do not reflect actual FY 2025 funding amounts.

Thomas J. Engels,

Administrator.

[FR Doc. 2025–19838 Filed 11–7–25; 8:45 am]

BILLING CODE 4165–15–P

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

[Docket No. FR–6271–N–06]

Final Determination: Adoption of Energy Efficiency Standards for New Construction of HUD- and USDA- Financed Housing; Additional Extension of HUD Compliance Dates

AGENCY: Department of Housing and
Urban Development (HUD).

ACTION: Notice; extension of compliance
dates.

SUMMARY: On April 26, 2024, HUD and the U.S. Department of Agriculture published the “Final Determination: Adoption of Energy Efficiency Standards for New Construction of HUD- and USDA-Financed Housing” Notice (Final Determination) in the **Federal Register**. The Final Determination provides compliance dates for HUD programs covered by the Final Determination. On March 10, 2025, HUD published a Notice of Extension of Compliance Dates in the

Federal Register for covered projects in the following HUD programs: Federal Housing Administration-Insured (FHA-Insured) Multifamily, FHA-Insured Single Family, Public Housing Capital Fund, and Competitive Grants (Choice Neighborhoods, Section 202, Section 811) and Section 8 Project Based Vouchers (PBV). This notice provides an additional extension of the compliance dates for these programs as specified below.

DATES: Applicable November 10, 2025.

FOR FURTHER INFORMATION CONTACT: Bryan Horne, Acting Principal Deputy Assistant Secretary, Office of Community Planning and Development, Department of Housing and Urban Development, 451 7th Street SW, Room 7272, Washington, DC 20410, telephone number 202–402–4270 (this is not a toll-free number). HUD welcomes and is prepared to receive calls from individuals who are deaf or hard of hearing, as well as individuals with speech or communication disabilities. To learn more about how to make an accessible telephone call, please visit: <https://www.fcc.gov/consumers/guides/telecommunications-relay-service-trs>.

SUPPLEMENTARY INFORMATION:

I. Background

On April 26, 2024, HUD and the U.S. Department of Agriculture published the Final Determination (89 FR 33112), which adopted the 2021 edition of the International Energy Conservation Code (IECC) and the 2019 edition of ANSI/ASHRAE/IES Standard 90.1: Energy Standard for Buildings, Except Low-Rise Residential Buildings (ASHRAE 90.1) as the minimum energy standards for new construction of buildings in programs covered by section 109 of the Cranston-Gonzalez National Affordable Housing Act of 1990 (42 U.S.C. 12709), as amended by the Energy Independence and Security Act of 2007 (EISA) (Pub. L. 110–140).

In Section VI of the Final Determination, the Departments provided Table 32, which lists compliance dates for the updated energy efficiency standards, also available with further guidance for HUD programs at <https://www.hudexchange.info/programs/minimum-energy-standards/>.

On March 10, 2025, HUD published “Final Determination: Adoption of Energy Efficiency Standards for New Construction of HUD- and USDA-Financed Housing; Extension of HUD Compliance Dates” (90 FR 11622), which extended the compliance dates for the following HUD programs:

Federal Housing Administration-Insured (FHA-Insured) Multifamily, FHA-Insured Single Family, Public Housing Capital Fund, and Competitive Grants (Choice Neighborhoods, Section 202, Section 811), and Section 8 Project Based Vouchers. As explained in the March 10 extension notice, HUD did not extend the compliance dates for HOME and Housing Trust Fund because those dates had already passed.

On July 7, 2025, HUD and USDA published “Adoption of Energy Efficiency Standards for New Construction of HUD- and USDA-Financed Housing; Notice for Comment” (90 FR 29882), in which the agencies announced that they intend to review the analysis contained in the Final Determination and requested additional public comment to inform such review. The agencies received nearly 100 public comments in response to the notice.

II. Additional Delay of Compliance Dates

HUD is providing an additional delay of the HUD compliance dates that have not yet passed. The compliance dates for the following HUD programs are extended until May 28, 2026: Federal Housing Administration-Insured (FHA-Insured) Multifamily, FHA-Insured Single Family, Public Housing Capital Fund, and Section 8 Project Based Vouchers. The deadline for the Competitive Grants (Choice Neighborhoods, Section 202, Section 811) is extended until the publication of the respective program NOFOs for FY2026.

The additional delay provided by this notice will provide time for the agencies to fully consider the public comments received in response to the July 7 Notice for Comment. In this regard, the Department notes the request from a national building industry advocacy organization for an additional extension of the compliance dates. The additional delay for Section 8 Project Based Vouchers will allow time for HUD to

solicit comment and develop and publish further guidance on compliance for Section 8 PBV.

As with the March 10 extension, HUD is not by this notice amending the compliance date for the HOME Investment Partnerships Program (HOME) and the Housing Trust Fund (HTF) Program, which has already passed. As stated on HUD Exchange, if HOME and HTF projects receive layered funding with other HUD funds covered by this notice as listed in the table below, the later compliance date applies. HUD confirms that HOME and HTF projects with funding from a program covered by this compliance date extension do not have to comply with the Final Determination until the new extended date. See <https://www.hudexchange.info/programs/minimum-energy-standards/> for more information. Program participants who may have difficulty meeting compliance dates that have already passed should contact HUD.

The updated compliance dates are as follows:

Program	Initiation event	Compliance date
HOME and HTF (If HOME/HTF funding is layered with other HUD funds, the later program compliance date applies).	Participating Jurisdiction (PJ) or HTF Grantee Funding Commitment.	November 28, 2024.
Federal Housing Administration-Insured (FHA-Insured) Multifamily.	Pre-application Submitted to HUD	May 28, 2026.
FHA-Insured Single Family	Building Permit Application	May 28, 2026.
Public Housing Capital Fund	HUD approvals of development proposals for new Capital Fund or mixed financed projects.	May 28, 2026.
Project Based Vouchers	To be determined in further guidance	May 28, 2026.
Competitive Grants (Choice Neighborhoods, Section 202, Section 811).	Notice of Funding Opportunity (NOFO) Publication.	Upon publication of FY2026 NOFO for each respective program.
All programs, persistent poverty rural areas	Based on program-specific event, above	May 28, 2026.
Rental Assistance Demonstration (RAD)	N/A	Already effective by Federal Register Notice and program notice.

III. Findings and Certifications

Environmental Impact

This notice provides updated compliance deadlines for the Final Determination. A Finding of No Significant Impact (FONSI) was prepared for the preliminary determination that preceded the Final Determination and remained applicable to the Final Determination. That FONSI is also applicable to this notice. Accordingly, under 24 CFR 50.19(c)(4) this notice is categorically excluded from environmental review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321).

Scott Turner,
Secretary.

[FR Doc. 2025-19823 Filed 11-7-25; 8:45 am]

BILLING CODE 4210-67-P

DEPARTMENT OF THE INTERIOR

Bureau of Ocean Energy Management [Docket No. BOEM-2025-0417]

Gulf of America OCS Oil and Gas One Big Beautiful Bill Act Lease Sale 1

AGENCY: Bureau of Ocean Energy Management, Interior.

ACTION: Final notice of sale.

SUMMARY: On Wednesday, December 10, 2025, the Bureau of Ocean Energy Management (BOEM) will open and publicly announce bids received for blocks offered in the Gulf of America (GOA) Outer Continental Shelf (OCS) Oil and Gas One Big Beautiful Bill Act Lease Sale 1 (Lease Sale BBG1). BOEM is holding this sale pursuant to the One Big Beautiful Bill Act (OBBBA) and in

accordance with the Outer Continental Shelf Lands Act (OCSLA), as amended, and its implementing regulations. The Final Notice of Sale (NOS) package for Lease Sale BBG1 contains information essential to potential bidders and comprises this notice, Information to Lessees, and Lease Stipulations. Section 50102 of the OBBBA mandates that the Secretary of the Interior conduct the sale within a specific time period and directs the Secretary to offer the same lease form, lease terms, economic conditions, and stipulations as contained in the final notice of sale entitled “Gulf of Mexico Outer Continental Shelf Region-Wide Oil and Gas Lease Sale 254” (85 FR 8010, Feb. 12, 2020).

DATES: BOEM will hold Lease Sale BBG1 at 9:00 a.m. on Wednesday, December 10, 2025. All times referred to

in this document are Central time, unless otherwise specified.

Bid submission deadline: BOEM must receive all sealed bids prior to the bid submission deadline of 10:00 a.m. on Tuesday, December 9, 2025, the day before the lease sale. For more information on bid submission, see Section VII of this document, “Bidding Instructions.”

ADDRESSES: Bids will be accepted, prior to the bid submission deadline, through any parcel delivery service (e.g., FedEx, UPS, U.S. Postal Service, DHL) or in person at 1201 Elmwood Park Boulevard, New Orleans, Louisiana 70123. Public bid reading for Lease Sale BBG1 will be held at 4545 Williams Boulevard, Kenner, Louisiana. The venue will not be open to the general public, but limited seating will be available for Lease Sale BBG1 bidders only. Bid opening will be available for public viewing on BOEM’s website at <https://www.boem.gov/Sale-BBG1> via live-streaming video beginning at 9:00 a.m. on the date of the sale. The results will be posted on BOEM’s website upon completion of bid opening and reading. Interested parties may download the Final NOS package from BOEM’s website at <https://www.boem.gov/Sale-BBG1>. Copies of the sale maps can be

obtained by contacting the BOEM GOA Region: Gulf of America Region Public Affairs Office, Bureau of Ocean Energy Management, 1201 Elmwood Park Boulevard, New Orleans, Louisiana 70123–2394, (504) 650–7060.

FOR FURTHER INFORMATION CONTACT:

Pedro Levy, Gulf of America Region Lease Sale Coordinator, at BOEMGulfLeaseSales@boem.gov or 504–739–1360. For sale day inquiries, please call Greg Purvis at 504–736–1729.

SUPPLEMENTARY INFORMATION:

Authority: This sale is being held pursuant to the requirements of Public Law 119–21 (One Big Beautiful Bill Act). This Final Notice of Sale is published pursuant to 43 U.S.C. 1331 *et seq.*, (Outer Continental Shelf Lands Act, as amended) and 30 CFR 556.308(a). Following President Trump’s Executive Order 14172, “Restoring Names That Honor American Greatness,” (January 20, 2025), the Gulf of Mexico has been renamed to the Gulf of America. Any references to “Gulf of Mexico” herein are solely retained due to official titles of statutes, treaties, agreements or publications.

Table of Contents

I. Lease Sale Area

II. Statutes and Regulations
III. Lease Terms and Economic Conditions
IV. Lease Stipulations
V. Information to Lessees
VI. Maps
VII. Bidding Instructions
VIII. Bidding Rules and Restrictions
IX. Forms
X. The Lease Sale
XI. Delay of Sale

I. Lease Sale Area

Blocks Offered for Leasing: BOEM will offer for bid in this lease sale all available unleased acreage in the GOA OCS as identified on the map, “Final Oil and Gas Sale Area for Sale BBG1” (<https://www.boem.gov/Sale-BBG1>), except those blocks listed below in “Blocks Not Offered for Leasing.”

Blocks Not Offered for Leasing: BOEM will exclude the following whole and partial blocks from this sale. The BOEM Official Protraction Diagrams (OPDs) and Supplemental OPDs are available online at <https://www.boem.gov/oil-gas-energy/mapping-and-data>.

- Whole and Partial Blocks withdrawn from leasing by Presidential Withdrawal in the September 8, 2020, *Memorandum on the Withdrawal of Certain Areas of the United States Outer Continental Shelf from Leasing Disposition*:

TABLE 1—OCS BLOCKS WITHDRAWN FROM LEASING PURSUANT TO THE PRESIDENTIAL MEMORANDUM ISSUED ON SEPTEMBER 8, 2020

GOA protraction areas	OCS block
Pensacola (Leasing Map NH 16–05)	Whole Blocks: 751–754, 793–798, 837–842, 881–886, 925–930, 969–975.
Destin Dome (Leasing Map NH 16–08)	Whole Blocks: 1–7, 45–51, 89–96, 133–140, 177–184, 221–228, 265–273, 309–317, 353–361, 397–405, 441–450, 485–494, 529–538, 573–582, 617–627, 661–671, 705–715, 749–759, 793–804, 837–848, 881–892, 925–936, 969–981.
DeSoto Canyon (Leasing Map NH 16–11)	Whole Blocks: 1–15, 45–59, 92–102.
Henderson (Leasing Map NG 16–05)	Partial Blocks: 16, 60, 61, 89–91, 103–105, 135–147.
	Partial Blocks: 114, 158, 202, 246, 290, 334, 335, 378, 379, 422, 423.

- Whole and Partial Blocks within the boundary of the Flower Garden Banks National Marine Sanctuary (East and

West Flower Garden Banks and the Stetson Bank) as of the July 14, 2008, *Memorandum on Modification of the*

Withdrawal of Areas of the United States Outer Continental Shelf from Leasing Disposition:

TABLE 2—OCS BLOCKS WITHDRAWN FROM LEASING IN THE FLOWER GARDEN BANKS NATIONAL MARINE SANCTUARY

GOA protraction areas	OCS block
High Island, East Addition, South Extension (Leasing Map TX7C).	Whole Block: A–398.
High Island, South Addition (Leasing Map TX7B).	Partial Blocks: A–366, A–367, A–374, A–375, A–383, A–384, A–385, A–388, A–389, A–397, A–399, A–401.
Garden Banks (Leasing Map NG 15–02)	Partial Blocks: A–502, A–513.
	Partial Blocks: 134, 135.

- Whole and Partial Blocks that are adjacent to or beyond the United States

Exclusive Economic Zone in the area

known as the northern portion of the Eastern Gap:

TABLE 3—OCS BLOCKS NOT OFFERED FOR LEASING ADJACENT TO OR BEYOND THE UNITED STATES EXCLUSIVE ECONOMIC ZONE

GOA Protraction areas	OCS Block
Lund South (Leasing Map NG 16–07)	Whole Blocks: 128, 129, 169–173, 208–217, 248–261, 293–305, 349.
Henderson (Leasing Map NG 16–05)	Whole Blocks: 466, 508–510, 551–554, 594–599, 637–643, 679–687, 722–731, 764–775, 807–819, 849–862, 891–905, 933–949, 975–992. Partial Blocks: 335, 379, 423, 467, 511, 555, 556, 600, 644, 688, 732, 776, 777, 820, 821, 863, 864, 906, 907, 950, 993, 994.
Florida Plain (Leasing Map NG 16–08)	Whole Blocks: 5–24, 46–67, 89–110, 133–154, 177–197, 221–240, 265–283, 309–327, 363–370.

• Depth-restricted, segregated block portion(s). The current block meeting this criterion is:

• Block 299, Main Pass Area, South and East Addition (as shown on Louisiana Leasing Map LA10A), containing 1,125 acres from the surface of the earth down to a subsea depth of 1,900 feet with respect to the following described portions:

SW_{1/4}NE_{1/4}; NW_{1/4}SE_{1/4}NE_{1/4};
W_{1/2}NE_{1/4}SE_{1/4}NE_{1/4};
S_{1/2}S_{1/2}NW_{1/4}NE_{1/4};
S_{1/2}SW_{1/4}NE_{1/4}NE_{1/4};
S_{1/2}SW_{1/4}SE_{1/4}NE_{1/4}NE_{1/4};
N_{1/2}SW_{1/4}SE_{1/4}NE_{1/4};
SW_{1/4}SW_{1/4}SE_{1/4}NE_{1/4}; NW_{1/4}SE_{1/4}SE_{1/4}NE_{1/4};
N_{1/2}NW_{1/4}SW_{1/4}SE_{1/4}NE_{1/4};
N_{1/2}SE_{1/4}SW_{1/4}SE_{1/4}NE_{1/4};
N_{1/2}S_{1/2}SE_{1/4}SW_{1/4}SE_{1/4}NE_{1/4};
S_{1/2}NE_{1/4}NW_{1/4};
S_{1/2}S_{1/2}N_{1/2}NE_{1/4}NW_{1/4};
N_{1/2}SE_{1/4}NW_{1/4}; S_{1/2}SE_{1/4}NW_{1/4}NW_{1/4};
NE_{1/4}SE_{1/4}NW_{1/4}NW_{1/4};
E_{1/2}NE_{1/4}SW_{1/4}NW_{1/4};
N_{1/2}SE_{1/4}SE_{1/4}NW_{1/4};
NE_{1/4}SW_{1/4}SE_{1/4}NW_{1/4};
N_{1/2}NW_{1/4}SW_{1/4}SE_{1/4}NW_{1/4};
SE_{1/4}SE_{1/4}SE_{1/4}NW_{1/4};
E_{1/2}SW_{1/4}SE_{1/4}SE_{1/4}NW_{1/4};
N_{1/2}NW_{1/4}NE_{1/4}SW_{1/4}NW_{1/4};
N_{1/2}S_{1/2}NW_{1/4}NE_{1/4}SW_{1/4}NW_{1/4};
N_{1/2}N_{1/2}NE_{1/4}NE_{1/4}NE_{1/4}SW_{1/4};
N_{1/2}N_{1/2}N_{1/2}NW_{1/4}NW_{1/4}SE_{1/4};
N_{1/2}N_{1/2}NW_{1/4}NE_{1/4}NW_{1/4}SE_{1/4}

• Any remaining blocks in which the status of existing leases is under appeal, if the lease status is not resolved before publication of the Final NOS.

The final list of blocks available for bid will be posted on BOEM's website at <https://www.boem.gov/Sale-BBG1>.

II. Statutes and Regulations

Each lease is issued pursuant to the OBBBA and OCSLA, 43 U.S.C. 1331 *et seq.*, as amended, and is subject to OCSLA implementing regulations promulgated pursuant thereto in 30 CFR part 556, and other applicable statutes and regulations in existence upon the effective date of the lease, as well as those applicable statutes enacted and regulations promulgated thereafter,

except to the extent that the after-enacted statutes and regulations explicitly conflict with an express provision of the lease. Each lease is subject to amendments to statutes and regulations, including but not limited to OCSLA, that do not explicitly conflict with an express provision of the lease. The lessee expressly bears the risk that such new or amended statutes and regulations (*i.e.*, those that do not explicitly conflict with an express provision of the lease) may increase or decrease the lessee's obligations under the lease. BOEM reserves the right to reject any and all bids received, regardless of the amount offered (see 30 CFR 556.516).

Section 50102(a)(1) of the OBBBA requires the Secretary to conduct a minimum of 30 offshore lease sales in the Gulf of America Region through 2040, notwithstanding the 2024–2029 Outer Continental Shelf Oil and Gas Leasing Program (or any successor leasing program that does not satisfy the requirements of the OBBBA). This lease sale constitutes the first lease sale required by OBBBA in the Gulf of America. The statute sets a specific timing requirement, directing the Secretary to hold not fewer than 1 lease sale in that aforementioned area by December 15, 2025, at least two lease sales in each calendar year from 2026 through 2039 (by March 15 and August 15 of each applicable year), and at least one sale by March 15, 2040. The statute further requires specific Terms and Stipulations that must be used for these sales, stating that the Secretary must “offer the same lease form, lease terms, economic conditions, and stipulations as contained in the final notice of sale of the Bureau of Ocean Energy Management entitled for the ‘Gulf of Mexico Outer Continental Shelf Region-Wide Oil and Gas Lease Sale 254’ (85 FR 8010 (February 12, 2020)).”

The OBBBA was signed into law on July 4, 2025, and contains statutory requirements to conduct a lease sale in the Gulf of America with specific parameters and timing requirements. All GOA oil and gas lease sales mandated

by the OBBBA must offer the same lease form, lease terms, economic conditions, and lease stipulations 4 through 9 as identified in the Lease Sale 254 Final NOS (85 FR 8010), which was published on February 12, 2020. Additionally, the OBBBA requires the Secretary of the Interior to set royalty rates at not less than 12½ percent and not more than 16⅔ percent; establishes a 10-year primary term for deepwater GOA leases; requires not fewer than 80 million acres to be offered, or all available unleased acres if less than 80 million acres are available; and increases the amount of revenue sharing pursuant to the Gulf of Mexico Energy Security Act of 2006 (GOMESA, Pub. L. 109–432) from \$500 million to \$650 million through 2034. The annual GOMESA revenue sharing caps continue thereafter at \$500 million per year through 2055, after which there will be no caps on GOMESA revenue sharing.

III. Lease Terms and Economic Conditions

BOEM will offer leases that include certain terms and conditions to ensure compliance with the requirements of the OBBBA.

OCS Lease Form

Pursuant to Section 50102(b)(1)(A) of the OBBBA, BOEM will use Form BOEM–2005 (February 2017) to convey leases resulting from this sale. This lease form can be viewed on BOEM's website at <http://www.boem.gov/BOEM-2005>. The lease form will be amended to include specific terms, conditions, and stipulations applicable to the individual lease. The final terms, conditions, and stipulations applicable to this sale are below.

Primary Terms

Section 50102(b)(1)(A) of the OBBBA requires that the primary term for leases in water depths less than 800 meters to be the same as those in Lease Sale 254. Additionally, Section 50102(b)(1)(D) requires a primary term of 10 years for leases offered in water depths 800 meters or deeper. The primary terms for

this sale are summarized in the following table:

TABLE 4—PRIMARY TERMS

Water depth (meters)	Primary term
0 to <400	The primary term is 5 years; the lessee may earn an additional 3 years (<i>i.e.</i> , for an 8-year extended primary term) if a well is spudded targeting hydrocarbons below 25,000 feet True Vertical Depth Subsea (TVDSS) during the first 5 years of the lease.
400 to <800	The primary term is 5 years; the lessee will earn an additional 3 years (<i>i.e.</i> , for an 8-year extended primary term) if a well is spudded during the first 5 years of the lease.
800 + ...	10 years.

1. The primary term for a lease in water depths of less than 400 meters is 5 years. If the lessee spuds a well targeting hydrocarbons below 25,000 feet TVDSS within the first 5 years of the lease, then the lessee may earn an additional 3 years, resulting in an 8-year primary term. The lessee will earn the 8-year primary term when the well is drilled to a target below 25,000 feet TVDSS; or the lessee may earn the 8-year primary term in cases where the well targets, but does not reach, a depth below 25,000 feet TVDSS due to mechanical or safety reasons that are beyond the lessee’s control, and that are supported by sufficient evidence from the lessee. To earn the 8-year primary term, the lessee is required to submit a letter to the BOEM GOA Regional Supervisor, Office of Leasing and Plans, as soon as practicable, but no more than 30 days after completion of the drilling operation, providing the well number, spud date, information demonstrating a target below 25,000 feet TVDSS and whether that target was reached, and if applicable, any safety or mechanical reasons encountered that prevented the well from reaching a depth below 25,000 feet TVDSS. In the letter, the lessee must request confirmation from BOEM that the lessee earned the 8-year primary term. The BOEM GOA Regional

Supervisor for Leasing and Plans will confirm in writing, within 30 days of receiving the lessee’s letter, whether the lessee has earned the extended primary term and accordingly update BOEM’s records. The extended primary term is not effective unless and until the lessee receives confirmation from BOEM. A lessee that has earned the 8-year primary term by spudding a well with a hydrocarbon target below 25,000 feet TVDSS during the standard 5-year primary term of the lease will not be granted a suspension for that same period under the regulations at 30 CFR 250.175 because the lease is not at risk of expiring.

2. The primary term for a lease in water depths ranging from 400 meters to less than 800 meters is 5 years. If the lessee spuds a well within the 5-year primary term of the lease, the lessee may earn an additional 3 years, resulting in an 8-year primary term. To earn the 8-year primary term, the lessee is required to submit a letter to the BOEM GOA Regional Supervisor, Office of Leasing and Plans, as soon as practicable, but no more than 30 days after spudding a well, providing the well number and spud date, and requesting confirmation from BOEM that the lessee earned the 8-year extended primary term. Within 30 days of receipt of the request, the BOEM GOA

Regional Supervisor for Leasing and Plans will provide written confirmation of whether the lessee has earned the extended primary term and accordingly update BOEM’s records. The extended primary term is not effective unless and until the lessee receives confirmation from BOEM.

3. The primary term for a lease in water depths 800 meters or deeper is 10 years.

Minimum Bonus Bid Amounts

Pursuant to Section 50102(b)(1)(A) of the OBBBA, the minimum bonus bids are the same as those used in Lease Sale 254. BOEM will not accept a bonus bid unless it provides for a cash bonus in an amount equal to or exceeding the specified minimum bid, as described below.

- \$25 per acre or fraction thereof for blocks in water depths less than 400 meters; and
- \$100 per acre or fraction thereof for blocks in water depths 400 meters or deeper.

Rental Rates

Pursuant to Section 50102(b)(1)(A) of the OBBBA, rental rates are the same as those used in Lease Sale 254. Annual rental rates, per acre or fraction thereof, are summarized in the following table:

TABLE 5—RENTAL RATES PER ACRE OR FRACTION THEREOF

Water depth (meters)	Years 1–5	Year 6	Year 7	Year 8+
0 to <200	\$7	\$14	\$21	\$28
200 to <400	11	22	33	44
400 + ...	11	16	16	16

Escalating Rental Rates for Leases With an 8-Year Primary Term in Water Depths Less Than 400 Meters

Any lessee with a lease in less than 400 meters water depth who earns an 8-year primary term will pay an escalating rental rate as shown above. The rental rates after the fifth year for blocks in less

than 400 meters water depth will become fixed and no longer escalate if another well is spudded targeting hydrocarbons below 25,000 feet TVDSS after the fifth year of the lease, and BOEM concurs that such a well has been spudded. In this case, the rental rate will become fixed at the rental rate

in effect during the lease year in which the additional well was spudded.

Minimum Royalty Rate

Pursuant to Section 50102(b)(1)(A) of the OBBBA, the minimum royalty rates are the same as those used in Lease Sale 254:

- \$7.00 per acre or fraction thereof per year for blocks in water depths less than 200 meters; and
- \$11.00 per acre or fraction thereof per year for blocks in water depths 200 meters or deeper.

Royalty Rate

The royalty rate is the minimum allowed by Section 50102(b)(1)(C) of the OBBBA:

- 12½ percent for blocks in all water depths.

Royalty Suspension Provisions

Pursuant to Section 50102(b)(1)(A) of the OBBBA, the royalty suspensions offered in this sale are the same as those offered in Lease Sale 254. The Department may issue leases with Royalty Suspension Volumes (RSVs) under 30 CFR part 560, which BOEM administers. The specific details relating to eligibility and implementation of RSVs and other royalty relief programs are found at 30 CFR part 203, which the Bureau of Safety and Environmental Enforcement administers.

Royalty Suspension Volumes on Gas Production From Ultra-Deep Wells

Pursuant to 30 CFR part 203, certain leases issued because of this sale may be eligible for RSV incentives on gas produced from ultra-deep wells. Under this program, wells on leases in less than 400 meters water depth and completed to a drilling depth of 20,000 feet TVDSS or deeper receive an RSV of 35 billion cubic feet on the production of natural gas. This RSV incentive is subject to applicable price thresholds set forth in the regulations at 30 CFR part 203. These regulations implement the requirements of the Energy Policy Act of 2005 (Pub. L. 109–58, 119 Stat. 594 (2005)).

IV. Lease Stipulations

Pursuant to Section 50102(b)(1)(A) of the OBBBA, BOEM must use the same lease stipulations 4 through 9 that were provided in the Lease Sale 254 Final NOS. BOEM has updated Stipulations 1, 2, 3, and 10, where applicable, to reflect current conditions in the GOA.

One or more of the stipulations below may be applied to leases issued in this sale. The applicable blocks for each stipulation are identified on the map entitled, “Final Gulf of America Oil and Gas Lease Sale BBG1, December 2025, Stipulations and Deferred Blocks,” which is included in the Final NOS package. The full text of the following stipulations is contained in the “Lease Stipulations” section of the Final NOS package. BOEM has posted the final list of blocks available for bid and the

applicable stipulations that apply to those blocks on its website at <https://www.boem.gov/Sale-BBG1> under the Final NOS tab.

1. Military Areas
2. Evacuation
3. Coordination
4. Protected Species
5. Topographic Features
6. United Nations Convention on the Law of the Sea Royalty Payment
7. Agreement between the United States and Mexico Concerning Transboundary Hydrocarbon Reservoirs
8. Live Bottom
9. Blocks South of Baldwin County, Alabama
10. Restrictions due to Rights-of-Use and Easement for Floating Production Facilities

V. Information to Lessees

Information to Lessees (ITLs) provide detailed information on certain issues pertaining to specific oil and gas lease sales. The full text of the ITLs for this sale is contained in the “Information to Lessees” section of the Final NOS package and covers the following topics.

1. Navigation Safety
2. Ordnance Disposal Areas
3. Existing and Proposed Artificial Reefs/Rigs-to-Reefs
4. Lightering Zones
5. Indicated Hydrocarbons List
6. Military Areas
7. Bureau of Safety and Environmental Enforcement Inspection and Enforcement of Certain U.S. Coast Guard Regulations
8. Significant Outer Continental Shelf Sediment Resource Areas
9. Notice of Arrival on the Outer Continental Shelf
10. Bidder/Lessee Notice of Obligations Related to Criminal/Civil Charges and Offenses, Suspension, or Debarment; Disqualification Due to a Conviction under the Clean Air Act or the Clean Water Act
11. Protected Species
12. Expansion of the Flower Garden Banks National Marine Sanctuary
13. Communication Towers
14. Deepwater Port Applications for Offshore Oil and Liquefied Natural Gas Facilities
15. Ocean Dredged Material Disposal Sites
16. Rights-of-Use and Easement
17. Industrial Waste Disposal Areas
18. Gulf Islands National Seashore
19. Air Quality Permit/Plan Approvals
20. Provisions Pertaining to Certain Transactions by Foreign Persons Involving Real Estate in the United States

VI. Maps

The maps pertaining to this lease sale can be viewed on BOEM’s website at <https://www.boem.gov/Sale-BBG1>. The following maps also are included in the Final NOS package:

Sale Area Map

The sale area is shown on the map entitled, “Final Oil and Gas Sale Area for Sale BBG1.”

Lease Terms and Economic Conditions Map

The lease terms and economic conditions associated with leases of certain blocks are shown on the map entitled, “Final Gulf of America Oil and Gas Lease Sale BBG1, December 2025, Lease Terms and Economic Conditions.”

Stipulations and Deferred Blocks Map

The lease stipulations and the blocks to which they apply are shown on the map entitled, “Final Gulf of America Oil and Gas Lease Sale BBG1, December 2025, Stipulations and Deferred Blocks.”

VII. Bidding Instructions

Prior to the bid submission deadline, bids may be submitted through any parcel delivery service (e.g., FedEx, UPS, U.S. Postal Service, DHL) or in-person at the address listed in the “Mailed Bid Submission” section.

Instructions on how to submit a bid, secure payment of the advance bonus bid deposit (if applicable), and the information to be included with the bid are as follows:

Bid Form

For each block bid upon, a separate sealed bid must be submitted in a sealed envelope (as described below) and include the following items:

- Total amount of the bid in whole dollars only;
- Sale number;
- Sale date;
- Each bidder’s exact name;
- Each bidder’s proportionate interest, stated as a percentage, using a maximum of five decimal places (e.g., 33.33333 percent);
- Typed name and title, and signature of each bidder’s authorized officer. Electronic signatures are acceptable. The typed name, title, and signature must agree exactly with the name and title on file in the BOEM Gulf of America OCS Region Adjudication Section;
- Each bidder’s BOEM qualification number;
- Map name and number or OPD name and number;

- Block number; and
- Statement acknowledging that the bidder(s) understands that this bid legally binds the bidder(s) to comply with all applicable regulations, including the requirement to post a deposit in the amount of one-fifth of the bonus bid amount for any tract bid upon and make payment of the balance of the bonus bid and first year's rental upon BOEM's acceptance of high bids.

The information required for each bid is specified in the document "Bid Form" that is available in the Final NOS package, which can be found at <https://www.boem.gov/Sale-BBG1>. A blank bid form is provided in the Final NOS package for convenience and can be copied and completed with the necessary information described above.

Bid Envelope

Each bid must be submitted in a separate sealed envelope labeled as follows:

- "Sealed Bid for Lease Sale BBG1, not to be opened until 9 a.m. Wednesday, December 10, 2025";
- Map name and number or OPD name and number;
- Block number for block bid upon;
- Acreage, if the bid is for a block that is split between the Central and Eastern Planning Areas; and
- The exact name and qualification number of the submitting bidder only.

The Final NOS package includes a sample bid envelope for reference.

Mailed Bid Submission

If bids will be mailed, BOEM advises bidders to inform BOEM by email at BOEMGulfLeaseSalesAttendance@boem.gov immediately after placing bid(s) in the mail. Please address the envelope containing the sealed bid envelope(s) as follows:

Attention: Leasing and Financial Responsibility Section, BOEM New Orleans Office, 1201 Elmwood Park Boulevard MS-266A, New Orleans, Louisiana 70123-2394, Contains Sealed Bids for Lease Sale BBG1, Please Deliver to Mr. Pedro Levy or Mrs. Karoline DiPerna, 2nd Floor, Immediately

Please Note: Bidders are advised to inform BOEM by email at BOEMGulfLeaseSalesAttendance@boem.gov immediately after placing bid(s) in the mail. This provides advance notice to BOEM regarding pending bids before the bid submission deadline. In the email, please state the tracking number of the bid package, the number of bids being submitted, and the email address of the person who should receive the bid receipt for signature. If BOEM receives bids later than the bid submission deadline, the BOEM GOA Regional Director (RD) will return those bids unopened to bidders. Please see Section XI, "Delay of

Sale," regarding BOEM's discretion to extend the bid submission deadline in the case of an unexpected event (e.g., flooding) and how bidders can obtain more information on such extensions.

In-Person Bid Submission and/or In-Person Bid Reading

Bidders *must* advise BOEM via email at BOEMGulfLeaseSalesAttendance@boem.gov no later than 4:00 p.m. on November 21, 2025, if the intention is to participate in Lease Sale BBG1 in person for bid submission, bid reading, or both. BOEM will promptly respond to the email with additional instructions for gaining security clearance to attend bid submission and/or bid reading in-person. Bidders who do not notify BOEM and gain clearance to attend in advance will not be granted access to the venue and will be instructed to mail in bids, which must arrive prior to the bid submission deadline.

Advance Bonus Bid Deposit Guarantee

Bidders who are not currently an OCS oil and gas lease record title holder or designated operator, or those who have ever defaulted on a one-fifth bonus bid deposit, must guarantee (secure) the payment of the one-fifth bonus bid deposit, by Electronic Funds Transfer (EFT) or otherwise, *before* bid submission using one of the following four methods:

- Provide a third-party guarantee;
- Amend a development stage area-wide bond via bond rider;
- Provide a letter of credit; or
- Provide a lump sum payment in advance via EFT.

Please provide, at the time of bid submittal, a confirmation or tracking number for the payment, the name of the company submitting the payment as it appears on the payment, and the date the payment was submitted so that BOEM can confirm payment with the Office of Natural Resources Revenue (ONRR). Bidders should submit payments to their financial institution at least 5 business days prior to bid submittal to ensure that the Office of Foreign Assets Control and the U.S. Department of the Treasury (U.S. Treasury) have time to screen and process payments and that payments are posted to ONRR prior to placing the bid. ONRR cannot confirm payment until the monies have been moved into settlement status by the U.S. Treasury. Bids will not be accepted if BOEM cannot confirm payment with ONRR before 10:00 a.m. on Tuesday, December 9, 2025.

If providing a third-party guarantee, amending a development stage area-wide bond via bond rider, or providing

a letter of credit to secure your one-fifth bonus bid deposit, bidders are urged to file these documents with BOEM well in advance of submitting the bid. This allows processing time and ensures bidders have time to take any necessary curative actions prior to bid submission. For more information on EFT procedures, see Section X, "The Lease Sale."

Geophysical Data and Information Statement (GDIS)

The GDIS is composed of five parts:

1. A "Statement" page that includes the company representatives' information and separate lists of blocks bid on that used proprietary data and those blocks bid upon that did not use proprietary data;
2. A "Table" listing the required data about each proprietary survey used (see below);
3. A "Survey Parameter Worksheet" listing acquisition geometry, frequency range, fold coverage and processing methods for each survey (see below);
4. "Maps," which contain the live trace maps for each proprietary survey and fast-track survey that are identified in the GDIS statement and table; and
5. Proprietary geophysical and fast-track data need to be submitted along with the GDIS.

Every bidder submitting a bid on a block in Lease Sale BBG1 or participating as a joint bidder in such a bid must submit at the time of bid submission all four parts of the GDIS. A bidder must submit the GDIS *even if a joint bidder or bidders on a specific block also have submitted a GDIS*. Any speculative data that has been reprocessed externally or "in-house" is considered proprietary due to the proprietary processing and is no longer considered to be speculative.

The bidder and joint bidder must submit the GDIS in a separate and sealed envelope and must identify all proprietary data; reprocessed speculative data, and/or any Controlled Source Electromagnetic surveys, Amplitude Versus Offset (AVO) data, gravity data, and/or magnetic data; or other data or information used as part of the decision to bid or participate in a bid on the block.

The bidder and joint bidder must also include a live trace map (e.g., .pdf and ArcGIS shapefile) for each proprietary survey identified in the GDIS illustrating the actual areal extent of the proprietary geophysical data in the survey (see the "Example of Preferred Format" that is included in the Final NOS package for additional information). The shape file must not include cultural resources information;

only the live trace map of the survey itself.

The GDIS statement must include the name, phone number, and full address for a contact person and an alternate, who are both knowledgeable about the geophysical information and data listed and who are available for 30 days after the sale date. The GDIS statement must also include a list of all blocks bid upon, including those blocks where no proprietary or reprocessed geophysical data and/or proprietary information was used, as a basis for the bidder's decision to bid or to participate as a joint bidder in the bid. All bidders must submit the GDIS statement even if no proprietary geophysical data or information was used in its bid preparation for the block.

Examples of the preferred format of the table and parameter worksheet are included in the Final NOS package, and a blank digital version of the preferred table and Survey Parameter Worksheet can be accessed on the Lease Sale BBG1 website at <https://www.boem.gov/Sale-BBG1>. The GDIS table should have columns that clearly state the following:

- The sale number;
- The bidder company's name;
- The joint bidder's company's name (if applicable);
- The company providing proprietary data to BOEM;
- The block area and block number bid upon;
- The owner of the original data set (i.e., who initially acquired the data);
- The industry's original name of the survey (e.g., E Octopus);
- The BOEM permit number for the survey;
- Whether the data set is a fast-track version; BOEM will request all fast-track data;
- Whether the data is speculative or proprietary;
- The data type (e.g., 2-D, 3-D, or 4-D; pre-stack or post-stack; time or depth);
- The migration algorithm (e.g., Kirchhoff migration, wave equation migration, reverse migration, reverse time migration) of the data and areal extent of bidder survey (i.e., number of line miles for 2-D or number of blocks for 3-D);
- The live proprietary survey coverage (2-D miles 3-D blocks);
- The computer storage size, to the nearest gigabyte, of each seismic data and velocity volume used to evaluate the lease block;
- Who reprocessed the data;
- The date on which the final reprocessing was completed (month and year);
- If the data was previously sent to BOEM, list the sale number and date of the sale for which it was used;

- Whether proprietary or speculative AVO/AVA (PROP/SPEC) was used;
- The date on which the AVO or AVA was sent to BOEM, if it was sent before the sale;
- Whether AVO/AVA is time or depth (PSTM or PSDM);
- Which angled stacks were used (e.g., NEAR, MID, FAR, ULTRAFAR);
- Whether the company used Gathers to evaluate the block in question; and
- List of other Geophysical Data methods used to evaluate the bid block (Inversion, Modeling, Illumination, Grav, Mag, etc.).

BOEM will use the computer storage size information to estimate the reproduction costs for each data set, if applicable. BOEM will determine the availability of reimbursement of production costs consistent with 30 CFR 551.13.

BOEM reserves the right to inquire about alternate data sets, perform quality checks, and compare the listed and alternative data sets to determine which data set most closely meets the needs of the fair market value determination process. See the "Example of Preferred Format" that is included in the Final NOS package.

Survey Parameter Worksheet

The BOEM GOA Region now requires bidders to submit a completed electronic version of the Survey Parameters Worksheet alongside any Seismic Survey submittal. This worksheet plays a critical role in supporting BOEM's Fair Market Value (FMV) Evaluation Methodology, which is used to assess the economic value of leases offered in OCS lease sales. The data provided in the worksheet allows BOEM to better understand the technical scope and intent behind each seismic survey, and how those data contribute to subsurface interpretation and prospectivity analysis.

By supplying detailed parameters—such as acquisition geometry, frequency range, fold coverage, and processing methods—bidders provide BOEM with the context necessary to:

- Qualitatively assess the degree of geological understanding obtained from the survey;
- Evaluate the quality and resolution of seismic imaging, which can directly influence the identification of leads and prospects;
- Determine the likelihood of successful hydrocarbon identification, by considering how the data may mitigate or highlight geological risks;
- Identify geophysical phenomena (e.g., amplitude anomalies, velocity pull-ups, multiples, etc.) that could

impact the interpretation and chance of success;

- Assess the commercial implications of the survey in supporting new play concepts or de-risking known trends.

Ultimately, the inclusion of this worksheet enhances the transparency and technical rigor behind BOEM's FMV assessments. It ensures that economic evaluations are informed by the best available subsurface data and geological interpretations, helping to safeguard the public interest in OCS resource development.

Bidders are encouraged to complete the worksheet with care and accuracy, as it will directly inform BOEM's ability to fairly and accurately evaluate lease block value based on current geoscientific insight.

Glossary of Terms in order the terms appear in the Seismic Parameter Worksheet:

- *BOEM Project Name*: Please do not fill out. This element is for internal BOEM purposes.

- *Seismic Vendor*: List the company who shot the survey.

- *Industry Survey Name*: List the name of the original survey.

• *Speculative or Proprietary*: Speculative is data that is available for purchase from a vendor for anyone; the original data "right out of the box." Proprietary is any data that was acquired by an E&P Company or Speculative Data that has become proprietary through reprocessing. Any speculative data such as 2-D or 3-D, pre-stack or post-stack, time or depth, amplitude with offset (AVO), inversion, CSEM, gravity and magnetic data that has been modified or changed from its original processing would be considered proprietary due to the proprietary processing.

- *2D/3D/4D*: List the acquisition type.
- *Time/Depth*: List the survey domain.

- *Acquisition Company (if different from Vendor)*: The Field Acquisition Company could be different from the Final Processed Survey Vendor.

- *Acquisition Project Name (if different from Final Processed Industry Survey Name)*: Acquisition Project Name could be different than Final Processed Survey Name especially when Merging Shoots and/or Reprocessing.

- *Acquisition Date*: List the date the field acquisition was complete.

- *Maximum Offset (Inline/Crossline)/(X/Y)*: Maximum distance between source and receiver. Offset can be different in Inline and Crossline direction.

- *Streamer or OBN*: Examples are marine towed streamer, seafloor cable, or seafloor nodes.

- *Streamer depth*: Depth of streamer below the water.

- *Streamer configuration (example: Multistreamer: ten 8,000m cables or 1,000 seafloor nodes)*: Description of receivers including how many cables and length of each.

- *Hydrophone type (2D (P wave), 2D (P+S wave), 3D (P Wave), 3D (P+S, Multicomponent))*: Describe the richness of the hydrophones.

- *Receiver Group Interval (DGF)(meters)*: The distance between two consecutive receivers located on the same receiver line.

- *Azimuth Distribution (NAZ, MAZ, WAZ, RAZ, FAZ)*: List the quality of the azimuth distribution in the survey.

- *Azimuth Orientation (either degree or cardinal direction)*: List the direction of the acquisition; example (N/S and W/E or 0/180 and 90/270).

- *Energy Source (# sources, # source vessels, cubic inches per array)*: Describe the source array and source vessel.

- *Source Depth*: Depth the source array is towed below the sea-surface.

- *Shot Interval*: Time between shots. Could also be recorded as distance between shots.

- *Sample Rate (ms)*: Time between vertical trace samples.

- *Record Length*: Total time of seismic shot record. (Number of samples per trace) x (sample rate).

- *Recorded bin dimensions (Example: 6.25 x 60m)*: The recorded grid dimensions in Inline and Crossline.

- *Fold*: The number of traces, or midpoints, within each CMP bin. Multiplicity of the CMP data.

- *Seismic Processing Vendor*: Company that completed the final processing for the survey.

- *Processing Completed Year*: Year the processing was completed.

- *Migration/Processing Type*: Examples are Post-Stack Time, Post-Stack Depth, Pre-Stack Time, and Pre-Stack Depth. Please list all that apply.

- *Processed Bin Size (specify either feet or meters, e.g., 25m x 30m)*: Bin size of the final processed product.

- *Migration algorithm(s)*: Migration types include: Kirchhoff, Beam, WEM, RTM, LSRTM, FWI or other. Please list all Migrations submitted with survey.

- *Velocity Build*: (Salt, Salt + Wells, Acoustic FWI, Elastic FWI). List the highest complexity of data involved with building the velocity model.

- *Illumination Study Type & Reliability (None, highly suspect, reasonable reliability, Full 3D wavefield)*. List the quality of the Illumination Study.

- *Velocity Anisotropy Used? Type? (HTI, VTI, TTI, other, none)*. List the type of anisotropy used in the velocity.

- *For Sub-Stack Volumes, list class and offset or angle range per volume*. (Example, Mid Offset Range: 5000'–7000' or Mid Angle Range: 24deg–30deg). Use a separate line for each sub-stack volume. Include the angle or offset range.

- *CSEM Source Type (HED—Horizontal Dipole or VED—Vertical Dipole)*: Type of CSEM Source.

- *CSEM Receiver Type (Seabed Nodes or Surface Towed Receiver)*: Type of receiver.

- *Inversion Year*: Year the inversion was completed.

- *Receiver Spacing*: Spacing between receiver/nodes.

- *Source Line Spacing*: Spacing between source lines.

- *Inversion Type (1D, 2D, 3D)*: Geometry/Complexity of the Inversion.

- *Inversion Type (Isotropic or Anisotropic)*: List if Inversion was Isotropic or Anisotropic.

- *TTI (Tilted Transverse Isotropy) performed (yes, no, unknown)*. If TTI applied, indicate Yes or No.

- *Is Inversion Speculative or Proprietary (Prospect Specific)?* Is the Inversion speculative or proprietary.

The GDIS maps are live trace maps (e.g., .pdf and ArcGIS shapefiles) that bidders should submit for each proprietary survey identified in the GDIS table. The maps should illustrate the actual areal extent of the proprietary geophysical data in the survey (see the “Example of Preferred Format” that is included in the Final NOS package for additional information). As previously stated, the shapefile must not include cultural resources information, only the live trace map of the survey itself.

Pursuant to 30 CFR 551.12 and 556.501, as a condition of the sale, the BOEM GOA RD requests that all bidders and joint bidders submit the proprietary data and fast-track data identified on their GDIS within 30 days after the lease sale (unless notified after the lease sale that BOEM has withdrawn the request). This request only pertains to proprietary data and fast-track data that is not commercially available. Commercially available data should not be submitted to BOEM unless specifically requested by BOEM. The BOEM GOA RD will notify bidders and joint bidders of any withdrawal of the request, for all or some of the proprietary data identified on the GDIS, within 15 days of the lease sale. BOEM requires all data that are considered proprietary and fast-track to be submitted for the evaluation of the bid blocks. Pursuant to 30 CFR part 551 and 30 CFR 556.501, as a condition of

this sale, all bidders that are required to submit data must ensure that the data are received by BOEM along with the GDIS for the lease sale. The proprietary and fast-track data must be submitted to BOEM at the following address: Bureau of Ocean Energy Management, Resource Studies, GM 881A, 1201 Elmwood Park Blvd., New Orleans, Louisiana 70123–2304.

BOEM recommends that bidders mark the submission's external envelope as “Deliver Immediately to DASPU.”

BOEM also recommends that bidders submit the GDIS data and Survey Parameter Worksheet in an internal envelope, or otherwise marked, with the following designation: “Geophysical Data and Information Statement for Oil and Gas Lease Sale BBG1”, Company Name, GOA Company Qualification Number, and “Proprietary Data.”

In the event a person supplies any type of data to BOEM, that person must meet the following requirements to qualify for reimbursement:

1. Must be registered with the System for Award Management (SAM), formerly known as the Central Contractor Registration (CCR). CCR usernames will not work in SAM. A new SAM user account is needed to register or update an entity's records. The website for registering is SAM.gov.

2. Must be enrolled in the U.S. Treasury's Invoice Processing Platform (IPP) for electronic invoicing; to enroll go to <https://www.ipp.gov/>. Access then will be granted to use the IPP for submitting requests for payment. When submitting a request for payment, the assigned Purchase Order Number must be included.

3. Must have a current Online Representations and Certifications Application at SAM.gov.

Please Note: Digital copies and duplicate hardcopies should be submitted for the GDIS Statement, Table, and Maps. The GDIS Statement should be sent in as a digital PDF. The GDIS Information Table must be submitted digitally as an Excel spreadsheet. The proprietary data and fast-track data maps should be sent in as PDF files and the live trace outline of each proprietary survey and fast-track survey should also be submitted as a shapefile. Please flatten all layered PDF files, since layered PDFs can have many objects. Layered PDFs can cause problems opening or printing the file correctly. Bidders may submit the digital files on a CD, DVD, or any USB external drive (formatted for Windows). If bidders have any questions, please contact Ms. Dee Smith at (504) 736–2706, or Ms. Tere Campbell at (504) 736–3231.

Bidders should refer to the “Acceptance, Rejection, or Return of Bids” heading under Section X, “The Lease Sale,” regarding a bidder's failure

to comply with the requirements of the Final NOS, including any failure to submit information required in the Final NOS package.

Telephone Numbers/Addresses of Bidders

BOEM requests that bidders provide this information in the suggested format prior to or at the time of bid submission. The suggested format is included in the Final NOS package. The form must not be enclosed inside the sealed bid envelope.

Additional Documentation

BOEM may require bidders to submit other documents in accordance with 30 CFR 556.107, 556.401, 556.501, and 556.513.

VII. Bidding Rules and Restrictions

Restricted Joint Bidders

On November 4, 2025, BOEM published the most recent List of Restricted Joint Bidders in the **Federal Register** (90 FR 49242). Potential bidders are advised to refer to the **Federal Register** before bidding for the most current list at the time of the lease sale. Please refer to the joint bidding provisions at 30 CFR 556.511–556.515.

Authorized Signatures

All signatories executing documents on behalf of the bidder(s) must execute the same in conformance with the BOEM qualification records. Bidders are advised that BOEM considers the signed bid to be a legally binding obligation on the part of the bidder(s) to comply with all applicable regulations, including the required payment of one-fifth of the bonus bid on all high bids. A statement to this effect is included on each bid form (see the document “Bid Form and Envelope” that is included in the Final NOS package).

Unlawful Combination or Intimidation

BOEM warns bidders against violation of 18 U.S.C. 1860, which prohibits unlawful combination or intimidation of bidders.

Bid Withdrawal

Bids may only be withdrawn by written request delivered to BOEM via any parcel delivery service, or in-person prior to the bid submission deadline. Withdrawals will not be accepted via email. The withdrawal request must be on company letterhead and must contain the bidder's name, its BOEM qualification number, the map name and number, and the block number(s) of the bid(s) to be withdrawn. The withdrawal request must be executed by one or more of the representatives

named in the BOEM qualification records. The name and title of the authorized signatory must be typed under the signature block on the withdrawal request. The BOEM GOA RD, or the RD's designee, will indicate approval by signing and dating the withdrawal request.

Bid Rounding

Minimum bonus bid calculations, including rounding, for all blocks are shown in the document “List of Blocks Available for Leasing” that is included in the Final NOS package. The bonus bid amount must be stated in whole dollars. If the acreage of a block contains a decimal figure, then prior to calculating the minimum bonus bid, BOEM will round up to the next whole acre. The appropriate minimum rate per acre will be applied to the whole (rounded up) acreage. The bonus bid amount must be greater than or equal to the minimum bonus bid, as calculated and stated in the Final NOS package.

IX. Forms

The Final NOS package includes instructions, samples, and/or the preferred format for the items listed below. BOEM strongly encourages bidders to use the recommended formats. If bidders use another format, they are responsible for including all the information specified for each item in the Final NOS package.

1. Bid Form
2. Sample Completed Bid
3. Sample Bid Envelope
4. Sample Bid Mailing Envelope
5. Telephone Numbers/Addresses of Bidders Form
6. Survey Parameters Worksheet
7. GDIS Form
8. GDIS Envelope Form

X. The Lease Sale

Bid Opening and Reading

Sealed bids received in response to the Final NOS will be opened at the place, date, and hour specified under the **DATES** and **ADDRESSES** sections of the Final NOS. The venue will not be open to the public. Instead, the bid opening will be available for the public to view on BOEM's website at <http://www.boem.gov> via live streaming. Bidders participating in Lease Sale BBG1 who have gained the required clearance as stated in the “In-person Bid Submission and/or In-person Bid Reading” section will be allowed to view bid reading in person. The opening of the bids is for the sole purpose of publicly announcing and recording the bids received; no bids will be accepted or rejected at that time.

Bonus Bid Deposit for Apparent High Bids

Each bidder submitting an apparent high bid must submit a bonus bid deposit to ONRR equal to one-fifth of the bonus bid amount for each such bid. A copy of the notification of the high bidder's one-fifth bonus bid amount can be obtained on the BOEM website at <https://www.boem.gov/Sale-BBG1> under the heading “Notification of EFT 1/5 Bonus Liability” after 1:00 p.m. on the day of the sale. All payments must be electronically deposited into an interest-bearing account in the U.S. Treasury by 1:00 p.m. Eastern Time the day following the bid reading (no exceptions). Account information is provided in the “Instructions for Making Electronic Funds Transfer Bonus Payments” found on the BOEM website identified above.

Bidders must submit payment to their financial institution as soon as possible on the day of bid reading and no later than 7:00 p.m. Eastern Time on the day of bid reading. This will help ensure that deposits have time to process through the U.S. Treasury and post to ONRR. ONRR cannot confirm payment until the monies have been moved into settlement status by the U.S. Treasury.

BOEM requires bidders to use EFT procedures for payment of one-fifth bonus bid deposits for Lease Sale BBG1, following the detailed instructions contained on the ONRR Payment Information web page at <https://www.onrr.gov/ReportPay/payments.htm>. Acceptance of a deposit does not constitute, and will not be construed as, acceptance of any bid on behalf of the United States.

Withdrawal of Blocks

The United States reserves the right to withdraw any block from this lease sale before issuance of a written acceptance of a bid for the block.

Acceptance, Rejection, or Return of Bids

The United States reserves the right to reject any and all bids, regardless of the amount offered. Furthermore, no bid will be accepted, and no lease for any block will be awarded to any bidder, unless:

1. The bidder has complied with all applicable regulations and requirements of the Final NOS, including those set forth in the documents contained in the Final NOS package;
2. The bid is the highest valid bid; and
3. The amount of the bid has been determined to be adequate by the authorized officer.

Any bid submitted that does not conform to the requirements of the Final

NOS, OCSLA, or other applicable statutes or regulations will be rejected and returned to the bidder. The United States Department of Justice and the Federal Trade Commission will review the results of the lease sale for any antitrust issues prior to the acceptance of bids and issuance of leases.

Bid Adequacy Review Procedures for Lease Sale BBG1

To ensure that the U.S. Government receives fair market value for the conveyance of leases from this sale, BOEM will evaluate high bids in accordance with the bid adequacy procedures that are effective on the date of the sale. This is the first lease sale to use the revised bid adequacy procedures that BOEM finalized in 2024. The bid adequacy procedures are available on BOEM's website at <https://www.boem.gov/oil-gas-energy/leasing/bid-adequacy-procedures>.

Lease Award

BOEM requires each bidder who is awarded a lease to complete the following:

1. Execute all copies of the lease (Form BOEM-2005 [February 2017], as amended);
2. Pay by EFT the balance of the bonus bid amount and the first year's rental for each lease issued in accordance with the requirements of 30 CFR 1218.155 and 556.520(a); and
3. Satisfy the bonding requirements of 30 CFR part 556, subpart I, as amended. ONRR requests that bidders use only one transaction for payment of the balance of the bonus bid amount and the first year's rental. Once ONRR receives such payment, the bidder awarded the lease may not request a refund of the balance of the bonus bid amount or first year's rental payment.

XI. Delay of Sale

The BOEM GOA RD has the discretion to change any date, time, and/or location specified in the Final NOS package if the RD deems that an emergent event could interfere with a fair and orderly lease sale. Such events could include, but are not limited to, natural disasters (e.g., earthquakes, hurricanes, floods), wars, riots, acts of terrorism, fires, strikes, civil disorder, or other events of a similar nature. In case of such events, bidders should call (504) 736-1729 or access the BOEM website

at <http://www.boem.gov>, for information regarding any changes.

Matthew N. Giacona,

Acting Director, Bureau of Ocean Energy Management.

[FR Doc. 2025-19828 Filed 11-7-25; 8:45 am]

BILLING CODE 4340-98-P

DEPARTMENT OF THE INTERIOR

Bureau of Ocean Energy Management

[Docket No. BOEM-2025-0384]

Notice of Availability of the Proposed Notice of Sale for the Cook Inlet Outer Continental Shelf Oil and Gas One Big Beautiful Bill Act Lease Sale 1

AGENCY: Bureau of Ocean Energy Management, Interior.

ACTION: Notice of availability.

SUMMARY: The Bureau of Ocean Energy Management (BOEM) announces the availability of the proposed notice of sale (NOS) for the Cook Inlet Outer Continental Shelf (OCS) Oil and Gas One Big Beautiful Bill Act (OBBBA) Lease Sale 1 (Lease Sale BBC1). BOEM publishes this notice pursuant to its regulatory authority under 30 CFR part 556. Pursuant to section 19 of the OCS Lands Act, the Secretary of the Interior provides the Governors of affected States and the executives of any affected local governments with the opportunity to review and comment on the proposed NOS. The proposed NOS describes the proposed size, timing, and location of the sale. The proposed NOS also includes lease stipulations, terms and conditions, minimum bids, royalty rates, and rental rates, which are required by section 501012 of the OBBBA for this sale.

DATES: Comments received from the Governors and the executives of any affected local governments on the size, timing, and location of this sale must be submitted to BOEM no later than January 9, 2026. BOEM will publish the final NOS in the **Federal Register** at least 30 days prior to the date of bid opening. Bid opening is currently scheduled for March 4, 2026.

ADDRESSES: The proposed NOS for Lease Sale BBC1 and other information essential to potential bidders may be obtained from the Leasing Section, Alaska Region, Bureau of Ocean Energy Management, 3801 Centerpoint Drive, Suite 500, Anchorage, AK 99503; telephone: 907-334-5200. The proposed NOS and other essential information are available for downloading or viewing on BOEM's website at <http://www.boem.gov/ak-bbc1/>.

FOR FURTHER INFORMATION CONTACT: Joel Immaraj, Alaska Regional Supervisor, Office of Leasing and Plans, 907-334-5238, joel.immaraj@boem.gov or Ben Burnett, Division Manager, Leasing Policy and Management Division, Office of Strategic Resources, 703-787-1782, benjamin.burnett@boem.gov.

Authority: This sale will be held pursuant to the requirements of the OBBBA. This notice is published pursuant to 43 U.S.C. 1331 *et seq.* (Outer Continental Shelf Lands Act, as amended) and 30 CFR 556.304.

Matthew N. Giacona,

Acting Director, Bureau of Ocean Energy Management.

[FR Doc. 2025-19827 Filed 11-7-25; 8:45 am]

BILLING CODE 4340-98-P

NATIONAL FOUNDATION ON THE ARTS AND THE HUMANITIES

National Endowment for the Humanities

Meeting of Humanities Panel

AGENCY: National Endowment for the Humanities; National Foundation on the Arts and the Humanities.

ACTION: Notice of meeting.

SUMMARY: The National Endowment for the Humanities (NEH) will hold three meetings, by video conference, of the Humanities Panel, a federal advisory committee, during November 2025. The purpose of the meetings is for panel review, discussion, evaluation, and recommendation of applications for financial assistance under the National Foundation on the Arts and the Humanities Act of 1965.

DATES: See **SUPPLEMENTARY INFORMATION** for meeting dates. The meetings will open at 8:30 a.m. and will adjourn by 5:00 p.m. on the dates specified below.

FOR FURTHER INFORMATION CONTACT: Elizabeth Voyatzis, Committee Management Officer, 400 7th Street SW, Room 4060, Washington, DC 20506; (202) 606-8322; evoyatzis@neh.gov.

SUPPLEMENTARY INFORMATION: Pursuant to section 10(a)(2) of the Federal Advisory Committee Act (5 U.S.C. 10), notice is hereby given of the following meetings:

1. Date: November 6, 2025

This video meeting will discuss applications on the topics of Revolutionary War, Military and Social History, for the Rediscovering Our Revolutionary Tradition grant program, submitted to the Division of Collections and Infrastructure.

2. Date: November 13, 2025

This video meeting will discuss applications on the topics of Territorial Expansion, State and Local History, for the Rediscovering Our Revolutionary Tradition grant program, submitted to the Division of Collections and Infrastructure.

3. Date: November 14, 2025

This video meeting will discuss applications on the topic of 19th Century American History, for the Rediscovering Our Revolutionary Tradition grant program, submitted to the Division of Collections and Infrastructure.

Because these meetings will include review of personal and/or proprietary financial and commercial information given in confidence to the agency by grant applicants, the meetings will be closed to the public pursuant to sections 552b(c)(4) and 552b(c)(6) of Title 5, U.S.C., as amended. I have made this determination pursuant to the authority granted me by the Chair's Delegation of Authority to Close Advisory Committee Meetings dated April 15, 2016.

Exceptional Circumstance: Pursuant to 41 CFR 102-3.150, NEH is providing notice less than 15 calendar days prior to the meetings because of the exceptional circumstances of the federal government shutdown.

Dated: November 5, 2025.

Kimberly Hylan,

Attorney-Advisor, National Endowment for the Humanities.

[FR Doc. 2025-19820 Filed 11-7-25; 8:45 am]

BILLING CODE 7536-01-P

NATIONAL FOUNDATION ON THE ARTS AND THE HUMANITIES

National Endowment for the Humanities

Meeting of National Council on the Humanities

AGENCY: National Endowment for the Humanities; National Foundation on the Arts and the Humanities.

ACTION: Notice of meeting.

SUMMARY: Pursuant to the Federal Advisory Committee Act, notice is hereby given that the National Council on the Humanities will meet to advise the Acting Chairman of the National Endowment for the Humanities (NEH) with respect to policies, programs and procedures for carrying out his functions; to review applications for financial assistance under the National Foundation on the Arts and Humanities Act of 1965 and make recommendations

thereon to the Acting Chairman; and to consider gifts offered to NEH and make recommendations thereon to the Acting Chairman.

DATES: The meeting will be held on Thursday, November 20, 2025, from 11:00 a.m. ET until adjourned.

ADDRESSES: The meeting will be held by videoconference originating at Constitution Center, 400 7th Street SW, Washington, DC 20506.

FOR FURTHER INFORMATION CONTACT:

Elizabeth Voyatzis, Committee Management Officer, 400 7th Street SW, 4th Floor, Washington, DC 20506; (202) 606-8322; evoyatzis@neh.gov.

SUPPLEMENTARY INFORMATION: The National Council on the Humanities is meeting pursuant to the National Foundation on the Arts and Humanities Act of 1965 (20 U.S.C. 951-960, as amended). The National Council on the Humanities will convene by videoconference on November 20, 2025, from 11:00 a.m. ET until adjourned, to discuss specific grant applications and programs before the Council. The agenda for the meeting will be as follows:

- A. Call to Order
- B. Quorum and Minutes of Previous Meetings
- C. Reports
 - 1. Acting Chairman's Remarks
 - 2. Budget Report
 - 3. Special Assistant to the Chairman's Remarks
 - 4. Actions on Requests for Chairman's Grants and Supplemental Funding
 - 5. Actions on Previously Considered Applications
- D. Collections and Infrastructure
- E. Federal/State Partnership
- F. Lifelong Learning
- G. Research

This meeting of the National Council on the Humanities will be closed to the public pursuant to sections 552b(c)(4), 552b(c)(6), and 552b(c)(9)(B) of Title 5 U.S.C., as amended, because it will include review of personal and/or proprietary financial and commercial information given in confidence to the agency by grant applicants, and discussion of certain information, the premature disclosure of which could significantly frustrate implementation of proposed agency action. I have made this determination pursuant to the authority granted to me by the Chair's Delegation of Authority to Close Advisory Committee Meetings dated April 15, 2016.

Dated: November 5, 2025.

Kimberly Hylan,

Attorney-Advisor, National Endowment for the Humanities.

[FR Doc. 2025-19821 Filed 11-7-25; 8:45 am]

BILLING CODE 7536-01-P

NUCLEAR WASTE TECHNICAL REVIEW BOARD

Notice of Meeting Postponement

ACTION: Notice of meeting postponement.

November 6, 2025—The U.S. Nuclear Waste Technical Review Board is postponing the public meeting scheduled for November 13, 2025. A future meeting date will be announced in the **Federal Register** and posted to the Board's website.

The public meeting of the Nuclear Waste Technical Review Board scheduled to occur in Arlington, Virginia, on Thursday, November 13, 2025, to receive program updates from Department of Energy's (DOE) Office of Spent Fuel and High-Level Waste Disposition, within the Office of Nuclear Energy (DOE-NE) has been postponed. The meeting will be re-scheduled, and a new notice will be published in the **Federal Register** and posted to the Board's website at www.nwtrb.gov. The original notice for the November 13, 2025, public meeting was published on September 12, 2025, FR Doc. 2025-17673, at 90 FR 44252.

The Board is an independent federal agency in the Executive Branch. It was established in the Nuclear Waste Policy Amendments Act of 1987 (Pub. L. 100-203) to perform ongoing evaluation of the technical and scientific validity of U.S. Department of Energy activities related to developing and implementing a program for the management and disposal of spent nuclear fuel and high-level radioactive waste, in accordance with the terms of the Nuclear Waste Policy Act of 1982. Board members serve part-time and are appointed by the President from a list of nominees submitted by the National Academy of Sciences. The Board reports its findings, conclusions, and recommendations to Congress and the Secretary of Energy. Board reports, correspondence, congressional testimony, meeting transcripts, and related materials are posted on the Board's website.

For information regarding the postponement, contact Mr. Christopher Burk, Director External Affairs, at burk@nwtrb.gov; by telephone at 703-235-4486; by mail at 2300 Clarendon Boulevard, Suite 1300, Arlington, VA 22201-3367; or by fax at 703-235-4495.

Dated: November 6, 2025.

Neysa Slater-Chandler,

*Director of Administration, U.S. Nuclear
Waste Technical Review Board.*

[FR Doc. 2025–19835 Filed 11–7–25; 8:45 am]

BILLING CODE 6820-AM-P

POSTAL REGULATORY COMMISSION

**[Docket Nos. MC2026–82 and K2026–82;
MC2026–83 and K2026–83; MC2026–84 and
K2026–84; MC2026–85 and K2026–85]**

New Postal Products

AGENCY: Postal Regulatory Commission.

ACTION: Notice.

SUMMARY: The Commission is noticing a recent Postal Service filing for the Commission's consideration concerning a negotiated service agreement. This notice informs the public of the filing, invites public comment, and takes other administrative steps.

ADDRESSES: Submit comments electronically via the Commission's Filing Online system at <https://www.prc.gov>. Those who cannot submit comments electronically should contact the person identified in the **FOR FURTHER INFORMATION CONTACT** section by telephone for advice on filing alternatives.

FOR FURTHER INFORMATION CONTACT: David A. Trissell, General Counsel, at 202–789–6820.

SUPPLEMENTARY INFORMATION:

Table of Contents

- I. Introduction
- II. Public Proceeding(s)
- III. Summary Proceeding(s)

I. Introduction

Pursuant to 39 CFR 3041.405, the Commission gives notice that the Postal Service filed request(s) for the Commission to consider matters related to Competitive negotiated service agreement(s). The request(s) may propose the addition of a negotiated service agreement from the Competitive product list or the modification of an existing product currently appearing on the Competitive product list.

The public portions of the Postal Service's request(s) can be accessed via the Commission's website (<http://www.prc.gov>). Non-public portions of the Postal Service's request(s), if any, can be accessed through compliance with the requirements of 39 CFR 3011.301.¹

¹ See Docket No. RM2018–3, Order Adopting Final Rules Relating to Non-Public Information, June 27, 2018, Attachment A at 19–22 (Order No. 4679).

Section II identifies the docket number(s) associated with each Postal Service request, if any, that will be reviewed in a public proceeding as defined by 39 CFR 3010.101(p), the title of each such request, the request's acceptance date, and the authority cited by the Postal Service for each request. For each such request, the Commission appoints an officer of the Commission to represent the interests of the general public in the proceeding, pursuant to 39 U.S.C. 505 and 39 CFR 3000.114 (Public Representative). The Public Representative does not represent any individual person, entity or particular point of view, and, when Commission attorneys are appointed, no attorney-client relationship is established. Section II also establishes comment deadline(s) pertaining to each such request.

The Commission invites comments on whether the Postal Service's request(s) identified in Section II, if any, are consistent with the policies of title 39. Applicable statutory and regulatory requirements include 39 U.S.C. 3632, 39 U.S.C. 3633, 39 U.S.C. 3642, 39 CFR part 3035, and 39 CFR part 3041. Comment deadline(s) for each such request, if any, appear in Section II.

Section III identifies the docket number(s) associated with each Postal Service request, if any, to add a standardized distinct product to the Competitive product list or to amend a standardized distinct product, the title of each such request, the request's acceptance date, and the authority cited by the Postal Service for each request. Standardized distinct products are negotiated service agreements that are variations of one or more Competitive products, and for which financial models, minimum rates, and classification criteria have undergone advance Commission review. See 39 CFR 3041.110(n); 39 CFR 3041.205(a). Such requests are reviewed in summary proceedings pursuant to 39 CFR 3041.325(c)(2) and 39 CFR 3041.505(f)(1). Pursuant to 39 CFR 3041.405(c)–(d), the Commission does not appoint a Public Representative or request public comment in proceedings to review such requests.

II. Public Proceeding(s)

None. See Section III for summary proceedings.

III. Summary Proceeding(s)

1. *Docket No(s).*: MC2026–82 and K2026–82; *Filing Title*: USPS Request to Add New Fulfillment Standardized Distinct Product, PM–GA Contract 908, and Notice of Filing Materials Under Seal; *Filing Acceptance Date*: November

5, 2025; *Filing Authority*: 39 U.S.C. 3642 and 3633, 39 CFR 3035.105, and 39 CFR 3041.325.

2. *Docket No(s).*: MC2026–83 and K2026–83; *Filing Title*: USPS Request to Add New Fulfillment Standardized Distinct Product, PM–GA Contract 909, and Notice of Filing Materials Under Seal; *Filing Acceptance Date*: November 5, 2025; *Filing Authority*: 39 U.S.C. 3642 and 3633, 39 CFR 3035.105, and 39 CFR 3041.325.

3. *Docket No(s).*: MC2026–84 and K2026–84; *Filing Title*: USPS Request to Add New Fulfillment Standardized Distinct Product, PM–GA Contract 910, and Notice of Filing Materials Under Seal; *Filing Acceptance Date*: November 5, 2025; *Filing Authority*: 39 U.S.C. 3642 and 3633, 39 CFR 3035.105, and 39 CFR 3041.325.

4. *Docket No(s).*: MC2026–85 and K2026–85; *Filing Title*: USPS Request to Add New Fulfillment Standardized Distinct Product, PM–GA Contract 911, and Notice of Filing Materials Under Seal; *Filing Acceptance Date*: November 5, 2025; *Filing Authority*: 39 U.S.C. 3642 and 3633, 39 CFR 3035.105, and 39 CFR 3041.325.

This Notice will be published in the **Federal Register**.

Erica A. Barker,
Secretary.

[FR Doc. 2025–19836 Filed 11–7–25; 8:45 am]

BILLING CODE 7710-FW-P

OFFICE OF THE UNITED STATES TRADE REPRESENTATIVE

Request for Comments on Suspending Section 301 Action for One Year: China's Targeting of the Maritime, Logistics, and Shipbuilding Sectors for Dominance

AGENCY: Office of the United States Trade Representative (USTR).

ACTION: Request for comments.

SUMMARY: On November 1, 2025, the White House announced a historic trade and economic deal reached between President Trump and President Xi Jinping of China. Pursuant to this deal, the United States Trade Representative, at the direction of the President, is proposing to suspend for one year, beginning on November 10, 2025, the responsive actions taken in this investigation. This notice announces the opening of a public comment docket for interested parties to comment on the proposed modification to suspend the actions in this investigation.

DATES:

November 6, 2025, 12:00 p.m. Eastern Standard Time: Comment period opens.

November 7, 2025, 5:00 p.m. Eastern Standard Time: To be assured of consideration, submit written comments regarding the proposed modification of the action by this date.

FOR FURTHER INFORMATION CONTACT:

Philip Butler, Chair of the Section 301 Committee; Thomas Au, Associate General Counsel; or David Salkeld, Assistant General Counsel at (202) 395–5725.

SUPPLEMENTARY INFORMATION:

I. Background

For background on the proceedings in this investigation, please see the prior notices issued in this investigation, including 89 FR 29424 (April 22, 2024), 90 FR 8089 (January 23, 2025), 90 FR 10843 (February 27, 2025), 90 FR 17114 (April 23, 2025) (April 23 notice), 90 FR 24856 (June 12, 2025), and 90 FR 48320 (October 16, 2025) (October 16 notice).

On April 17, 2025, pursuant to sections 301(b), 301(c), and 304(a) of the Trade Act of 1974, as amended (19 U.S.C. 2411(b), 2411(c), and 2414(a)), and following consideration of public comments, as well as consultations with advisory committees and the Section 301 Committee, the U.S. Trade Representative determined to take action in this investigation. *See* April 23 notice.

On October 10, pursuant to section 307(a), and following consideration of public comments, as well as consultations with advisory committees and the Section 301 Committee, the U.S. Trade Representative determined to modify the action. The modifications included changes to certain aspects of Annexes III and IV of the April 23 notice, as well as imposition of duties on ship-to-shore cranes and on certain cargo handling equipment of China as described in Annex V.A of the October 16 notice. *See* October 16 notice.

II. Request for Comments

The United States is engaging with China with the goal of obtaining the elimination of the acts, policies, and practices covered in the investigation.

On November 1, 2025, the White House announced a historic trade and economic deal reached between President Trump and President Xi Jinping of China.¹ Pursuant to this deal,

the United States would suspend for one year, beginning on November 10, 2025, the responsive actions taken in this investigation. The United States also would negotiate with China pursuant to Section 301 regarding the issues raised in this investigation. While taking these actions, the United States would continue its domestic efforts and its discussions with key allies and partners on revitalizing American shipbuilding.

The United States Trade Representative, at the direction of the President, is therefore proposing to suspend for one year, beginning on November 10, 2025, the responsive actions taken in this investigation. The Trade Representative is requesting comments from any interested person regarding the proposal to suspend the responsive actions from 12:01 a.m. Eastern Standard Time on November 10, 2025, through 11:59 p.m. Eastern Standard Time on November 9, 2026.

During the suspension period, no party would accrue liability for or be required to pay the fees on maritime transport services under Annexes I, II, or III of the April 23 notice, as modified by the October 16 notice. Further, during the suspension period, no party would accrue liability for or be required to pay the duties provided in Annex V.A of the October 16 notice.

III. Request for Public Comments

In accordance with Section 307(a)(2)(b) of the Trade Act (19 U.S.C. 2414(b)), and consistent with specific direction of the President, as well as the deal reached between the United States and China on November 1, 2025, USTR invites comments from interested persons with respect to the proposed suspension as described in Section II above. To be assured of consideration, you must submit written comments on the proposed modifications by November 7, 2025, at 5:00 p.m. Eastern Standard Time.

IV. Procedures for Written Comments

You must submit written comments and rebuttal comments using docket number USTR–2025–0274 on the electronic portal at <https://comments.ustr.gov/s/>. To submit written comments, use the docket on the portal entitled “Request for Comments Concerning the Suspension of Action in the Section 301 Investigation of China’s Targeting of the Maritime, Logistics, and Shipbuilding Sectors for Dominance.”

You do not need to establish an account to submit comments. The first screen of each docket allows you to enter identification and contact information. Third party organizations such as law firms, trade associations, or customs brokers, should identify the full legal name of the organization they represent, and identify the primary point of contact for the submission. Information fields are optional; however, your comment or request may not be considered if insufficient information is provided. Fields with a gray Business Confidential Information (BCI) notation are for BCI information which will not be made publicly available. Fields with a green (Public) notation will be viewable by the public.

After entering the identification and contact information, you can complete the remainder of the comment, or any portion of it by clicking ‘Next.’ You may upload documents at the end of the form and indicate whether USTR should treat the documents as business confidential or public information.

Any page containing BCI must be clearly marked ‘BUSINESS CONFIDENTIAL’ on the top of that page and the submission should clearly indicate, via brackets, highlighting, or other means, the specific information that is BCI. If you request business confidential treatment, you must certify in writing that disclosure of the information would endanger trade secrets or profitability, and that the information would not customarily be released to the public.

Parties uploading attachments containing BCI also must submit a public version of their comments. If these procedures are not sufficient to protect BCI or otherwise protect business interests, please contact the USTR Section 301 support line at 202.395.5725 to discuss whether alternative arrangements are possible.

USTR will post attachments uploaded to the docket for public inspection, except for properly designated BCI. You can view submissions on USTR’s electronic portal at <https://comments.ustr.gov/s/> by entering docket numbers USTR–2025–0274 in the search field on the home page.

Jennifer Thornton,

General Counsel, Office of the United States Trade Representative.

[FR Doc. 2025–19839 Filed 11–6–25; 4:15 pm]

BILLING CODE 3390–F4–P

¹ Fact Sheet, The White House, President Donald J. Trump Strikes Deal on Economic and Trade Relations with China (Nov. 1, 2025), <https://www.whitehouse.gov/fact-sheets/2025/11/fact-sheet-president-donald-j-trump-strikes-deal-on-economic-and-trade-relations-with-china/>.



FEDERAL REGISTER

Vol. 90

Monday,

No. 215

November 10, 2025

Part II

Environmental Protection Agency

40 CFR Part 82

Protection of Stratospheric Ozone: Listing of Substitutes Under the Significant New Alternatives Policy Program in Refrigeration and Air Conditioning and Fire Suppression; Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 82

[EPA-HQ-OAR-2024-0503; FRL-12207-01-OAR]

RIN 2060-AW45

Protection of Stratospheric Ozone: Listing of Substitutes Under the Significant New Alternatives Policy Program in Refrigeration and Air Conditioning and Fire Suppression

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: Pursuant to the U.S. Environmental Protection Agency's Significant New Alternatives Policy program, this action proposes to list several substitutes as acceptable, subject to use conditions, for residential and light commercial air conditioning and heat pumps, chillers, household refrigerators and freezers, motor vehicle air conditioning, and fire suppression and explosion protection. This action also proposes to update use conditions for substitutes previously listed for certain air conditioning end-uses and for water coolers.

DATES: Comments must be received on or before December 26, 2025 unless a public hearing is held. If a public hearing is held, comments on this notice of proposed rulemaking must be received on or before date 30 days after date of public hearing. *Public hearing:* Any party requesting a public hearing must notify the contact listed in the **FOR FURTHER INFORMATION CONTACT** section, which is Emily Maruyama at email address: maruyama.emily@epa.gov by 5 p.m. Eastern Daylight Time on or before November 17, 2025. If a public hearing is held, it will take place on or around November 25, 2025. Please refer to the **SUPPLEMENTARY INFORMATION** section for additional information on the public hearing.

ADDRESSES: You may send comments, identified by Docket ID No. EPA-HQ-OAR-2024-0503 by any of the following methods:

- *Federal Rulemaking Portal:* <https://www.regulations.gov> (our preferred method). Follow the online instructions for submitting comments.

- *Email:* a-and-r-Docket@epa.gov. Include Docket ID No. EPA HQ-OAR-2024-0503 in the subject line of the message.

- *Mail:* U.S. Environmental Protection Agency, EPA Docket Center, Air and Radiation Docket, Mail Code

28221T, 1200 Pennsylvania Avenue NW, Washington, DC 20460.

- *Hand Delivery or Courier:* EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Avenue NW, Washington, DC 20004. The Docket Center's hours of operations are 8:30 a.m. to 4:30 p.m., Monday–Friday (except Federal Holidays).

Instructions: All submissions received must include the Docket ID No. for this rulemaking. Comments received may be posted without change to <https://www.regulations.gov>, including personal information provided. For detailed instructions on sending comments and additional information on the rulemaking process, see the “Public Participation” heading of the **SUPPLEMENTARY INFORMATION** section of this document. For information on EPA Docket Center services, please visit us online at <https://www.epa.gov/dockets>.

If a public hearing is requested on or before November 17, 2025, the EPA will post an update at <https://www.epa.gov/snap>. The EPA does not intend to publish a document in the **Federal Register** announcing updates. The public hearing will be held on or around November 25, 2025. Information on the hearing including the time and URL will be posted at EPA's Stratospheric Ozone website at <https://www.epa.gov/snap>. Refer to the section titled, Public Participation for additional information.

FOR FURTHER INFORMATION CONTACT: For information about this proposed rule, contact Emily Maruyama, Stratospheric Protection Division, Office of Atmospheric Protection (Mail Code 6205A), Environmental Protection Agency, 1200 Pennsylvania Ave. NW, Washington, DC 20460; telephone number: (202) 564-2809; email address: maruyama.emily@epa.gov. Notices and rulemakings under the EPA's Significant New Alternatives Policy (SNAP) program are available on the EPA's SNAP website at <https://www.epa.gov/snap/snap-regulations>.

SUPPLEMENTARY INFORMATION:

Preamble acronyms and abbreviations. Throughout this preamble the use of “we,” “us,” or “our” is intended to refer to the EPA. We use multiple acronyms and terms in this preamble. While this list may not be exhaustive, to ease the reading of this preamble and for reference purposes, the EPA defines the following terms and acronyms here:

2-BTP—2-bromo-3,3,3-trifluoropropene
AC—Air Conditioning
AIHA—American Industrial Hygiene Association
AIM—American Innovation and Manufacturing

ANSI—American National Standards Institute
APU—Auxiliary Power Unit
ASHRAE—American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASTM—American Society for Testing and Materials
BTMS—Battery Thermal Management Systems
CAA—Clean Air Act
CAS Reg. No.—Chemical Abstracts Service Registry Identification Number
CBI—Confidential Business Information
CFC—Chlorofluorocarbon
CFR—Code of Federal Regulations
CMAQ—Community Multiscale Air Quality
CO₂—Carbon Dioxide
CRP—Cooperative Research Program
DIY—Do it yourself
DOT—United States Department of Transportation
EEAP—Environmental Effects Assessment Panel
EPA—United States Environmental Protection Agency
ER&R—Emissions Reduction and Reclamation
EV—Exchange Value
FMEA—Failure Mode and Effects Analysis
FR—Federal Register
GHG—Greenhouse Gas
GSHP—Ground-Source Heat Pump
HC—Hydrocarbon
HCFC—Hydrochlorofluorocarbon
HCFO—Hydrochlorofluoroolefin
HCR—Hydrocarbon Refrigerant
HD—Heavy-Duty
HDOH—Heavy-Duty On-Highway
HFC—Hydrofluorocarbon
HFO—Hydrofluoroolefin
ICF—ICF International, Inc.
IEC—International Electrotechnical Commission
IPCC—Intergovernmental Panel on Climate Change
IPR—Industrial Process Refrigeration
IRC—International Residential Code
LD—Light-Duty
LFL—Lower Flammability Limit
LMDV—Light- and Medium-Duty Vehicle
MIR—Maximum Incremental Reactivity
MVAC—Motor Vehicle Air Conditioning or Motor Vehicle Air Conditioner
MY—Model Year
NAAQS—National Ambient Air Quality Standard
NAICS—North American Industrial Classification System
NCEL—New Chemical Exposure Limit
NFPA—National Fire Protection Association
NRTL—Nationally Recognized Testing Laboratory
ODP—Ozone Depletion Potential
ODS—Ozone-Depleting Substances
OECD—Organisation for Economic Co-operation and Development
OEL—Occupational Exposure Limit
OEM—Original Equipment Manufacturer
OMB—United States Office of Management and Budget
OSHA—United States Occupational Safety and Health Administration
PBI—Proprietary Business Information
PEL—Permissible Exposure Limit
PFAS—Per- and Polyfluoroalkyl Substances

PFC—Perfluorocarbon
 PMN—Pre-Manufacture Notice
 PMS—Pantone® Matching System
 PPE—Personal Protective Equipment
 ppm—Parts Per Million
 PRA—Paperwork Reduction Act
 PTAC—Packaged Terminal Air Conditioner
 PTHP—Packaged Terminal Heat Pump
 RAL—“Reichs-Ausschuß für Lieferbedingungen und Gütesicherung,” Germany’s National Commission for Delivery Terms and Quality Assurance
 RCRA—Resource Conservation and Recovery Act
 RFA—Regulatory Flexibility Act
 RfC—Reference Concentration
 SAE—SAE International, previously known as the Society of Automotive Engineers
 SDS—Safety Data Sheet
 SIP—State Implementation Plan
 SNAP—Significant New Alternatives Policy
 SNUR—Significant New Use Rule
 TEAP—Technology and Economic Assessment Panel
 TFA—Trifluoroacetic Acid
 TLV—Threshold Limit Value
 TWA—Time Weighted Average
 UL—UL, formerly known as Underwriters Laboratories, Inc.
 UMRA—Unfunded Mandates Reform Act
 VOC—Volatile Organic Compounds
 VRF—Variable Refrigerant Flow
 WEEL—Workplace Environmental Exposure Limit
 WMO—World Meteorological Organization
 WSHP—Water-Source Heat Pump

Table of Contents

- I. Executive Summary
 - A. Purpose of the Regulatory Action
 - B. Summary of the Major Provisions of the Regulatory Action
- II. Public Participation
 - A. Written Comments
 - B. Participation in Virtual Public Hearing
 - C. Public Access to Voluntary Consensus Safety Standards
- III. General Information
 - A. Does this action apply to me?
 - B. What action is the Agency proposing to take?
 - C. What is the Agency’s authority for taking this action?
 - D. What are the guiding principles of the SNAP program and what are the SNAP criteria for evaluating substitutes?
- IV. Residential and Light Commercial Air Conditioning and Heat Pumps
 - A. What is the EPA proposing in this action?
 - B. Background on Residential and Light Commercial AC and Heat Pumps
 - C. What are the ASHRAE groups for refrigerant flammability and toxicity?
 - D. What are the refrigerants the EPA is proposing to list as acceptable in the residential and light commercial AC and heat pumps end-use and how do they compare to other refrigerants in this end-use?
 - E. What are the refrigerants for which the EPA is proposing to update use conditions and how do they compare to other refrigerants in the residential and light commercial AC and heat pumps end-use?

- F. What use conditions is the EPA proposing in this action for new and updated listings in this residential and light commercial AC and heat pumps end-use?
- G. What additional information is the EPA including in these proposed listings?
- V. Household Refrigerators and Freezers
 - A. What is the EPA proposing in this action?
 - B. Background on Household Refrigerators and Freezers
 - C. What are the ASHRAE groups for refrigerant flammability and toxicity?
 - D. What is HCR 4141 and how does it compare to other refrigerants in the household refrigerators and freezers end-use?
 - E. What use conditions is the EPA proposing in this action for the new listing for HCR 4141 in new household refrigerators and freezers?
 - F. What additional information is the EPA including in this proposed listing?
- VI. Water Coolers
 - A. What is the EPA proposing in this action?
 - B. Background on Water Coolers
 - C. What are the ASHRAE groups for refrigerant flammability and toxicity?
 - D. What is R-290 and how does it compare to other refrigerants in the water coolers end-use?
 - E. What use conditions is the EPA proposing in this action for the updated listing for R-290 in new water coolers?
 - F. What additional information is the EPA including in this proposed listing?
- VII. Chillers
 - A. What is the EPA proposing in this action?
 - B. Background on Centrifugal Chillers and Positive Displacement Chillers
 - C. What are the ASHRAE classifications for refrigerant flammability and toxicity?
 - D. What is R-516A and how does it compare to other refrigerants in the centrifugal chillers and positive displacement chillers end-uses?
 - E. What use conditions is the EPA proposing in this action for the new listing for R-516A in new centrifugal chillers and positive displacement chillers?
 - F. What additional information is the EPA including in this proposed listing?
- VIII. Motor Vehicle Air Conditioning
 - A. What is the EPA proposing in this action?
 - B. Background on Motor Vehicle Air Conditioning
 - C. What are the ASHRAE classifications for refrigerant flammability and toxicity used in MVACs?
 - D. What are refrigerants HFO-1234yf, R-444A, R-453A, R-456A, and R-480A and how do they compare to other refrigerants in the same end-use?
 - E. What use conditions is the EPA proposing in this action that apply to proposed listings in this end-use?
 - F. Modification of “unacceptability” Listing Applicable to Flammable Refrigerants in MVAC
 - G. Modifications to MVAC SNAP Requirements

- IX. Fire Suppression and Explosion Protection
 - A. What is the EPA proposing in this action?
 - B. Background on Total Flooding Fire Suppression
 - C. What is 2-BTP/CO₂ and how does it compare to other fire suppressants in the same end-use?
 - D. What use conditions is the EPA proposing?
 - E. Why is the EPA proposing these specific use conditions?
 - F. What Additional Information Is the EPA Including in This proposed listing?
- X. On Which Topics Is the EPA Specifically Requesting Comment?
 - A. Residential and Light Commercial AC and Heat Pumps, Household Refrigerators and Freezers, and Water Coolers
 - B. Chillers
 - C. Motor Vehicle Air Conditioning
 - D. Fire Suppression and Explosion Protection
- XI. Statutory and Executive Order Reviews
 - A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review
 - B. Executive Order 14192: Unleashing Prosperity Through Deregulation
 - C. Paperwork Reduction Act (PRA)
 - D. Regulatory Flexibility Act (RFA)
 - E. Unfunded Mandates Reform Act (UMRA)
 - F. Executive Order 13132: Federalism
 - G. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments
 - H. Executive Order 13045: Protection of Children From Environmental Health and Safety Risks
 - I. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use
 - J. National Technology Transfer and Advancement Act
- XII. References

I. Executive Summary

A. Purpose of the Regulatory Action

The EPA is proposing new and revised listings after our evaluation of human health and environmental information for certain substitutes under Clean Air Act (CAA) section 612, Significant New Alternatives Policy (SNAP) program. The Agency is proposing action on these new listings in the refrigeration and air conditioning (AC), and fire suppression and explosion protection sectors based on the information that the EPA has included in the docket. This proposed action would provide new refrigerant and fire suppressant options in specific uses, thereby increasing flexibility for industry. It also would revise certain existing requirements under the SNAP program to allow for greater consistency and compatibility with current industry

safety standards such as those for AC equipment and for water coolers.

B. Summary of the Major Provisions of the Regulatory Action

This action proposes to list new alternatives as well as to revise use conditions for existing alternatives for the refrigeration and AC sector and to list a new alternative for the fire suppression and explosion protection sector. Specifically, the EPA is proposing to:

- Update existing use conditions for hydrofluorocarbon (HFC)–32, R–452B, R–454A, R–454B, R–454C, R–457A, R–290, and R–441A in residential and light commercial AC and heat pumps;
- List the hydrocarbon refrigerant (HCR) blend HCR 4141, hydrofluoroolefin (HFO)–1234ze(E), and the HFO/HFC blend R–516A as acceptable, subject to use conditions, in residential and light commercial AC and heat pumps;
- List HCR 4141 as acceptable, subject to use conditions, in household refrigerators and freezers;
- Update existing use conditions for R–290 in water coolers;
- List R–516A as acceptable, subject to use conditions, in positive displacement chillers and centrifugal chillers;
- List HFO–1234yf as acceptable, subject to use conditions, in retrofit light- and medium-duty vehicle (LMDV) motor vehicle air conditioning (MVAC), in new MVACs on buses, and in new MVACs in heavy-duty on-highway (HDOH) vehicles;
- List the blend R–444A as acceptable, subject to use conditions, in retrofit LMDV MVACs and retrofit heavy-duty (HD) pickup trucks and van MVACs (complete and incomplete);
- List the blend R–456A as acceptable, subject to use conditions, in retrofit LMDV MVACs, retrofit HD pickup trucks and van MVACs (complete and incomplete), retrofit HDOH MVACs, and retrofit MVACs on buses and trains;
- List the blend R–480A as acceptable, subject to use conditions, in retrofit LMDV MVACs, retrofit MVACs on HD pickup trucks and vans (complete and incomplete), retrofit HDOH MVACs, and retrofit MVACs on buses and trains;
- List the blend R–453A as acceptable, subject to use conditions, in retrofit MVACs on buses and trains; and
- List 2-bromo-3,3,3-trifluoropropene/carbon dioxide (2-BTP/CO₂) as acceptable, subject to use conditions, as a total flooding agent in fire suppression for use in normally unoccupied spaces onboard aircraft

including engine nacelles, auxiliary power units (APUs), and cargo bays.

In summary, the common use conditions proposed for new household refrigerators and freezers, residential and light commercial AC and heat pumps, water coolers, and chillers are as follows:

(1) These refrigerants may be used only in new equipment, designed specifically and clearly identified for use with the refrigerant. None of these substitutes may be used as a conversion or “retrofit” refrigerant for existing equipment.

(2) These refrigerants must be used with warning labels on the equipment and packaging that are similar to or match verbatim those required by the relevant Underwriters Laboratories (UL) standard.

(3) Equipment must be marked with distinguishing red color-coded hoses and piping to indicate use of a flammable refrigerant and marked service ports, pipes, hoses, and other devices through which the refrigerant is serviced.

Additional use conditions specific to particular end-uses also apply and are discussed with each proposed listing. The regulatory text of the proposed listings, including the proposed use conditions and further information, appears in tables in the docket for this rulemaking under the title “Proposed Regulatory Text for SNAP Rule 27.” All proposed new listings appear in proposed appendix Z of 40 Code of Federal Regulations (CFR) part 82, subpart G. The proposed updated listings for HFC–32, R–452B, R–454A, R–454B, R–454C, R–457A, R–290, and R–441A in residential and light commercial AC and heat pumps and for R–290 in new water coolers appear as proposed changes in appendix R, appendix W, and appendix V of 40 CFR part 82, subpart G.

II. Public Participation

A. Written Comments

Submit your comments, identified by Docket ID No. EPA–HQ–OAR–2024–0503 at <https://www.regulations.gov> (our preferred method), or the other methods identified in the **ADDRESSES** section. Once submitted, comments cannot be edited or removed from the docket. The EPA may publish any comment received to its public docket. Do not submit to the EPA’s docket at <https://www.regulations.gov> any information you consider to be Confidential Business Information (CBI), Proprietary Business Information (PBI), or other information whose disclosure is restricted by statute. Multimedia

submissions (audio, video, etc.) must be accompanied by a written comment. The written comment is considered the official comment and should include discussion of all points you wish to make. The EPA will generally not consider comments or comment contents located outside of the primary submission (*i.e.*, on the web, cloud, or other file sharing system). Please visit <https://www.epa.gov/dockets/commenting-epa-dockets> for additional submission methods; the full EPA public comment policy; information about CBI, PBI, or multimedia submissions; and general guidance on making effective comments.

B. Participation in Virtual Public Hearing

The EPA may hold a virtual public hearing if the agency receives a request to hold one. Any party requesting a public hearing must notify the contact listed in the **FOR FURTHER INFORMATION CONTACT** section, which is Emily Maruyama at email address: maruyama.emily@epa.gov by 5 p.m. Eastern Daylight Time on or before November 17, 2025. If a virtual public hearing is held, it will take place on or around November 25, 2025 and further information will be provided on the EPA’s Stratospheric Ozone website at <https://www.epa.gov/snap>.

The EPA will make every effort to follow the schedule as closely as possible on the day of the hearing; however, please plan for the hearings to run either ahead of schedule or behind schedule. Each commenter will have 3–5 minutes to provide oral testimony. The EPA encourages commenters to provide a copy of their oral testimony electronically by emailing it to maruyama.emily@epa.gov. The EPA also recommends submitting the text of your oral comments as written comments to the rulemaking docket EPA–HQ–OAR–2024–0503. Written statements and supporting information submitted during the comment period will be considered with the same weight as oral comments and supporting information presented at the public hearing. The EPA may ask clarifying questions during the oral presentations but will not respond to the presentations at that time.

Please note that any updates made to any aspect of the hearing are posted online at <https://www.epa.gov/snap>. While the EPA expects the hearing to go forward as set forth above, please monitor our website or contact Emily Maruyama, 202–564–2809, maruyama.emily@epa.gov to determine if there are any updates. The EPA does

not intend to publish a document in the **Federal Register** announcing updates.

C. Public Access to Voluntary Consensus Safety Standards

The EPA is proposing to incorporate by reference the American National Standards Institute/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ANSI/ASHRAE) Standard 15–2024, “Safety Standard for Refrigeration Systems” (hereafter “ASHRAE 15–2024”) in the use conditions for one refrigerant proposed to be listed for use in chillers. The standard concerns the safe design, construction, installation, and operation of refrigeration systems. This standard is available at <https://www.ashrae.org/technical-resources/bookstore/ashrae-refrigeration-resources> and may be purchased by mail at: 180 Technology Parkway NW, Peachtree Corners, Georgia 30092; by telephone: 1–800–527–4723 in the United States or Canada. ASHRAE 15–2024 and ASHRAE 34–2024 are available as a bundle costing \$178.00 for an electronic copy or hard copy. The cost of obtaining this standard is not a significant financial burden for equipment manufacturers or for those selling, installing, and servicing the equipment. Therefore, the ASHRAE standard the EPA is proposing to incorporate by reference is reasonably available.

As one of two co-proposed options for use conditions for listings in the residential and light commercial AC and heat pumps, household refrigerators and freezers, and water coolers end-uses, the EPA proposes to incorporate by reference several industry safety standards from UL. The EPA is also proposing to incorporate by reference an industry safety standard from UL in the use conditions for one refrigerant proposed to be listed for use in chillers. The 2022 revision of the standard UL 60335–2–40, “Household And Similar Electrical Appliances—Safety—Part 2–40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers” (hereafter “UL 60335–2–40”), 4th edition, December 15, 2022 is available at: <https://www.shopulstandards.com/ProductDetail.aspx?UniqueKey=43802>, and may be purchased by mail at: COMM 2000, 151 Eastern Avenue, Bensenville, IL 60106; Email: orders@shopulstandards.com; Telephone: 1–888–853–3503 in the United States or Canada (other countries dial 1–415–352–2178); internet address: <https://ulstandards.ul.com> or <https://www.shopulstandards.com>. The cost of the 2022 revision to UL 60335–2–40 is

\$521 for an electronic copy and \$652 for a hard copy.

The 2024 revision of the standard UL 60335–2–24, “Household And Similar Electrical Appliances—Safety—Part 2–24: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers,” (hereafter “UL 60335–2–24”), 3rd edition, July 29, 2022, and revisions through February 29, 2024, is available at: https://www.shopulstandards.com/ProductDetail.aspx?productId=UL60335-2-24_3_S_20220729. It may be purchased by mail, email, or telephone as described in the previous paragraph for UL 60335–2–40. The cost of the 2024 revision to the 3rd edition of UL 60335–2–24 is \$555 for an electronic copy and \$694 for a hard copy.

The February 2024 revision of the standard UL 399, “Drinking Water Coolers” (hereafter “UL 399”), 8th edition, March 30, 2017, and revisions through February 28, 2024, is available at: https://www.shopulstandards.com/ProductDetail.aspx?productId=UL399_8_S_20170330. It may be purchased by mail, email, or telephone as described in the previous paragraphs for UL 60335–2–40 and UL 60335–2–24. The cost of the February 2024 revision to the 8th edition of UL 399 is \$798 for an electronic copy and \$998 for a hard copy.

UL also offers a subscription service to the Standards Certification Customer Library that allows unlimited access to their standards and related documents. The cost of obtaining these standards is not a significant financial burden for equipment manufacturers and purchase is not necessary for those selling, installing, and servicing the equipment. Therefore, the UL standards the EPA is proposing to incorporate by reference are reasonably available.

III. General Information

A. Does this action apply to me?

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

- New Single-Family Housing Construction (except For-Sale Builders) (236115).
- Commercial and Institutional Building Construction (236220).
- Plumbing, Heating, and Air Conditioning Contractors (238220).
- All Other Basic Organic Chemical Manufacturing (325199).
- Air Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing (333415).

- Aircraft Manufacturing (336411).
- Motor Vehicle Manufacturing (3361).
- Motor Vehicle Parts Manufacturing (3363).
- Refrigeration Equipment and Supplies Merchant Wholesalers (423740).
- Recyclable Material Merchant Wholesalers (423930).
- Convenience Stores (445120).
- General Automotive Repair (811111).
- Appliance Repair and Maintenance (811412).
- Fire Protection (922160).

This list is not intended to be exhaustive, but rather to provide a guide for readers regarding entities likely to be affected by this action. To determine whether your facility, company, business, or organization could be affected by this action, you should carefully examine the regulations at 40 CFR part 82, subpart G, and the proposed revisions. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the **FOR FURTHER INFORMATION CONTACT** section.

B. What action is the Agency proposing to take?

The EPA is proposing to list new alternatives for the refrigeration and AC sector and for the fire suppression and explosion protection sector. The Agency also proposes to revise use conditions for existing alternatives for the refrigeration and AC sector and list a new alternative for the fire suppression and explosion protection sector.

C. What is the Agency's authority for taking this action?

This action is based upon the EPA's authority under CAA section 612. The SNAP program implements CAA section 612. The first SNAP rulemaking was promulgated in 1994, and set forth the framework for the program in addition to finalizing listings for a number of alternatives as acceptable. Since that time, EPA has issued 26 final rules and 39 **Federal Register** notices under the SNAP program. Several major provisions of CAA section 612 are as follows:

CAA section 612(c) requires the EPA to promulgate rules making it unlawful to “replace any class I [(chlorofluorocarbon (CFC), halon, carbon tetrachloride, methyl chloroform, methyl bromide, hydrobromofluorocarbon, and chlorobromomethane)] or class II [(hydrochlorofluorocarbon (HCFC))] substance with any substitute substance which the Administrator determines

may present adverse effects to human health or the environment, where the Administrator has identified an alternative to such replacement that (1) reduces the overall risk to human health and the environment; and (2) is currently or potentially available.” CAA section 612(c) requires the EPA to publish a list of the substitutes that it finds to be unacceptable for specific uses and to publish a corresponding list of acceptable substitutes for specific uses. Since its inception, the SNAP program has continually responded to petitions and submissions using either a rulemaking or notice to convey listing decisions.

CAA section 612(d) grants the right to any person to petition the Administrator to add a substance to, or delete a substance from, the lists published in accordance with section 612(c).

CAA section 612(e) directs the EPA to require “any person who produces a chemical substitute for a class I substance . . . to notify the [Agency] not less than 90 days before new or existing chemicals are introduced into interstate commerce for significant new use as substitutes for a class I substance.” The producer must also provide the Agency with the producer’s unpublished health and safety studies on such substitutes.

The regulations for the SNAP program are promulgated at 40 CFR part 82, subpart G, and the Agency’s process for reviewing SNAP submissions is described in regulations at 40 CFR 82.180. Under these rules, the Agency identified five types of listing decisions: acceptable; acceptable, subject to use conditions; acceptable, subject to narrowed use limits; unacceptable; and pending. Use conditions and narrowed use limits are both considered “use restrictions.” Substitutes that are deemed acceptable with no use restrictions (no use conditions or narrowed use limits) can be used for all applications within the relevant end-uses in the sector. After reviewing a substitute, the Agency may determine that a substitute is acceptable if certain conditions in the way that the substitute is used are met to minimize risks to human health and the environment. The EPA describes such substitutes as “acceptable, subject to use conditions.”¹ For some substitutes, the Agency may permit a narrowed range of use within an end-use or sector. For example, the Agency may limit the use of a substitute to certain end-uses or specific applications within an industry sector. The EPA describes these substitutes as “acceptable subject to

narrowed use limits.”² Under the narrowed use limit, users intending to adopt these substitutes “must ascertain that other alternatives are not technically feasible.”³ CAA section 612 and the EPA regulations do not allow the introduction of substitutes on the “unacceptable” list into interstate commerce unless and until the effective date of a final rule that changes an unacceptable listing to acceptable, acceptable subject to use conditions, or acceptable subject to narrowed use limits.

Many SNAP listings include “comments” or “further information” to provide additional information on substitutes. Since this additional information is not part of the regulatory decision under SNAP, these statements are not binding for use of the substitute under the SNAP program. The EPA encourages users of substitutes to apply all statements in the “Further Information” column in their use of these substitutes. Regulatory requirements so listed may be binding under other regulatory programs (e.g., worker protection regulations promulgated by United States Occupational Safety and Health Administration (OSHA) or Department of Transportation (DOT) requirements for transport of flammable gases). In many instances, the information simply refers to sound operating practices that have already been identified in existing industry and/or building codes or safety standards. Thus, many of the statements, if adopted, would not require the affected user to make significant changes in existing operating practices.

The “Further Information” column also does not necessarily include all other legal obligations pertaining to the manufacture, use, handling, and disposal of the listed substitute. Flammable refrigerants being recovered or otherwise disposed of from commercial or industrial air conditioning equipment are likely to be considered hazardous waste under the Resource Conservation and Recovery Act (RCRA).⁴ Lower flammability ignitable spent refrigerants that are recycled for reuse can follow alternative safety standards under 40 CFR part 266, subpart Q, instead of the full RCRA Subtitle C hazardous waste requirements.

For additional information on the SNAP program, visit the EPA’s SNAP website at <https://www.epa.gov/snap>. The lists of acceptable substitutes for

Ozone-Depleting Substances (ODS) in all industrial sectors are available at <https://www.epa.gov/snap/snap-substitutes-sector>. For more information on the Agency’s process for administering the SNAP program or criteria for evaluation of substitutes, refer to the initial SNAP rulemaking, codified at 40 CFR part 82, subpart G.⁵ SNAP decisions and the appropriate **Federal Register** (FR) citations can be found at <https://www.epa.gov/snap/snap-regulations>. Substitutes listed as unacceptable; acceptable, subject to narrowed use limits; or acceptable, subject to use conditions, are also listed in the appendices of 40 CFR part 82, subpart G.

D. What are the guiding principles of the SNAP program and what are the SNAP criteria for evaluating substitutes?

The guiding principles of the SNAP program are described in the preamble to the first SNAP rule.⁶ These principles, reiterated and described in many subsequent SNAP rulemakings, are:

1. Evaluate substitutes within a comparative risk framework: The SNAP program evaluates the risk of substitutes compared to available or potentially available substitutes which the new substitutes are intended to replace.
2. Do not require that substitutes be risk free to be found acceptable: Substitutes found to be acceptable must not pose significantly greater risk than other substitutes, but they do not have to be risk free.
3. Restrict those substitutes that are significantly worse: The EPA does not intend to restrict a substitute if it has only marginally greater risk.
4. Evaluate risks by use: Central to SNAP’s evaluations is the intersection between the characteristics of the substitute itself and its specific end-use application.
5. Provide the regulated community with information as soon as possible.
6. Do not endorse products manufactured by specific companies.
7. Defer to other environmental regulations when warranted: In some cases, the EPA and other federal agencies have developed extensive regulations under other sections of the CAA or other statutes that address potential environmental or human health effects that may result from the use of certain substitutes. The SNAP program takes existing regulations under other programs into account when reviewing substitutes.

² 40 CFR 82.180(b)(3).

³ *Id.*

⁴ 40 CFR parts 260–270.

⁵ See 59 FR 13044; March 18, 1994.

⁶ *Ibid.*

¹ 40 CFR 82.180(b)(2).

In making decisions regarding whether a substitute is acceptable or unacceptable, and whether substitutes present risks that are lower than or comparable to risks from other substitutes that are currently or potentially available in the end-uses under consideration, the EPA examines the following criteria in 40 CFR 82.180(a)(7): “(i) atmospheric effects and related health and environmental impacts; (ii) general population risks from ambient exposure to compounds with direct toxicity and to increased ground-level ozone; (iii) ecosystem risks; (iv) occupational risks; (v) consumer risks; (vi) flammability; and (vii) cost and availability of the substitute.” To enable the EPA to assess these criteria, we require submitters to include various information including but not limited to ozone depletion potential (ODP), flammability, and the potential for human exposure. The EPA applies the same criteria to all evaluations; however, the Agency notes, for different sectors, the relevance of the factors may vary. For example, for the fire suppression sector, flammability would be considered differently than for the other sectors.

To assess atmospheric effects, the EPA uses both the ODP of class I and class II ODS in appendix A of 40 CFR part 82, subpart A and where appropriate the exchange values for HFCs listed in the American Innovation and Manufacturing (AIM) Act and codified at 40 CFR part 84, subpart A. For both ODP and exchange values, there are equivalent values listed in *Montreal Protocol on Substances that Deplete the Ozone Layer* (Montreal Protocol) annexes.⁷ For substitute compounds without these values, the Agency uses information provided in the World Meteorological Organization (WMO) 2022 assessment,⁸ and other relevant sources. For chemical blends, such as the fire suppressant blend proposed as acceptable in this document, the EPA calculates atmospheric effects values as a mass weighted average of each component of the blend.

In a future notice and comment rulemaking, the EPA plans to revisit the criteria used for these evaluations particularly regarding atmospheric effects. The EPA acknowledges that

there is an important relationship between ODS and HFCs. Therefore, this future rulemaking may be combined with other relevant proposals in order to consider the provisions regarding substitutes under CAA Title VI and the AIM Act subsection (i) paragraph (5) holistically. The Agency is not proposing or seeking comment on these topics in this rulemaking.

The SNAP program uses exposure assessments to estimate concentration levels of substitutes to which workers, consumers, the general population, and environmental receptors may be exposed over a determined period of time. These assessments are based on personal monitoring data or area sampling data if available. Exposure assessments may be conducted for many types of releases including: (1) releases in the workplace and in homes; (2) releases to ambient air and surface water; (3) releases from the management of solid wastes.

The SNAP program uses toxicity data to assess the possible health and environmental effects of exposure to substitutes. We use broad health-based criteria such as: (1) Permissible Exposure Limits (PELs) for occupational exposure; (2) inhalation reference concentrations (RfCs) for noncarcinogenic effects on the general population; and (3) cancer slope factors for carcinogenic risk to members of the general population. When considering risks in the workplace, if OSHA has not issued a PEL for a compound, the EPA then considers Recommended Exposure Limits from the National Institute for Occupational Safety and Health, Workplace Environmental Exposure Limits (WEELs) set by the American Industrial Hygiene Association (AIHA), or Threshold Limit Values (TLVs) set by the American Conference of Governmental Industrial Hygienists. If limits for occupational exposure or exposure to the general population are not already established, then the EPA derives these values following the Agency’s peer reviewed guidelines. Exposure information is combined with toxicity information to explore any basis for concern. Toxicity data are used with existing EPA guidelines to develop health-based limits for interim use in these risk characterizations.

The SNAP program examines flammability as a safety concern for workers and consumers. The EPA assesses flammability risk using data on: (1) flash point and flammability limits (e.g., OSHA flammability/combustibility classifications); (2) data on testing of blends with flammable components; (3) test data on flammability in consumer applications conducted by independent

laboratories; and (4) information on flammability risk mitigation techniques.

The SNAP program also examines other potential environmental impacts such as ecotoxicity and local air quality impacts. A compound that is likely to be discharged to water may be evaluated for impacts on aquatic life. Some substitutes are volatile organic compounds (VOC). The EPA also notes whenever a potential substitute is considered a hazardous or toxic air pollutant (under CAA sections 112(b) and 202(l)) or hazardous waste under the RCRA subtitle C regulations.

The EPA also notes that the U.S. government has not adopted a single definition of per- and polyfluoroalkyl substances (PFAS) and has not included HFCs, HFOs, 2-BTP, or trifluoroacetic acid (TFA) in any PFAS-related restrictions. There also is no consensus definition of PFAS as a class of chemicals, and different definitions can result in more or fewer chemicals being classified as PFAS. There are several HFCs and HFOs, among other chemicals such as 2-BTP and TFA, that are defined as PFAS by some states and other jurisdictions. The EPA is not proposing or seeking comment on any definitions of PFAS in this rulemaking.

As described above, the proposed listing decisions consider whether substitutes present risks that are lower than or comparable to risks from other substitutes that are currently or potentially available in the end-uses under consideration. The EPA does not assume any substitute is risk free.

IV. Residential and Light Commercial Air Conditioning and Heat Pumps

A. What is the EPA proposing in this action?

The EPA is proposing to list R-516A and HFO-1234ze(E) as acceptable, subject to use conditions, for use in all applications under the residential and light commercial AC and heat pumps end-use. The EPA is also proposing to list HCR 4141 as acceptable, subject to use conditions, for use in self-contained room AC, a limited subset of equipment covered by this end-use.

SNAP use conditions are designed to ensure that refrigerants are listed for specific end-uses and in a way that mitigates risks to human health and the environment. The use conditions proposed for these new listings are discussed in Section IV.F. They include a requirement that these refrigerants be used in new equipment only and specific requirements for warning labels and markings. The EPA is also co-proposing two options for an additional use condition related to equipment

⁷ <https://ozone.unep.org/treaties/montreal-protocol/montreal-protocol-substances-deplete-ozone-layer>.

⁸ WMO, *Scientific Assessment of Ozone Depletion: 2022*, GAW Report No. 278, 509 pp.; WMO: Geneva, 2022. Available at: <https://ozone.unep.org/system/files/documents/Scientific-Assessment-of-Ozone-Depletion-2022.pdf>. (WMO, 2022).

certification or industry safety standard requirements. These options are described in detail in Section IV.F.4. One option would incorporate by reference a new edition of the safety standard for this end-use. The second option would require residential and light commercial AC and heat pump equipment to be certified to a U.S. industry consensus safety standard by an organization that is recognized as a Nationally Recognized Testing Laboratory (NRTL).

The proposed regulatory text for listings using the third-party certification option can be found in the docket for this rulemaking under the title “Proposed Regulatory Text for SNAP Rule 27” in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Third-Party Certification Option (co-proposed as an alternative to Section III).” The proposed regulatory text for listings using the incorporate by reference option can be found in the docket for this rulemaking under the title “Proposed Regulatory Text for SNAP Rule 27” in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Incorporate by Reference Option.” If one of the use condition options is finalized, the EPA would publish corresponding finalized listings for R-516A, HCR 4141, and HFO-1234ze(E) in new residential and light commercial AC and heat pump equipment in appendix Z of 40 CFR part 82, subpart G.

The EPA is also proposing to update use conditions for the previously listed refrigerants HFC-32, R-452B, R-454A, R-454B, R-454C, R-457A, R-290, and R-441A for use in the residential and light commercial AC and heat pumps end-use. Information on the previous listing locations and the existing use conditions for these refrigerants can be found in Section IV.E.

The EPA proposes that the same use conditions described previously in this section for the new listings in this end-use would also apply to these updated listings. The EPA is also co-proposing the same two options for a use condition related to equipment certification or industry safety standard requirements. For these updated listings, the EPA intends to finalize one of these co-proposed options along with an appropriate transition period to provide manufacturers with opportunity for a smooth transition between the existing and updated use conditions. Throughout Sections IV. and VI. in this document, the term “updated use conditions” refers to the set of use conditions being proposed that would apply to new equipment manufactured

after the effective date of a final rule. The updated use conditions would neither apply to nor affect equipment manufactured before the effective date of the final rule. All the proposed use conditions are described in detail in Section IV.F. The EPA would update the existing listings for these substitutes in the following locations:

- HFC-32 in new residential and light commercial AC and heat pumps—self-contained room AC only in appendix R of 40 CFR part 82, subpart G;
- HFC-32 in new residential and light commercial AC and heat pumps excluding self-contained room AC in appendix W of 40 CFR part 82, subpart G;
- R-452B, R-454A, R-454B, R-454C, and R-457A in new residential and light commercial AC and heat pumps in appendix W of 40 CFR part 82, subpart G; and
- R-290 and R-441A in new residential and light commercial AC and heat pumps—self-contained room AC only in appendix R of 40 CFR part 82, subpart G.

This proposal would also add listing numbers to each row in the end-use column of appendix W in the table “Refrigerants—Substitutes Acceptable Subject to Use Conditions.” Additionally, this proposal would fix a typographical error in appendix R and appendix V where the name of a standard was written as “UL 60355-2-89” instead of “UL 60335-2-89” in the “Further information” column. These formatting and typographical edits would not substantively change any listings in the tables and would improve clarity and readability.

B. Background on Residential and Light Commercial AC and Heat Pumps

The residential and light commercial AC and heat pumps end-use includes equipment for cooling air in individual rooms, single-family homes, and small commercial buildings. Heat pumps are equipment types that offer both air heating and cooling options for such locations. This end-use differs from commercial comfort AC, which uses chillers to cool water that is then circulated to cool air throughout a large commercial building, such as an office building or hotel. This end-use includes both self-contained and split systems. Self-contained systems include some rooftop AC units (e.g., those ducted to supply conditioned air to multiple spaces) and many types of room ACs, including packaged terminal air conditioners (PTACs), packaged terminal heat pumps (PTHPs), window AC units, portable room AC units, and

wall-mounted self-contained ACs, designed for use in a single room. The EPA refers to the variety of self-contained equipment for cooling a single room using the phrase “residential and light commercial AC and heat pumps—self-contained room AC,” irrespective of whether they are air conditioners, providing space cooling, or heat pumps that can either heat or cool a space. Split systems include ducted and non-ducted mini-splits (which might also be designed for use in a single room), multi-splits and variable refrigerant flow (VRF) systems, and ducted unitary splits. Water-source and ground-source heat pumps (WSHPs/GSHPs) often are packaged systems similar to self-contained equipment but could be applied with the condenser separated from the other components similar to split systems. Examples of equipment for residential and light commercial AC and heat pumps include:

- *Unitary AC or unitary split systems, also called central air conditioners:* These systems include an outdoor unit with a condenser and a compressor, refrigerant lines, an indoor unit with an evaporator, and ducts to carry cooled air throughout a building. Central heat pumps are similar but offer the choice to either heat or cool the indoor space.

- *Multi-split and mini-split air conditioners and heat pumps:* Multi-split systems include one or more outdoor unit(s) with a condenser and compressor, and multiple indoor units, each of which is connected to the outdoor unit by refrigerant lines. Mini-split systems are similar to multi-split systems, but they have only a single outdoor unit and a single indoor unit, and they cool a single room. Non-ducted multi-splits and mini-splits provide cooled or heated air directly from the indoor unit rather than providing the air through ducts.

- *Rooftop AC units:* These are units that combine the compressor, condenser, and evaporator in a single package and may contain additional components for filtration and dehumidification. Most units also include dampers to control air intake. Rooftop AC units cool or heat outside air that is then delivered to the space directly through the ceiling or a duct network. Rooftop AC units are common in small commercial buildings such as a single store in a mall with no indoor passageways between stores (e.g., a “strip-mall”). They can also be set up in an array to provide cooling or heating throughout a larger commercial establishment such as a department store or supermarket.

- *Window air conditioners:* These are self-contained units that fit in a window with the condenser extending outside the window.

- *PTACs and PTHPs:* These are self-contained units that consist of a separate, un-encased combination of heating and cooling assemblies mounted through a wall. PTACs and PTHPs are intended for use in a single room and use no ducts to carry cooled air and no external refrigerant lines. Typical applications include motel or dormitory air conditioners.

- *Portable room air conditioners:* These are self-contained units that usually have wheels and are designed to be moved easily from room to room. They may contain an exhaust hose that can be placed through a window or door to eject heat to the outside.

- *WSHPs and GSHPs:* These are similar to unitary split systems except that, when in cooling mode, heat is ejected from the condenser through a second circuit rather than directly with outside air. The second circuit transfers the heat to the ground, ground water, or another body of water such as a lake. Water is used for this transfer, but brine can be used if temperatures would risk freezing. Some systems can perform heating in a similar matter with the refrigerant circuit running in reverse. Regardless, the term “heat pump” is most often used.

Unless specified, all these types of AC and heat pump equipment would be subject to the listing decisions under this rule for the identified substitutes. Of these types of equipment, window air conditioners, PTACs, PTHPs, rooftop AC units, portable room air conditioners, and often GSHPs and WSHPs are self-contained equipment with the condenser, compressor, evaporator, and tubing all within a single unit casing. In contrast, unitary split systems, multi-split systems, and mini-split systems have an outdoor condenser that is separate from an indoor unit. Compared to these split systems, self-contained equipment typically has smaller charge sizes, fewer locations that are prone to leak, and is less likely to require servicing by a technician. These types of AC and heat pump equipment, both self-contained and split systems, typically fall under the scope of UL 60335–2–40.

C. What are the ASHRAE groups for refrigerant flammability and toxicity?

ASHRAE 34–2024 assigns a safety group for each refrigerant, which consists of two to three alphanumeric

characters (e.g., A2L or B1).⁹ The initial character indicates the toxicity, and the numeral, with or without suffix letter, denotes the flammability. ASHRAE classifies Class A refrigerants as refrigerants for which toxicity has not been identified at concentrations less than or equal to 400 parts per million (ppm) by volume, based on data used to determine threshold limit value-time-weighted average (TLV–TWA) or consistent indices. Class B signifies refrigerants for which there is evidence of toxicity at concentrations below 400 ppm by volume, based on data used to determine TLV–TWA or consistent indices.

ASHRAE 34–2024 also assigns refrigerants a flammability class of 1, 2, 2L, or 3. Tests for flammability are conducted in accordance with American Society for Testing and Materials (ASTM) E681 using a spark ignition source at 140 °F (60 °C) and 14.7 psia (101.3 kPa). The flammability class “1” is given to refrigerants that, when tested, show no flame propagation. The flammability class “2” is given to refrigerants that, when tested, exhibit flame propagation, have a heat of combustion less than 19,000 kJ/kg (8,169 BTU/lb), and have a lower flammability limit (LFL) greater than 0.10 kg/m³. The flammability class “2L” is given to refrigerants that meet the requirements of the “2” class and have a maximum burning velocity of 10 cm/s or lower when tested in dry air at 73.4 °F (23.0 °C) and 14.7 psia (101.3 kPa). Throughout this document, refrigerants in the flammability class of “2L” are referred to as lower flammability refrigerants. The flammability class “3” is given to refrigerants that, when tested, exhibit flame propagation and either have a heat of combustion of 19,000 kJ/kg (8,169 BTU/lb) or greater or have an LFL of 0.10 kg/m³ or lower. Throughout this document, refrigerants in the flammability class of “3” are referred to as higher flammability refrigerants.¹⁰ Flammability for refrigerant blends are designated based on the worst case of formulation for flammability and the worst case of fractionation for flammability determined for the blend. Information about refrigerant safety groups is consistent with that in prior rules under the SNAP program. See Section II.A.2. of SNAP Rule 26¹¹ for more detail. Using these safety groups,

HFO–1234ze(E), HFC–32 and the refrigerant blends R–452B, R–454A, R–454B, R–454C, R–457A, and R–516A are in the A2L Safety Group, while R–290, R–441A, and the components of HCR 4141 are in the A3 Safety Group.

D. What are the refrigerants the EPA is proposing to list as acceptable in the residential and light commercial AC and heat pumps end-use and how do they compare to other refrigerants in this end-use?

The EPA is proposing to list HCR 4141, HFO–1234ze(E), and R–516A as acceptable, subject to use conditions, for this end-use. HCR 4141 is a higher flammability refrigerant blend with each component in the A3 Safety Group. HFO–1234ze(E) and R–516A are lower flammability refrigerants, both in the A2L Safety Group. HCR 4141 is a blend of the saturated hydrocarbons (HCs) isobutane (R–600a), n-butane (R–600), and propane (R–290); the percentages of each component in the blend are claimed as CBI. The respective Chemical Abstracts Service Registry Identification Numbers (CAS Reg. Nos.) of R–600a, R–600, and R–290 are 75–28–5, 106–97–8, and 74–98–6. HFO–1234ze(E), also known by the trade names “Solstice® ze and Solstice® 1234ze,” is also known as *trans*-1,3,3,3-tetrafluoroprop-1-ene (CAS Reg. No. 29118–24–9). R–516A, also known by the trade name “Forane® 516A,” is a blend consisting of 77.5 percent HFO–1234yf (also known as 2,3,3,3-tetrafluoroprop-1-ene, CAS Reg. No. 754–12–1), 14 percent HFC–152a (also known as 1,1-difluoroethane, CAS Reg. No. 75–37–6), and 8.5 percent HFC–134a (also known as 1,1,1,2-tetrafluoroethane, CAS Reg. No. 811–97–2).

Redacted submissions and supporting documentation for HCR 4141, HFO–1234ze(E), and R–516A are provided in the docket. The EPA performed a risk screening assessment to examine the human health and environmental risks of each of these substitutes which are available in the docket.^{12 13 14}

Environmental information: The specific atmospheric effects values can be found in the individual risk screens for HCR 4141, HFO–1234ze(E), and R–

¹² ICF, 2025a. Risk Screen on Substitutes in Residential and Light Commercial Air Conditioning and Heat Pumps (New Equipment); Substitute: HCR 4141.

¹³ ICF, 2025b. Risk Screen on Substitutes in Residential and Light Commercial Air Conditioning and Heat Pumps (New Equipment); Substitute: HFO–1234ze(E) (Solstice® ze, Solstice® 1234ze).

¹⁴ ICF, 2025c. Risk Screen on Substitutes in Residential and Light Commercial Air Conditioning and Heat Pumps (New Equipment); Substitute: R–516A (Forane® 516A).

⁹ ASHRAE, 2024b. ANSI/ASHRAE Standard 34–2024: Designation and Safety Classification of Refrigerants.

¹⁰ To see a diagram depicting these classifications, see SNAP Rule 26, 89 FR 50417; June 13, 2024.

¹¹ See 89 FR 50410; June 13, 2024.

516A. These were determined consistent with the source information noted in Section III.C. above as well as using the methodology for determining values for blends of chemicals (*i.e.*, determined by the percentage of each component). HFO-1234ze(E) and the components of R-516A—HFC-134a, HFC-152a, and HFO-1234yf—are excluded from the EPA's regulatory definition of VOC¹⁵ addressing the development of State Implementation Plans (SIPs) to attain and maintain the National Ambient Air Quality Standards (NAAQS).¹⁶

HCR 4141 is a blend of saturated HCs, all of which fall under the EPA's regulatory definition of VOC¹⁷ for the purpose of developing SIPs to attain and maintain the NAAQS. The maximum incremental reactivities (MIRs)¹⁸ of the components of this blend are as high or higher and more reactive than that of ethane (MIR of 0.26 g O₃/g ethane), which the EPA uses as a threshold to determine whether substances may have negligible photochemical reactivity in the lower atmosphere (troposphere). The MIR of the blend HCR 4141 is expected to be less than that of R-600a (MIR of 1.23 g O₃/g isobutane) and R-290 (MIR of 0.49 g O₃/g propane). The EPA has previously listed R-290 as acceptable, subject to use conditions, in residential and light commercial AC and heat pumps—self-contained room AC.

The EPA has previously performed air quality modeling on various scenarios to determine whether emissions of HC refrigerants could have a significant impact on local air quality, particularly in certain cities with challenges in achieving attainment of the NAAQS for ground-level ozone. The EPA prepared an analysis in 2014¹⁹ and a follow-on analysis in 2016²⁰ to evaluate the potential impact of the use of HC refrigerants on ground-level ozone concentrations in the United States. These analyses estimated refrigerant

emissions from refrigeration and AC equipment which were all assumed to contain propylene, R-600a, R-290, and/or the HC blends R-441A and R-443A under different scenarios. The EPA concluded that potential emissions of saturated HC refrigerants used in refrigeration and AC equipment, such as R-290 and R-600a, do not have a significant impact on local air quality and would not have a greater overall impact on human health and the environment than other acceptable refrigerants, even if their market share grew much greater than anticipated.²¹

The analysis evaluated HC refrigerant in the following end-uses: cold storage warehouses, chillers, residential and light commercial AC and heat pumps, and specific small, self-contained refrigeration and air-conditioning units. The EPA considered it possible that HC refrigerants may be used in those end-uses because either SNAP had received applications for HCs in these end-uses or UL standards that specifically address higher flammability refrigerants existed for these end-uses, showing industry interest in using HC refrigerants. The scenarios for these end-uses were modeled to consider whether they were or were not exempted from the CAA section 608 venting prohibition.²² The HC emissions used for these scenarios were estimated based on the EPA's Vintaging Model, and their potential contributions to ozone concentrations were assessed using the EPA's Community Multiscale Air Quality (CMAQ) model.

CMAQ modeling was performed for the Atlanta, Houston, and Los Angeles regions, due to their distinctive geographic settings and chronic high levels of ground-level ozone. Their ozone concentrations were used to estimate and scale for national emission estimates. Ozone concentrations due to HC refrigerant emissions were compared to 70 ppb for the purposes of illustrating that even under a worst-case scenario, the projected impacts on ground-level ozone would be small.²³ We found that even if all the HC refrigerants in appliances in end-uses listed as acceptable, subject to use conditions, and listed as acceptable in previous rules were to be emitted, as well as two unsaturated HC refrigerants that the EPA ultimately listed as unacceptable in certain end-uses, there would be a worst-case impact of less than 0.15 ppb

for ground-level ozone in the Los Angeles area.²⁴

In 2022, the EPA conducted a more recent air quality analysis, which considered additional end-uses and recently listed acceptable refrigerants (*e.g.*, R-1150 [ethylene] in very low temperature refrigeration). This analysis did not include the refrigerants propylene and R-443A due to the EPA's listing of these refrigerants as unacceptable in certain end-uses, citing their potential for local air quality impacts.²⁵ The analysis utilized updated models and projected future impacts out to 2040.²⁶ The EPA found that the revised air quality models showed slightly greater impacts compared to our 2014 and 2016 analyses when using the same refrigerants in the same end-uses. For example, when looking at a worst-case scenario where the most reactive HC refrigerant analyzed, propylene, was used broadly in all refrigeration and AC end-uses, the largest incremental amount of O₃ generated was 7.80 ppb in the 2016 analysis, which increased to 8.62 ppb in the 2022 analysis. Changes to the CMAQ model, more updated refrigerant emissions estimates from the EPA's Vintaging Model, as well as the longer time-period considered, resulted in the changes in impacts. However, the 2022 analysis also included analyses that accounted for updates in the SNAP listings since the prior analysis. In the 2022 analysis scenarios that estimated emissions if HC refrigerants then listed as acceptable, subject to use conditions, reached 100 percent market penetration in the end-uses in SNAP Rule 25, the worst-case increase in ground-level ozone in Los Angeles was 0.012 ppb, in Houston was 0.009 ppb, and in Atlanta was 0.006 ppb. Unlike the 2016 analysis, the 2022 analysis only examined impacts of propylene in the worst-case scenario and did not otherwise model propylene or the propylene blend R-443A in the more reasonable scenarios, as those refrigerants were listed as unacceptable in SNAP Rule 21.²⁷ Because propylene and R-443A had a much higher potential impact on local air quality than the saturated HCs, removing propylene and R-443A from the modeling resulted in lower projected impacts on local air quality in the 2022 analysis compared to the 2016 analysis in the more reasonable scenarios. The

¹⁵ 40 CFR 51.100(s).

¹⁶ 40 CFR 51.100(s) states that "any compound of carbon" which "participates in atmospheric photochemical reactions" is considered a VOC unless expressly excluded in that provision based on a determination of "negligible photochemical reactivity" when compared to ethane's photochemical reactivity.

¹⁷ 40 CFR 51.100(s).

¹⁸ MIR values are from "Development of the SAPRC-07 Chemical Mechanism and Updated Ozone Reactivity Scales," Report to the California Air Resources Board by William P.L. Carter. Revised January 27, 2010. (Carter, 2010).

¹⁹ ICF, 2014. Assessment of the Potential Impact of Hydrocarbon Refrigerants on Ground Level Ozone Concentrations. February, 2014.

²⁰ ICF, 2016. Additional Follow-on Assessment of the Potential Impact of Hydrocarbon Refrigerants on Ground Level Ozone Concentrations. September, 2016.

²¹ ICF, 2014.

²² ICF, 2016.

²³ The current NAAQS for ozone and other photochemical oxidants is 0.070 ppm, as the fourth-highest daily maximum 8-hour concentration, averaged across three consecutive years. The level of the NAAQS, 0.070 ppm, is equivalent to 70 ppb.

²⁴ ICF, 2016. *Op cit.*

²⁵ See SNAP Rule 21, 81 FR 86778; December 1, 2016.

²⁶ ICF, 2022. Additional Assessment of the Potential Impact of Hydrocarbon Refrigerants on Ground Level Ozone Concentrations. May 2022.

²⁷ See 81 FR 86778; December 1, 2016.

EPA considers the 2022 modeling to further support the Agency's earlier conclusions in 2015 and 2016 that use of saturated HCs as refrigerants would not result in a significant increase in ground-level ozone.

HCR 4141 is a blend of saturated HCs. The potential of this refrigerant blend to form ground-level ozone, as determined by the MIRs of its components, is expected to be less than that of R-600a or the blend R-441A, and greater than that of R-290, as mentioned earlier in this section. The EPA is proposing to list HCR 4141 as acceptable, subject to use conditions, for use in household refrigerators and freezers, where other HC refrigerants with comparable MIRs are listed as acceptable, subject to use conditions, and for use in residential and light commercial AC and heat pumps—self-contained room AC. Thus, the EPA considers the potential impacts of HCR 4141 on local air quality, as well as the overall risk to human health and the environment, to be no greater than that of other substitutes available and already listed as acceptable in the same end-uses.

Flammability information: HCR 4141 has higher flammability, with all its components having an ASHRAE flammability classification of 3. HFO-1234ze(E) and R-516A have lower flammability, with an ASHRAE flammability classification of 2L.

Toxicity and exposure data: HFO-1234ze(E) and R-516A have an ASHRAE toxicity classification of A (lower toxicity). HCR 4141 has not yet been reviewed by ASHRAE's committee that develops the ASHRAE 34 standard, "Refrigerant Designation and Safety Classification;" however, its components all have an ASHRAE toxicity classification of A.

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

The AIHA has established WEELs of 1,000 ppm as an 8-hr TWA for HFC-134a and HFC-152a and 500 ppm as an 8-hr TWA for HFO-1234yf. ASHRAE has adopted an Occupational Exposure Limit (OEL) of 800 ppm as an 8-hr TWA for HFO-1234ze(E). ASHRAE also has adopted an OEL of 590 ppm as an 8-hr TWA for R-516A.²⁸ ASHRAE has

adopted OELs of 1,000 ppm for each of the components of HCR 4141. The EPA anticipates that users can meet the AIHA WEELs and ASHRAE OELs and address potential health risks by following requirements and recommendations in the manufacturers' safety data sheets (SDSs), the proposed use conditions, and other safety precautions common to the refrigeration and AC industry.

Comparison to other substitutes in this end-use: The atmospheric effects for HCR 4141, HFO-1234ze(E), and R-516A are overall better than or comparable to many of the substitutes currently listed as acceptable in this end-use such as R-290, R-457A, R-454C, R-454A, R-454B, or R-513A. More specifically, for new residential and light commercial AC and heat pump applications, R-516A, HFO-1234ze(E), and HCR 4141 have better than or comparable profiles to other acceptable substitutes already listed in this end-use such as R-457A, R-454C, R-454A, R-454B, R-513A, and HFC-32. The EPA acknowledges that the atmospheric effects of ammonia absorption, acceptable in this end-use, may be lower than R-516A, HFO-1234ze(E), and HCR 4141; however, the EPA is unaware of any ammonia absorption systems that are being used in the United States for this end-use. Other regulations also may limit the use of ammonia absorption; therefore, the SNAP program does not consider this substitute to be available or potentially available for new equipment in the affected applications. Furthermore, as noted above, the EPA does not intend to restrict a substitute if it has only marginally greater risk. The EPA does not consider the atmospheric effects of these three substitutes to be significantly greater and the Agency recognizes that they can provide an additional option for situations where other refrigerants are not viable, such as for use in split-systems and equipment requiring larger charge sizes, or where equipment using other generally available alternatives may be restricted in some jurisdictions. For new residential and light commercial AC and heat pumps—self-contained room AC, the atmospheric effects of HCR 4141 are comparable to or lower than that of other acceptable substitutes in this end-use category such as HFC-32, R-290, R-441A, and R-454B.

Toxicity risks of use, determined by the likelihood of exceeding the exposure limit of these refrigerants in this end-use, are evaluated in the previously referenced risk screens. The toxicity risks of using HCR 4141, HFO-1234ze(E), and R-516A are comparable to or lower than toxicity risks of other

available substitutes in the same end-use.²⁹ Toxicity risks of the proposed refrigerants can be minimized by use consistent with the proposed use conditions and best industry practices.

The flammability risks associated with HCR 4141, HFO-1234ze(E), and R-516A in this end-use, determined by the likelihood of exceeding their respective LFLs, are evaluated in the risk screens referenced earlier in this section. While these refrigerants are more flammable than available, acceptable A1 refrigerants in the same end-use, this risk can be minimized by use consistent with the proposed use conditions, as well as recommendations in the manufacturers' SDS and other safety precautions common in the refrigeration and AC industry. The flammability risks of these refrigerants are comparable to or less than other available lower flammability (e.g., HFC-32, R-454B) or higher flammability refrigerants (e.g., R-290) that the EPA has previously listed as acceptable, subject to use conditions. The EPA is proposing use conditions that mitigate human health and environmental risks associated with the flammability of these alternatives so that they will not pose greater overall risk than other acceptable substitutes in this end-use category.

The EPA is proposing to list R-516A, HCR 4141, and HFO-1234ze(E) as acceptable, subject to use conditions. Given the wide range of applications for residential and light commercial AC and heat pumps, not all refrigerants listed as acceptable under SNAP will be suitable for the full range of equipment in this end-use. This proposal would provide additional refrigerant options for the full range of residential and light commercial AC and heat pump equipment.

E. What are the refrigerants for which the EPA is proposing to update use conditions and how do they compare to other refrigerants in the residential and light commercial AC and heat pumps end-use?

The EPA is proposing to update the use conditions for eight previously listed refrigerants in the residential and light commercial AC and heat pumps end-use. The EPA previously listed HFC-32, R-452B, R-454A, R-454B, R-454C, and R-457A as acceptable, subject to use conditions, for use in all residential and light commercial AC and heat pump applications, and R-290 and R-441A as acceptable, subject to use

²⁹ See previous listing decisions for information regarding the toxicity of other available alternatives (see <https://www.epa.gov/snap/substitutes-residential-and-light-commercial-air-conditioning-and-heat-pumps>).

²⁸ ANSI/ASHRAE Standard 34–2024. Designation and Safety Classification of Refrigerants.

conditions, for use in residential and light commercial AC and heat pumps—self-contained room AC.

R-290 is a HC refrigerant with three carbons and the formula C₃H₈. R-441A is a HC blend³⁰ consisting of 55 percent R-290, 36 percent R-600, six percent R-600a, and three percent R-170 (ethane) by weight. R-290 and R-441A are higher flammability refrigerants in the A3 Safety Group.

HFC-32 is also known as difluoromethane. R-452B, also known by the trade names “Opteon™ XL 55,” and “Solstice® L41y,” is a blend consisting of 67 percent by weight HFC-32; seven percent HFC-125, also known as 1,1,1,2,2-pentafluoroethane; and 26 percent HFO-1234yf. R-457A, also known by the trade name “Forane® 457A,” is a blend consisting of 18 percent HFC-32, 12 percent HFC-152a, and 70 percent HFO-1234yf. R-454A, also known by the trade name “Opteon™ XL 40,” is a blend consisting of 35 percent HFC-32 and 65 percent HFO-1234yf. R-454B, also known by the trade names “Opteon™ XL 41” and “Puron Advance™,” is a blend consisting of 68.9 percent HFC-32 and 31.1 percent HFO-1234yf. R-454C, also known by the trade name “Opteon™ XL 20,” is a blend consisting of 21.5 percent HFC-32 and 78.5 percent HFO-1234yf. R-457A, also known by the trade name “Forane® 457A,” is a blend consisting of 70 percent HFO-1234yf, 18 percent HFC-32, and 12 percent HFC-152a.

HFC-32, R-452B, R-454A, R-454B, R-454C, and R-457A are lower flammability refrigerant blends in the A2L Safety Group. Additional information on the refrigerants and their components can be found in the docket for this rulemaking under the title “Section IV.E. Information on Refrigerants and Their Components—Residential and Light Commercial AC and Heat Pumps.”

Redacted submissions and supporting documentation for HFC-32, R-452B, R-454A, R-454B, R-454C, R-457A, R-290, and R-441A are provided in the docket. The EPA performed updated risk screening for two proposed updated A2L listings, R-454C and R-457A, and one proposed updated A3 listing, R-441A, to examine the human health and

environmental risks of these substitutes and to evaluate the impact of applying the 4th edition of UL 60335-2-40. The EPA chose these three representative substitutes which had the most conservative (lowest) LFLs and most conservative short- and long-term exposure limits among the group of refrigerants proposed for updated use conditions. These representative refrigerants were selected because it was presumed that substances with higher LFLs and exposure limits that were modeled for the same scenarios and end-uses would also pass the risk screens. The EPA proposes to conclude from these comparisons that while some calculated concentrations changed due to different assumptions and requirements, the refrigerants still could be used without exceeding the LFL and therefore did not increase flammability or exposure risks compared to the EPA’s previous risk screens that assumed equipment followed UL 60335-2-40, 3rd edition. Thus, the risk screens demonstrated no greater overall risk to human health and the environment than other refrigerants being used when considering the impact of the co-proposed use conditions requiring use that meets the requirements of UL 60335-2-40, 4th edition. These risk screens are available in the docket.^{31 32 33}

Environmental information: The specific atmospheric effects values can be found in the individual risk screens for HFC-32, R-290, R-441A, R-452B, R-454A, R-454B, R-454C, and R-457A. These were determined consistent with the source information noted in Section III.C. above (e.g., CAA, the AIM Act) as well as using the methodology used for determining values for blends of chemicals (i.e., determined by the percentage of each component).

The refrigerant blends R-452B, R-454A, R-454B, R-454C, and R-457A are made up of the components HFC-125, HFC-32, HFC-152a, and HFO-1234yf. R-441A is made up of HC components and R-290 is a neat HC refrigerant.

The components of the refrigerant blends, HFC-125, HFO-1234yf, HFC-152a, and HFC-32, are excluded from the EPA’s regulatory definition of

VOC³⁴ for the purpose of addressing the development of SIPs to attain and maintain the NAAQS. See Section IV.D. for discussion of air quality analysis that was performed, which the EPA used to evaluate potential air quality impacts due to emissions of R-290, R-441A, and other HC refrigerants that are VOC under the EPA’s regulatory definition of VOC.³⁵ The EPA has also established certain exemptions to the CAA section 608 venting prohibition, as listed in 40 CFR 82.154(a)(1), and none of those exemptions apply to HFC-32, R-452B, R-454A, R-454B, R-454C, or R-457A. The EPA previously exempted R-290 and R-441A in self-contained room air conditioners for residential and light commercial AC and heat pumps from the venting prohibition under CAA section 608(c)(2), finding that such venting, release, or disposal does not pose a threat to the environment.³⁶ The EPA is not proposing to change either of these decisions and is not reopening them for comment.

Flammability information: HFC-32, R-452B, R-454A, R-454B, R-454C, and R-457A have lower flammability, with an ASHRAE flammability classification of 2L. R-290 and R-441A have higher flammability, with an ASHRAE flammability classification of 3.

Toxicity and exposure data: HFC-32, R-290, R-441A, R-452B, R-454A, R-454B, R-454C, and R-457A have an ASHRAE toxicity classification of A (lower toxicity). Potential health effects of exposure to these substitutes include drowsiness or dizziness. The substitutes may also irritate the skin or eyes or cause frostbite. At sufficiently high concentrations, the substitutes may cause irregular heartbeat. The substitutes could cause asphyxiation if air is displaced by vapors in a confined space. These potential health effects are common to many refrigerants.

The AIHA has established WEELs of 1,000 ppm as an 8-hr TWA for HFC-32, HFC-125, HFC-134a, and HFC-152a and 500 ppm as an 8-hr TWA for HFO-1234yf. ASHRAE also has adopted OELs of 1,000, 1,000, 870, 690, 850, 620, and 650 ppm as an 8-hr TWA for R-290, R-441A, R-452B, R-454A, R-454B, R-454C, and R-457A, respectively.³⁷ The EPA anticipates that users can meet the AIHA WEELs and ASHRAE OELs and address potential health risks by following requirements and recommendations in the manufacturers’

³⁰ The EPA notes that under the SNAP program, we review and list refrigerants with specific compositions (59 FR 13044; March 18, 1994). To the extent possible, we follow ASHRAE’s designations for refrigerants. Blends of refrigerants must be reviewed separately. For example, we consider each blend of R-290 with R-600a to be a different and unique refrigerant, and each would require separate submission, review and listing. Thus, blends of the refrigerants that we are listing as acceptable, subject to use conditions, in this rule are not acceptable.

³¹ ICF, 2025e. Risk Screen on Substitutes in Residential and Light Commercial Air Conditioning and Heat Pumps (New Equipment); Substitute: R-441A.

³² ICF, 2025f. Risk Screen on Substitutes in Residential and Light Commercial Air Conditioning and Heat Pumps (New Equipment); Substitute: R-454C (Opteon™ XL20).

³³ ICF, 2025g. Risk Screen on Substitutes in Residential and Light Commercial Air Conditioning and Heat Pumps (New Equipment); Substitute: R-457A (Forane® 457A).

³⁴ 40 CFR 51.100(s).

³⁵ *Id.*

³⁶ See 80 FR 19454; April 10, 2015.

³⁷ OELs are those in ASHRAE 34-2024, “Designation and Safety Classification of Refrigerants.”

SDS, the proposed use conditions, and other safety precautions common to the refrigeration and AC industry.

Comparison to other substitutes in this end-use: The atmospheric effects for HFC-32, R-290, R-441A, R-452B, R-454A, R-454B, R-454C, and R-457A are overall better than or comparable to many of the substitutes currently listed as acceptable. For new residential and light commercial AC and heat pump applications (the full category), HFC-32, R-452B, R-454A, R-454B, R-454C, and R-457A have comparable or higher individual values than some other substitutes listed as acceptable in part of this end-use such as R-290 and ammonia absorption and lower values than other acceptable substitutes listed in this end-use (e.g., the exchange value of HFC-32 is lower than HFC-134a, R-407C, and R-410A). However, the EPA is unaware of any ammonia absorption systems being used in the United States for this end-use and due to its flammability, R-290 is listed as acceptable for use in self-contained room AC only and is not an available substitute for any of the other end-uses within the sector. As noted above, the EPA does not intend to restrict a substitute if it has only marginally greater risk. The EPA does not consider the atmospheric effects of these proposed substitutes to be significantly greater than other acceptable substitutes and the Agency recognizes that they can provide an additional option for situations where other refrigerants are not viable.

Toxicity risks of HFC-32, R-290, R-441A, R-452B, R-454A, R-452B, R-454C, and R-457A in this end-use, determined by the likelihood of exceeding their respective exposure limits, are evaluated in the previously referenced risk screens. The toxicity risks of using HFC-32, R-290, R-441A, R-452B, R-454A, R-454B, R-454C, and R-457A are comparable to or lower than toxicity risks of other available substitutes in the same end-use.³⁸ Toxicity risks of the proposed refrigerants can be minimized by use consistent with the proposed use conditions and best industry practices.

The flammability risks of HFC-32, R-290, R-441A, R-452B, R-454A, R-454B, R-454C, and R-457A in this end-use, determined by the likelihood of exceeding their respective LFLs, are evaluated in the previously referenced risk screens. While these refrigerants may pose greater flammability risk than

other available substitutes in the same end-use, this risk can be minimized by use consistent with the proposed use conditions, as well as recommendations in the manufacturers' SDS and other safety precautions common in the refrigeration and AC industry. The EPA is proposing use conditions that maintain the low potential risk associated with the flammability of these alternatives so that they will not pose greater overall risk than other acceptable substitutes in this end-use category. A full discussion of the proposed use conditions may be found in Section IV.F.

While R-290 and R-441A have higher flammability than many substitutes listed as acceptable in this end-use, the proposed updated use conditions would reduce the potential risk associated with the flammability of these alternatives so that they would not pose greater overall risk than other acceptable substitutes in this end-use. The proposed substitutes HFC-32, R-452B, R-454A, R-454B, R-454C, and R-457A would provide additional options for situations where other refrigerants are not viable, such as for use in split-systems or equipment requiring larger charge sizes, or where equipment using other generally available alternatives may be restricted in some jurisdictions.

The EPA proposes to find that updating the use conditions for the existing listings for HFC-32, R-452B, R-454A, R-454B, R-454C, and R-457A as acceptable, subject to use conditions, for use in all types of residential and light commercial AC and heat pumps and for R-290 and R-441A in residential and light commercial AC and heat pumps—self-contained room AC, is appropriate to maintain a broad list of acceptable substitutes available for the full range of applications under this end-use and to continue safe use of these refrigerants. These updated listings would help establish and maintain an equal playing field for substitutes used in the market.

HFC-32, R-452B, R-454A, R-454B, R-454C, R-457A, R-290, and R-441A are currently listed as acceptable, subject to use conditions, for use in the residential and light commercial AC and heat pumps end-use. The EPA is not proposing to move any of these listings to any other listing category (e.g., unacceptable). Rather, the EPA is proposing to update the use conditions because the industry consensus safety standards that were incorporated by reference at the time of the listing have since been either updated³⁹ or superseded.⁴⁰

This list provides a summary of the existing listings for each refrigerant in the residential and light commercial AC and heat pumps end-use that the EPA is proposing to update:

- HFC-32 is listed as acceptable, subject to use conditions, in all new residential and light commercial AC and heat pump applications. The current use conditions incorporate by reference UL 60335-2-40, 3rd edition. Previous listings for this refrigerant in this end-use and detailed information on the use conditions, listing decision, and rationale for these previous listings can be found in SNAP Rule 19,⁴¹ SNAP Rule 23,⁴² and SNAP Rule 25.⁴³

- R-452B, R-454A, R-454B, R-454C, and R-457A are listed as acceptable, subject to use conditions, in all new residential and light commercial AC and heat pump applications. The current use conditions incorporate by reference UL 60335-2-40, 3rd edition. Previous listings for these refrigerants in this end-use and detailed information on the use conditions, listing decision, and rationale for these previous listings can be found in SNAP Rule 23.⁴⁴

- R-290 and R-441A are listed as acceptable, subject to use conditions, in new residential and light commercial AC and heat pumps—self-contained room AC only. The current use conditions incorporate by reference Supplement SA and Appendices B through F of the 8th edition of UL 484. Previous listings for these refrigerants in this end-use and detailed information on the use conditions, listing decision, and rationale for these previous listings can be found in SNAP Rule 19.⁴⁵

F. What use conditions is the EPA proposing in this action for new and updated listings in this residential and light commercial AC and heat pumps end-use?

The proposed use conditions described in this section would apply to newly listed refrigerants HCR 4141, HFO-1234ze(E), and R-516A in this end-use and to previously listed refrigerants HFC-32, R-452B, R-454A, R-454B, R-454C, R-457A, R-290, and R-441A in this end-use. For these eight previously listed refrigerants, the proposed use conditions would apply to new equipment manufactured after the effective date of the final rule. The proposed updated use conditions would neither apply to nor affect equipment

³⁸ See previous listing decisions for information regarding the toxicity of other available alternatives (<https://www.epa.gov/snap/substitutes-residential-and-light-commercial-air-conditioning-and-heat-pumps>).

³⁹ UL 60335-2-40.

⁴⁰ UL 484.

⁴¹ See 80 FR 19454; April 10, 2015.

⁴² See 86 FR 24444; May 6, 2021.

⁴³ See 88 FR 26382; April 28, 2023.

⁴⁴ See 86 FR 24444; May 6, 2021.

⁴⁵ See 80 FR 19454; April 10, 2015.

manufactured before the effective date of the final rule.

Many of the proposed use conditions described in this section mirror the SNAP program's historical approach to requirements for lower flammability and higher flammability refrigerants. For example, the proposed use condition related to use only in new equipment is consistent with previously listed lower flammability and higher flammability refrigerants in this end-use. The proposed use conditions related to labels and markings are very similar to previous requirements for lower and higher flammability refrigerants in this end-use, with a few changes to better align the EPA's requirements with updated industry consensus safety standards. The co-proposed option that would incorporate by reference UL 60335–2–40 described in Section IV.F.4.a. would simply update the required safety standard to the latest edition in a manner consistent with the EPA's historical practice of incorporating portions of or entire industry consensus safety standards by reference. The other co-proposed option described in Section IV.F.4.b., while different than the EPA's historical practice, would address situations where agency regulations require adherence to editions of industry consensus safety standards that have been updated and replaced subsequent to the issuance of a final rule.

The EPA is proposing to remove the existing use conditions specific to refrigerant charge size limits for R–290, R–441A, R–452B, R–454A, R–454B, R–454C, and R–457A in residential and light commercial AC and heat pump applications. SNAP Rule 19⁴⁶ included a specific use condition for R–290 and R–441A in self-contained room AC for refrigerant charge size limits based on cooling capacity and type of equipment. SNAP Rule 23⁴⁷ included a specific use condition for R–452B, R–454A, R–454B, R–454C, and R–457A in all residential and light commercial AC and heat pump applications for charge size based on UL 60335–2–40 and the room size where the equipment is used. The EPA is not proposing to eliminate charge size restrictions. Rather, the EPA is co-proposing two use condition options related to equipment certification or industry consensus safety standards, which both include requirements to ensure that equipment is designed using safe refrigerant charge sizes. The EPA is proposing to rely on the charge size restrictions inherent in that proposed requirement rather than duplicate

charge size restrictions in a separate use condition. The EPA proposes the following use conditions:

1. New Equipment Only; Not Intended for Use as a Retrofit Alternative

The EPA is proposing that all refrigerants covered by this action in the residential and light commercial AC and heat pumps end-use, including the applicable applications (*e.g.*, unitary split AC systems, mini-splits, and heat pumps), may be used only in new equipment designed to address concerns unique to lower and higher flammability refrigerants. In other words, none of these substitutes may be used as a conversion or “retrofit” refrigerant for existing equipment. These lower and higher flammability refrigerants were not submitted under the SNAP program to be used in retrofitted equipment, and no information was provided on how to address hazards if they were to be used in equipment that was designed for nonflammable refrigerants.

2. Labels

The EPA is proposing to require labels for residential and light commercial AC and heat pump equipment. These labels would need to be permanently attached at the locations provided. The following text would be required for residential and light commercial AC and heat pump equipment containing an A2L refrigerant that is proposed to be listed in this rule:

a. On the outside of the equipment: “WARNING—Risk of Fire. Flammable Refrigerant Used. To Be Repaired Only by Trained Service Personnel. Do Not Puncture Refrigerant Tubing.”

b. On the outside of the equipment: “WARNING—Risk of Fire. Dispose of Properly in Accordance with Federal or Local Regulations. Flammable Refrigerant Used.”

c. On the inside of the equipment near the compressor: “WARNING—Risk of Fire. Flammable Refrigerant Used. Consult Repair Manual/Owner's Guide Before Attempting to Service This Product. All Safety Precautions Must be Followed.”

d. For any equipment pre-charged at the factory, on the equipment packaging: “WARNING—Risk of Fire due to Flammable Refrigerant Used. Follow Handling Instructions Carefully in Compliance with National Regulations”

e. On the indoor unit near the nameplate: A label stating the minimum installation height (if applicable), in m and ft, and the minimum room area (operating or storage), in m² and ft². These values shall be calculated according to a U.S. industry consensus

safety standard for AC and heat pump equipment.

f. On the outside of non-fixed equipment, such as portable air conditioners and window air conditioners and heat pumps: “WARNING—Risk of Fire—Store in a well ventilated room without continuously operating flames or other potential ignition.”

g. For fixed equipment such as packed terminal air conditioners, packaged terminal heat pumps, rooftop units, and split air conditioners: “WARNING—Risk of Fire—Auxiliary devices which may be ignition sources shall not be installed in the ductwork, other than auxiliary devices listed for use with the specific appliance. See instructions.”

The EPA has previously stated that it would be difficult to see warning labels with the minimum lettering height requirement for A2L refrigerants of 1/8 inch as required by the UL standard. Therefore, as in previous rules,⁴⁸ the EPA is proposing that the minimum height for lettering be 1/4 inch (6.4 mm) as opposed to 1/8 inch, which would make it easier for technicians, consumers, retail storeowners, first responders, and those disposing of the appliance to view the warning labels. Other than the proposed label under paragraph e, the text of the labels is similar or verbatim in language to those required by the 4th edition of UL 60335–2–40. They are also aligned with labeling requirements for A2L refrigerants in previous SNAP Rules 23⁴⁹ and 25.⁵⁰

The proposed label under paragraph e describes the required content of a label rather than exact language that the label would need to contain. The same change is being proposed for one of the labels for equipment using A3 refrigerants, see paragraph l, later in this section. This proposed change would allow the EPA's use conditions to remain consistent with the requirements of the latest edition of UL 60335–2–40 while giving flexibility for the use condition to remain applicable even if the third-party certification option described in Section IV.F.4.b. is finalized, and the UL standard is not incorporated by reference. This proposed change is intended to avoid potential conflict between the regulatory requirements and the industry safety standards if the specific requirements in those standards are changed.

The EPA is also proposing labels for residential and light commercial AC and

⁴⁸ See 86 FR 24444, May 6, 2021; 88 FR 26382, April 28, 2023.

⁴⁹ See 86 FR 24444, May 6, 2021.

⁵⁰ See 88 FR 26382, April 28, 2023.

⁴⁶ See 80 FR 19454; April 10, 2015.

⁴⁷ See 86 FR 24444; May 6, 2021.

heat pump equipment using A3 refrigerants proposed in this rule. The following text would need to be permanently attached at the locations provided:

h. On the outside of the equipment: “DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. To Be Repaired Only by Trained Service Personnel. Do Not Puncture Refrigerant Tubing.”

i. On the outside of the equipment: “WARNING—Risk of Fire or Explosion. Dispose Of Properly in Accordance with Federal or Local Regulations. Flammable Refrigerant Used.”

j. On the inside of the equipment near the compressor: “DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. Consult Repair Manual/Owner’s Guide Before Attempting to Service This Product. All Safety Precautions Must Be Followed.”

k. For any equipment pre-charged at the factory, on the equipment packaging: “DANGER—Risk of Fire or Explosion due to Flammable Refrigerant Used. Follow Handling Instructions Carefully in Compliance with National Regulations.”

l. On an indoor unit near the nameplate: A label stating the minimum installation height (if applicable), in m and ft, and the minimum room area (operating or storage), in m² and ft². These values shall be calculated according to a U.S. industry consensus safety standard for AC and heat pump equipment.

m. On the outside of non-fixed equipment, such as portable air conditioners and window air conditioners and heat pumps: “WARNING—Risk of Fire or Explosion—Store in a well ventilated room without continuously operating flames or other potential ignition.”

The EPA is proposing that the minimum height for lettering be at least ¼ inch (6.4 mm), consistent with the labeling requirements for A3 refrigerants under the 4th edition of UL 60335–2–40. This text size makes it easier for technicians, consumers, retail storeowners, first responders, and those disposing the appliance to view the warning labels. The text of the proposed labels is similar or verbatim in language to those that required by the 4th edition of UL 60335–2–40. This proposed text differs from that in SNAP Rule 19⁵¹ for A3 refrigerants in this end-use. For example, the proposed labels under paragraphs k and m do not currently exist as use conditions for R–290 and R–441A but are consistent with the latest labeling requirements for A3 refrigerants

under the 4th edition of UL 60335–2–40. Additionally, the proposed labels under paragraphs i and j use the words “WARNING” and “DANGER” in lieu of “CAUTION.” The EPA proposes these updates to the labeling requirements to be consistent with the 4th edition of UL 60335–2–40 and with the SNAP labeling requirements for other higher flammability refrigerants. The EPA proposes to find that using a common set of labels would aid in compliance, especially for a manufacturer that uses more than one of these refrigerants or produces both self-contained room ACs and heat pumps and other types of residential and light commercial AC and heat pumps. The labels for residential and light commercial AC and heat pump equipment using A3 refrigerants are listed in paragraphs a through f in appendices R and Z in the proposed regulatory text for the A3 listings in this end-use. The proposed regulatory text can be found in the docket for this rulemaking under the title “Proposed Regulatory Text for SNAP Rule 27” in the sections “Proposed revisions to Appendices R, V, W, and new Appendix Z—Incorporate by Reference Option” and “Proposed revisions to Appendices R, V, W, and new Appendix Z—Third-Party Certification Option (co-proposed as an alternative to Section III).” The proposed labeling requirements are identical in both sections.

3. Color-Coded Hoses and Piping

The EPA is proposing to require that equipment have distinguishing red (Pantone® Matching System [PMS] #185 or “Reichs-Ausschuß für Lieferbedingungen und Gütesicherung,” [RAL] 3020 from Germany’s National Commission for Delivery Terms and Quality Assurance) color-coded hoses and piping to indicate use of a flammable refrigerant. The equipment would need to have red marked service ports, pipes, hoses, and other devices through which the refrigerant is serviced. This color would need to be present at all service ports and where service puncturing or otherwise creating an opening from the refrigerant circuit to the atmosphere might be expected. Markings would need to extend at least one inch (25 mm) from the servicing port and would need to be replaced if removed. The EPA has applied this proposed use condition in past actions for lower and higher flammability refrigerants.⁵² The EPA is proposing that such markings apply to both A2L and A3 refrigerants to establish a common, familiar, and standard means of

identifying the use of a lower or higher flammability refrigerant. Being able to immediately identify the use of a lower or higher flammability refrigerant would reduce the risk of a technician using sparking equipment or otherwise having an ignition source nearby. The AC and refrigeration industry currently uses red-colored hoses and piping as means for identifying the use of a lower or higher flammability refrigerant based on previous SNAP listings. Likewise, distinguishing coloring is used elsewhere to indicate an unusual and potentially dangerous situation, for example in the use of orange-insulated wires in hybrid electric vehicles.

The use of color-coded hoses and piping would be in addition to the proposed use of warning labels. Having two such warning methods is reasonable and consistent with other general industry practices. This approach is the same as in our previous rules on A2L and A3 refrigerants.⁵³

4. Use Condition Options Related to Equipment Certification or Industry Safety Standard Requirements

The EPA is co-proposing two options for a use condition related to equipment certification or industry safety standard requirements. Under the first option, the EPA would incorporate by reference a new edition of the industry consensus safety standard for this end-use. Under the second option, the EPA would require residential and light commercial AC and heat pump equipment to be certified by an organization that is recognized as an NRTL to a U.S. industry consensus safety standard that is designed to allow for safe use of flammable refrigerants and mitigates risks such that the listed refrigerants can be used in a manner that does not pose a greater overall risk to human health and the environment than other substitutes in this end-use.

a. Incorporate by Reference UL 60335–2–40, 4th Edition Option

Since 2008, the EPA has listed numerous A2, A2L, and A3 refrigerants as acceptable, subject to use conditions, addressing use of lower and higher flammability refrigerants in end-uses where the EPA has determined it is necessary to mitigate risks. Most often, the EPA has relied in part on incorporating by reference industry consensus safety standards to ensure these risks are mitigated. Industry consensus safety standards are developed in cooperation with parties with an interest in participating in the

⁵¹ See 80 FR 19454; April 10, 2015.

⁵² See 86 FR 24444, May 6, 2021; 88 FR 26382, April 28, 2023.

⁵³ See 76 FR 78832, December 20, 2011; 80 FR 19454, April 10, 2015; 88 FR 26382, April 28, 2023.

development or use of the standard. For example, UL uses a process where experts with various interests, including manufacturers, government agencies, and academia, come together to agree on the safety requirements for a product, resulting in a standard that reflects a collective consensus on best practices for safety. These standards are typically under continuous maintenance, meaning that they are updated and superseded by newer editions. This often means that regulations and safety standards are out of step; and thus, the EPA often updates its regulations to incorporate the newer version of the standard. The revision cycle for the 4th edition of UL 60335–2–40, including final recirculation, concluded with its publication on December 15, 2022.

Under this first option, the EPA is proposing to set a use condition consistent with the latest version of UL standards through incorporation by reference. Thus, the EPA proposes to list new refrigerants and update existing listings for refrigerants in the relevant end-use covered by this action with a use condition that these refrigerants may be used only in equipment that meets all requirements in UL 60335–2–40, 4th edition. This option continues the practice of updating regulations to align with newer editions of standards.

Specifically, the EPA is proposing to update the condition to meet all requirements listed in UL 60335–2–40, 3rd edition, “Household and Similar Electrical Appliances—Safety—Part 2–40: Particular Requirements for Electrical Heat Pumps, Air Conditioners and Dehumidifiers,” dated November 1, 2019 (for A2L refrigerants), or Supplement SA and Appendices B through F of UL Standard 484 8th edition, “Room Air Conditioners,” dated August 2, 2012 (for R–290 and R–441A), with the proposed condition to meet all requirements listed in the 4th edition of UL 60335–2–40, “Household and Similar Electrical Appliances—Safety—Part 2–40: Particular Requirements for Electrical Heat Pumps, Air Conditioners and Dehumidifiers,” dated December 15, 2022. This proposed use condition incorporating the 4th edition would apply to new equipment manufactured after the effective date of any final action. In cases where this rule includes requirements that are different than those of UL 60335–2–40 (e.g., font size), the EPA is proposing that the requirements of this rule apply.

UL 60335–2–40 applies to the SNAP applications of window unit room air conditioners, PTACs and PTHPs, portable air conditioners, central air conditioners, non-ducted AC systems,

packaged rooftop units, WSHPs, GSHPs, and other products. This UL standard indicates that refrigerant charges greater than a specific amount (called “m3” in the UL standard and based on the refrigerant’s LFL) are beyond its scope and that national safety standards might apply, such as ANSI or ASHRAE 15.2. Because the EPA has not evaluated such situations, this proposal only covers residential and light commercial AC and heat pump equipment that fits within the scope of the UL standard.

UL 60335–2–40 was developed in an open and consensus-based approach, with the assistance of experts in the refrigeration and AC industry as well as experts involved in assessing the safety of products. Participants of the UL 60335–2–40 consensus standard process reviewed results of testing on equipment for flammability risk in residential applications and evaluated the relevant scientific studies. Further, UL has developed safety standards for construction and system design, markings, and performance tests concerning refrigerant leakage, ignition of switching components, surface temperature of parts, and component strength after being scratched. Aspects of system construction and design, including charge size, ventilation, and installation space, and greater detail on markings, are discussed later in this section. While similar safety standards exist from other bodies, such as the International Electrotechnical Commission (IEC), we are proposing in this option to use specific UL standards that are most applicable and used by U.S. manufacturers. The EPA used this approach in previous SNAP rules concerning lower and higher flammability refrigerants.⁵⁴

The EPA has evaluated the revisions and proposes to find that construction and use of equipment in accordance with the 4th edition would not pose greater overall risk to human health and the environment than use in accordance with the 3rd edition. The 4th edition makes changes that address potential hazards of flammable refrigerants including refined requirements for leak detection systems to accommodate various methods, increase robustness and reliability, and account for deviation and drift over the system life cycle.

The requirements in UL 60335–2–40 would reduce the risk to workers and consumers. Incorporating the latest edition of the UL standard as a use condition would also reduce conflict

between federal regulations, building codes, and other authorities that require compliance with the latest version of the UL standard. This section summarizes relevant aspects of UL 60335–2–40 for information only and is not meant to be a complete review of the standard or how it is applied.

UL 60335–2–40 limits the amount of refrigerant allowed in each type of appliance based on several factors explained in that standard. The EPA is proposing to require charge size limits for each of the proposed refrigerants by equipment type in accordance with UL 60335–2–40, 4th edition. Annex GG of the standard provides the charge limits, ventilation requirements, and requirements for secondary circuits. The standard specifies requirements for installation space of an appliance (*i.e.*, room floor area) and/or ventilation or other requirements which are determined according to the refrigerant charge used in the appliance, the installation location, and the type of ventilation of the location or of the appliance. Within Annex GG, table GG.1DV provides guidance on how to apply the requirements to address the potential flammability hazards of flammable refrigerants.

UL 60335–2–40, 4th edition also contains new specific requirements for determining releasable charge. As opposed to total refrigerant charge, which is the actual refrigerant charge of a single refrigerating system, releasable charge is the mass of refrigerant that can be released into the indoor space from a refrigerating system in the event of a leak. While accounting for releasable charge results in larger total refrigerant charges allowed under the 4th edition when compared to the 3rd edition, the EPA proposes to find that the mitigation requirements in the 4th edition of the standard, such as leak detection systems and safety shutoff valves, effectively reduce risk and address the hazards of flammable refrigerants even at larger total charge sizes.

UL 60335–2–40, 4th edition contains provisions for safety mitigation that were developed to ensure the safe use of flammable refrigerants over a range of appliances. In general, as larger charge sizes are used, more stringent mitigation requirements apply. In certain applications, refrigerant detection systems (as described in Annex LL, Refrigerant detection systems for A2L refrigerants), refrigerant sensors (as described in Annex MM, Refrigerant sensor location confirmation test), and safety alarms are required. The 4th edition includes significantly improved requirements for refrigerant detection systems, including clarified sensor

⁵⁴ See 76 FR 78832, December 20, 2011; 80 FR 19454, April 10, 2015; 86 FR 24444, May 6, 2021; 88 FR 26382, April 28, 2023.

location requirements and better test methods for leak simulation tests.

Where mechanical ventilation (*i.e.*, fans) is required in accordance with Annex GG, it must be initiated by a separate refrigerant detection system either as part of the appliance or installed separately. In a room with no mechanical ventilation, Annex GG provides requirements for openings to rooms based on several factors including the charge size and the room area. The minimum opening is intended to be sufficient so that natural ventilation would reduce the risk of using a flammable refrigerant. The standard also includes specific requirements for split system appliances covering construction, instruction manuals, and allowable charge sizes, mechanical ventilation, safety alarms, and shut off valves for A2L refrigerants.

In addition to Annex GG and table GG.1DV, UL 60335–2–40 has a requirement for the maximum charge for an appliance using an A2L refrigerant, such as HFC–32, HFO–1234ze(E), R–452B, R–454A, R–454B, R–454C, R–457A, and R–516A. The 4th edition sets more comprehensive requirements on A2L refrigerants than the 3rd edition, and the EPA proposes to consider these additional safety mechanisms, including charge size limitations, to be more protective of human health and the environment. If the appliance is a portable appliance, a non-fixed factory-sealed single package, or a cord-connected appliance, which may be periodically or seasonally relocated (excluding servicing) by the end user, there are no additional requirements for room area, ventilation, or other risk mitigation if the charge is sufficiently small—under three times the LFL. Additional requirements exist for charge sizes exceeding three times the LFL.

For A3 refrigerants, including R–290, R–441A, and HCR 4141, UL 60335–2–40 requires a maximum charge of three times the LFL for an appliance that is a portable appliance, a non-fixed factory-sealed single package, or a cord-connected appliance which may be periodically or seasonally relocated (excluding servicing) by the end user. For example, for R–290 this maximum charge for non-fixed appliances would be 114 g.

The EPA compared the effect that requirements from previous standards (UL 484 and UL 60335–2–40, 3rd edition) versus UL 60335–2–40, 4th edition, would have on the results of the EPA's comparative risk screens, which are included in the docket. The EPA conducted updated risk screening on two proposed A2L listings and one proposed A3 listing, which had the

most conservative (lowest) LFLs and most conservative short- and long-term exposure limits among the proposed alternatives. As discussed in Section IV.E., these risk screens demonstrated that use of these refrigerants in the residential and light commercial AC and heat pumps end-use would not pose greater overall risk to human health and the environment than other refrigerants being used when considering the impact of the co-proposed use condition requiring use that meets the requirements of UL 60335–2–40, 4th edition.

As discussed earlier in this section, the EPA is proposing to remove the existing use conditions specific to refrigerant charge size limits for R–290, R–441A, R–452B, R–454A, R–454B, R–454C, and R–457A in residential and light commercial AC and heat pump applications. Rather than duplicate charge size restrictions in a separate use condition, the EPA is proposing to rely on the charge size restrictions inherent in the requirements of UL 60335–2–40, 4th edition. Consistent with previous listings for other lower and higher flammability refrigerants in this end-use, the EPA is not proposing to include a use condition related to adherence to ASHRAE 15 or ASHRAE 15.2. As discussed in this section, the 4th edition of UL 60335–2–40 includes changes from the 3rd edition that specifically address the potential flammability hazards of lower and higher flammability refrigerants. The EPA proposes to find that these refrigerants can be used safely provided the use conditions in this proposed rule are followed, including compliance with the 4th edition of UL 60335–2–40. The EPA recognizes that in certain clauses, UL 60335–2–40 refers to ASHRAE 15 and ASHRAE 15.2 for compliance. We also note that other authorities might impose additional requirements, such as the adoption of ASHRAE 15 and 15.2 in building codes, that would provide an additional layer of safety above what the EPA is proposing to require under SNAP.

Under this incorporate by reference option, all three of the new refrigerant listings and the eight updated refrigerant listings proposed for this end-use would include the use conditions described in Sections IV.F.1., IV.F.2., and IV.F.3., as well as a use condition that the refrigerant may only be used in equipment that meets all the requirements of UL 60335–2–40, 4th edition.

The EPA performed assessments to examine the human health and environmental risks of each of these substitutes. These assessments are

available in the docket.⁵⁵ The proposed regulatory text for new and updated listings under this option can be found in the docket under the title “Proposed Regulatory Text for SNAP Rule 27” in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Incorporate by Reference Option.”

b. Third-Party Certification Option

As noted elsewhere, in recent rulemakings for listings of lower and higher flammability refrigerants, the EPA has incorporated by reference portions of or entire industry consensus safety standards as use conditions for SNAP listings. The Agency recognizes that these standards are under continuous maintenance, meaning that they are updated and superseded by newer editions. This often means that regulations and safety standards are out of step; and thus, the EPA often updates its regulations to incorporate the newer version of the standard and to avoid directing regulated entities to editions of standards that have been updated and replaced subsequent to the issuance of a final rule. This is time-consuming, increases administrative burden, and there is often time between the issuance of a new edition of a standard and a later revised regulation which could result in confusion for the regulated community as well as slowing down adoption of revised requirements based upon the most recent science and industry experience.

This approach also may result in the EPA's requirements including sections of standards that are not needed to address the flammability risks of refrigerants. For example, UL 60335–2–40 includes certain tests that apply to all parts of the equipment, not just to the refrigerating system, and specifications about leakage current and electrical strength, which are not needed specifically to address flammability of refrigerants. Therefore, the EPA is proposing another option to streamline use conditions and to maintain consistency with the latest version of the relevant standards. This option allows for the EPA to address flammability risks while recognizing that a specific edition of a relevant standard applicable for the residential and light commercial AC and heat pumps end-use may be replaced by a later edition. This option is described in this Section IV.F.4.b.

Under this potential option, the EPA proposes that all residential and light commercial AC and heat pump

⁵⁵ See in section XII., “References”: ICF, 2025a; ICF, 2025b; ICF, 2025c; ICF, 2025e; ICF, 2025f; and ICF, 2025g.

equipment using the refrigerants listed in this rulemaking would need to be certified by an OSHA-recognized NRTL to a U.S. industry consensus safety standard that is designed to allow for safe use of flammable refrigerants in residential and light commercial AC and heat pump equipment, and mitigates risks such that the listed refrigerants can be used in a manner that does not pose a greater overall risk to human health and the environment than other substitutes in this end-use. For listings in this end-use under this option, the EPA is proposing replacing the practice of incorporating by reference portions of or entire industry consensus safety standards with a use condition that relies on NRTLs certifying equipment to a U.S. industry consensus safety standard that mitigates risks. The industry consensus safety standard would need to be designed for use in the United States and be consistent with best industry safety practices (e.g., UL 60335–2–40). The EPA proposes that an industry consensus safety standard used to meet this use condition would need to contain requirements for:

- Refrigerant charge sizes and risk mitigation measures that are designed to allow for safe use of flammable refrigerants (e.g., refrigerant detection systems, ventilation to maintain refrigerant concentrations below the LFL in the case of a leak); and
- Markings that communicate the risks.

Definitions and requirements for the OSHA NRTL Program can be found at 29 CFR 1910.7. The term “NRTL” means an organization recognized by OSHA in accordance with appendix A to 29 CFR 1910.7, and which tests for safety, lists or labels or accepts equipment or materials, and meets the criteria described in 29 CFR 1910.7. Any testing agency or organization considering itself to meet the definition of an NRTL as specified in § 1910.7 may apply for OSHA recognition.

While the EPA is proposing reliance on certification by these NRTLs, the EPA is not opening OSHA’s regulations at 29 CFR 1910.7 for comment, including definitions or requirements, nor is the EPA seeking comment on the OSHA program itself. For listings in this end-use under this option, the EPA is proposing a use condition based on certification by NRTLs instead of incorporation by reference of portions of or entire industry consensus safety standards. In addition to meeting the requirements laid out above, the U.S. industry consensus safety standard used to meet this requirement would also need to be deemed an appropriate test standard and approved by OSHA. The

NRTL Program regulation at 29 CFR 1910.7(c) sets forth the criteria for determining whether a test standard is appropriate. An appropriate test standard is a document which specifies the safety requirements for specific equipment or class of equipment and is (1) recognized in the United States as a safety standard providing an adequate level of safety; (2) compatible with and maintained current with periodic revisions of applicable national codes and installation standards; and (3) developed by a standards developing organization under a method providing for input and consideration of views of industry groups, experts, users, consumers, governmental authorities, and others having broad experience in the safety field involved; or (4) in lieu of paragraphs (c) (1), (2), and (3), the standard is currently designated as an ANSI safety-designated product standard or an ASTM test standard used for evaluation of products or materials. The various procedures for approval of appropriate test standards are found in the OSHA NRTL Program Policies, Procedures, and Guidelines CPL–01–00–004 (Program Directive). NRTLs and a list of appropriate test standards that are recognized by OSHA are publicly available, and updated periodically, on OSHA’s website.⁵⁶

As discussed earlier in Section IV.F.4.a., industry consensus safety standards are developed in cooperation with parties with an interest in participating in the development or use of the standard. The EPA has confidence in this safety standards development process, as it relies on consensus built by the industry. For example, UL uses a process where experts with various interests, including manufacturers, government agencies, and academia, come together to agree on the safety requirements for a product, resulting in a standard that reflects a collective consensus on best practices for safety.

One example of an appropriate test standard for equipment in the residential and light commercial AC and heat pumps end-use is UL 60335–2–40. UL 60335–2–40 was developed in an open and consensus-based approach. The EPA proposes to view this standard as one example of a U.S. industry consensus safety standard that could be used to meet this requirement, as the requirements of the standard align with the levels of safety that the EPA expects in terms of mitigating risks to human health and the environment. As

mentioned in Sections IV.D. and IV.E., the EPA performed risk screening assessments to examine the human health and environmental risks of the refrigerants being proposed in this action for this end-use. These risk screens demonstrated that use of these refrigerants in the residential and light commercial AC and heat pumps end-use consistent with the latest edition of UL 60335–2–40 would not pose greater overall risk to human health and the environment than other acceptable substitutes for new equipment in this end-use.

One potential downside of this third-party certification option is that future revisions could be made to OSHA-recognized appropriate test standards that do not align with the SNAP program’s criteria for mitigating risks to human health and the environment. However, the EPA already monitors the development and revision process for industry consensus safety standards that apply to equipment in the residential and light commercial AC and heat pumps end-use and other end-uses. If this option is finalized, the EPA would continue monitoring these standards, and if revisions are made to industry safety standards that impact their alignment with the SNAP program’s risk mitigation criteria, the EPA would raise concerns and could revisit and propose changes to refrigerant listing categories and/or use conditions through rulemaking.

OSHA recognizes NRTLs at the organizational-level as opposed to the laboratory-level. Therefore, the laboratory that performs the equipment testing would need to be part of an NRTL that is recognized by OSHA and have the necessary equipment and training required to test to a specific standard that would be most applicable to the equipment applications in this section.

OSHA requires all electrical equipment used in the workplace to be tested and certified by an NRTL or otherwise determined to be “acceptable” as defined in 29 CFR 1910.399. The EPA is proposing that equipment in the residential and light commercial AC and heat pumps end-use using the refrigerants proposed in this action would need to be certified to a U.S. industry consensus safety standard by an OSHA-recognized NRTL. In accordance with Annex B of the OSHA NRTL Program Directive and section 4 of ISO/IEC 17065:2012, NRTLs shall maintain registration of a certification mark with the U.S. Patent and Trademark Office, and an NRTL’s procedures shall require clients to apply the NRTL’s registered certification mark

⁵⁶ <https://www.osha.gov/nationally-recognized-testing-laboratory-program/current-list-of-nrtls> and <https://www.osha.gov/nationally-recognized-testing-laboratory-program/list-standards>.

to the certified equipment to signify that the equipment is certified by an NRTL and complies with the requirements of an appropriate safety test standard. In addition, the test standard(s), certification category, or a symbol or code that identifies the test standard(s) to which the unit is certified shall be shown adjacent to the NRTL's mark. These markings provide users with evidence that the equipment complies with applicable safety test standard requirements and is safe for use.

The EPA is not proposing to establish specific requirements or protocols for laboratories because OSHA already has established such requirements and performs detailed reviews of equipment certification entities. OSHA's review of NRTLs includes a thorough evaluation of application materials, assessments of the organization's programs and facilities, publication of findings in the **Federal Register**, response to public comments, and announcement of a final decision on NRTLs. OSHA also performs ongoing evaluations of NRTLs and responds to safety concerns that occur in the field. Because NRTLs must be recognized to test to a specific safety standard, all of the requirements of that particular safety standard are adopted by the NRTL, which is similar to SNAP's current use condition approach for HFC-32, R-452B, R-454A, R-454B, R-454C, R-457A, R-290, and R-441A that incorporates by reference a particular safety standard.

By not incorporating by reference a specific edition of a relevant safety standard in this use condition option, the EPA intends to increase efficiencies by not having to propose a new rule each time a safety standard is updated and to leverage OSHA's NRTL Program. The EPA does not expect this option to pose significant additional burden on manufacturers or NRTLs because most manufacturers of residential and light commercial AC and heat pump equipment have their equipment certified by an NRTL already. Manufacturers that do not already certify their equipment through an OSHA-recognized NRTL would need to do so beginning two years after the effective date of the final rule.

The EPA is aware of three entities, UL, Intertek, and CSA Group, that are currently NRTLs and test and certify equipment to industry consensus safety standards for equipment in the residential and light commercial AC and heat pumps end-use. The EPA understands there may be additional entities now or in the future.

As noted previously, the current SNAP regulations incorporate by reference UL 60335-2-40, 3rd edition,

which is no longer the latest edition of a standard that is publicly available and applicable to this end-use. OSHA regulations do not specify specific editions of standards. Rather, an NRTL recognized for an ANSI-approved test standard may use either the latest proprietary version or the latest ANSI version of the standard, regardless of which version appears in its list of test standards on OSHA's web page for the NRTL. When an NRTL applies to be recognized to test to a particular standard, they must submit the specific standard to which they aim to test. If an NRTL is found to be testing and certifying equipment to a standard they are not recognized for, OSHA may act.

As discussed earlier in this section, the EPA is proposing to remove the existing use conditions specific to refrigerant charge size limits for R-290, R-441A, R-452B, R-454A, R-454B, R-454C, and R-457A in residential and light commercial AC and heat pump applications. Rather than duplicating charge size restrictions in a separate use condition, the EPA is proposing to rely on the charge size restrictions inherent in the process of getting residential and light commercial AC and heat pump equipment certified by an NRTL to an industry consensus safety standard that is designed to allow for safe use of flammable refrigerants.

Under this third-party certification option, all three of the new refrigerant listings and eight updated refrigerant listings proposed for this end-use would include the use conditions described in Sections IV.F.1., IV.F.2., and IV.F.3. There would also be a condition that equipment be certified by an OSHA-recognized NRTL to a U.S. industry consensus safety standard that is designed to allow for safe use of flammable refrigerants in residential and light commercial AC and heat pump equipment.

The EPA performed an assessment to examine the human health and environmental risks of each of the proposed new substitutes. These assessments are available in the docket.⁵⁷ As discussed in Section IV.E., the EPA also conducted updated analyses for three representative substitutes for the updated listings to evaluate the health and safety implications of designing and using AC equipment in accordance with the latest edition of UL 60335-2-40, which the EPA proposes to view as one example of a U.S. industry consensus safety standard that could be used to meet this third-party certification requirement.

These analyses found that use of these proposed refrigerants in accordance with this standard would not pose greater overall risk to human health and the environment than other acceptable substitutes for new equipment in this end-use. These assessments are available in the docket.⁵⁸ Proposed regulatory text for these new and updated listings under this potential option can be found in the docket under the title "Proposed Regulatory Text for SNAP Rule 27" in the section "Proposed revisions to Appendices R, V, W, and new Appendix Z—Third-Party Certification Option (co-proposed as an alternative to Section III)."

5. When would the use conditions take effect?

For the newly listed refrigerants in this end-use, the use conditions would take effect on the effective date of a final rule based upon this proposal. For the refrigerants for which the EPA is proposing to update use conditions in this end-use, the EPA is proposing to allow regulated entities to follow either the existing use conditions or the proposed updated use conditions from the effective date of a final rule until two years after the effective date of the final rule.

If the EPA finalizes the third-party certification option, equipment manufactured between the effective date of the final rule and two years after that effective date could follow either the existing use conditions that include use of either UL 60335-2-40, 3rd edition⁵⁹ or the updated use conditions that would include certification of equipment by an OSHA-recognized NRTL. The updated use conditions would neither apply to nor affect equipment manufactured before the effective date of the final rule.

G. What additional information is the EPA including in these proposed listings?

For all proposed listings in this end-use, the EPA is including recommendations, found in the "Further Information" column of the proposed listings, to protect personnel from the risks of using flammable refrigerants. Similar to our previous listings of flammable refrigerants, the EPA is including information on the OSHA requirements at 29 CFR part 1910, proper ventilation, personal protective equipment (PPE), fire extinguishers, use of spark-proof tools

⁵⁷ See in section XII., "References": ICF, 2025a; ICF, 2025b; and ICF, 2025c.

⁵⁸ See in section XII., "References": ICF, 2025e; ICF, 2025f; and ICF, 2025g.

⁵⁹ Or UL 484, 8th edition for R-290 and R-441A.

and equipment designed for flammable refrigerants, and training.

If the third-party certification option described in Section IV.F.4.b. is finalized, the EPA would also include a sentence in the “Further Information” column stating that the EPA views UL 60335–2–40 to be an example of an appropriate U.S. industry consensus safety standard that mitigates risks.

Since this additional information is not part of the regulatory decision under SNAP, these statements are not binding for use of the substitute under the SNAP program. While the statements in the “Further Information” column are not legally binding under the SNAP program, the EPA encourages users of substitutes to apply all statements in the “Further Information” column in their use of these substitutes.

V. Household Refrigerators and Freezers

A. What is the EPA proposing in this action?

The EPA is proposing to list HCR 4141 as acceptable, subject to use conditions, for use in new household refrigerators and freezers. The EPA would list HCR 4141 in a table in the new appendix Z of 40 CFR part 82, subpart G.

The EPA is proposing several use conditions for the use of HCR 4141 in the household refrigerators and freezers end-use. SNAP use conditions are designed to ensure that refrigerants are listed for specific end-uses and in a way that mitigates risks to human health and the environment. In summary, the EPA is co-proposing two options for use conditions to address flammability risks of the refrigerant HCR 4141 in household refrigerators and freezers similar to the two options discussed in Section IV.F.4. for the residential and light commercial AC and heat pumps end-use. The key difference between the two options in the household refrigerators and freezers end-use and the two options in the residential and light commercial AC and heat pumps end-use is the industry safety standard that the EPA would incorporate by reference or would describe as being a relevant industry consensus safety standard for third-party certification. In the household refrigerators and freezers end-use the relevant U.S. industry consensus safety standard that addresses safe use of flammable refrigerant is UL 60335–2–24, “Household and Similar Electrical Appliances—Safety—Part 2–24: Particular Requirements for Refrigerating Appliances, Ice-Cream

Appliances and Ice-Makers,” rather than UL 60335–2–40.

Under both options, the EPA proposes the same use conditions that would restrict the use of the refrigerant HCR 4141 to new equipment that is specifically designed for that refrigerant and that would require warning labels and markings on equipment to inform consumers, technicians, and first responders of potential flammability hazards. Those common use conditions are described in Section V.E.

The two co-proposed options take two different potential approaches to proposed use conditions addressing design safety requirements for household refrigerators and freezers and in particular, charge size. These options are described in detail in Sections V.E.4.a. and V.E.4.b. Section V.E.4.a. describes an option in which the EPA would incorporate by reference UL 60335–2–24, 3rd edition, including testing and charge sizes. Section V.E.4.b. describes an option in which the EPA would require household refrigerators and freezers to be certified to a U.S. industry consensus safety standard such as UL 60335–2–24 by an organization that OSHA recognizes as an NRTL. The EPA will consider comments and available information and could finalize either of these two co-proposals.

The common use conditions are described in Sections V.E.1., V.E.2., and V.E.3. The use condition option requiring household refrigerators and freezers using HCR 4141 to meet a specific edition of UL 60335–2–24 is described in Section V.E.4.a. The option for a use condition requiring third-party certification of household refrigerators and freezers using HCR 4141 is described in Section V.E.4.b.

The proposed regulatory text for this listing using the third-party certification option appears in the docket for this rulemaking under the title “Proposed Regulatory Text for SNAP Rule 27” in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Third-Party Certification Option (co-proposed as an alternative to Section III).” The proposed regulatory text for this listing using the incorporate by reference option can be found in the docket for this rulemaking under the title “Proposed Regulatory Text for SNAP Rule 27” in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Incorporate by Reference Option.” If one of the use condition options is finalized, the EPA would publish a corresponding finalized listing for HCR 4141 in new household refrigerators and freezers in appendix Z of 40 CFR part 82, subpart G.

B. Background on Household Refrigerators and Freezers

Household refrigerators, freezers, and combination refrigerators and freezers are intended primarily for residential use, although they may be used outside the home (e.g., workplace kitchen pantries). The designs and refrigeration capacities of equipment vary widely. This equipment is composed of three main categories: household freezers only offer storage space at freezing temperatures, household refrigerators only offer storage space at non-freezing temperatures, and products with both a refrigerator and freezer in a single unit which are most common and are referred to as combination refrigerators and freezers. Small refrigerated household appliances (e.g., chilled kitchen drawers, wine coolers, mini-fridges, stand-alone ice makers, home ice cream makers) are also within this end-use. In addition, refrigerators or freezers that are designed for consumer, but not commercial or professional, use and that are merely situated on a moving vehicle (e.g., personal vehicle, recreational vehicle, or boat for leisure purposes) are within the scope of the household refrigerators and freezers end-use for purposes of the SNAP program. These uses are within the scope of the relevant U.S. industry safety standard, UL 60335–2–24. Throughout this document, we refer to all these uses with the phrase “household refrigerators and freezers.” Refrigerators or freezers in a commercial kitchen such as onboard a cruise ship or on aircraft are not household refrigerators or freezers for purposes of the SNAP program and such equipment is outside the scope of UL 60335–2–24. Household refrigerators and freezers have all refrigeration components integrated, and for the smallest types, the refrigeration circuit is entirely brazed or welded. These systems are charged with refrigerant at the factory and typically require only an electricity supply to begin operation.

ASHRAE’s Handbook of Refrigeration provides an overview of food preservation regarding household refrigerators and freezers. Generally, a storage temperature between 32 and 39 °F (0 to 3.9 °C) is desirable for preserving fresh food. Humidity and higher or lower temperatures are more suitable for certain foods and beverages. Wine chillers, for example, are frequently used for storing wine, and have slightly higher optimal temperatures from 45 to 65 °F (7.2 to 18.3 °C). Freezers and combination refrigerators and freezers that are designed to store food for long durations

have temperatures below 8 °F (−13.3 °C) and are designed to hold temperatures near 0 to 5 °F (−17.7 to −15 °C). In single-door refrigerators, the optimum conditions for food preservation are typically warmer than this because food storage is not intended for long-term storage.

C. What are the ASHRAE groups for refrigerant flammability and toxicity?

See Section IV.C. for information on ASHRAE groups for refrigerant flammability and toxicity.

D. What is HCR 4141 and how does it compare to other refrigerants in the household refrigerators and freezers end-use?

HCR 4141 is a blend of the saturated HCs R-600a, R-600, and R-290, all of which are higher flammability refrigerants having an ASHRAE safety group of A3; the percentage of each component in the blend is claimed as CBI. See Section IV.D. for environmental information, flammability information, and toxicity and exposure information on HCR 4141. The redacted submission and supporting documentation for HCR 4141 in household refrigerators and freezers are provided in the docket. The EPA performed a risk screening assessment to examine the human health and environmental risks of this substitute which also is available in the docket.⁶⁰

Comparison to other substitutes in the household refrigerators and freezers end-use: The specific atmospheric effects values can be found in the individual risk screen for HCR 4141. The values were determined consistent with the source information noted in Section III.C. above (e.g., CAA; the AIM Act; WMO, 2022) as well as using the methodology for determining values for blends of chemicals (i.e., determined by the percentage of each component). The EPA compared HCR-4141 to other A3 refrigerants listed as acceptable subject to use conditions for the same end-use. The MIR of the blend HCR 4141 is expected to be less than that of R-600a (MIR of 1.23 g O₃/g isobutane) and greater than that of R-290 (MIR of 0.49 g O₃/g propane). The MIR of HCR 4141 is greater than that of compounds that have been excluded from the EPA's regulatory definition of VOC⁶¹ addressing the development of SIPs to attain and maintain the NAAQS, such as HFC-152a.

The EPA's risk screen for HCR 4141 in new household refrigerators and

freezers⁶² found that HCR 4141 can be used without exceeding its recommended OEL of 1,000 ppm (8-hr TWA); thus, the toxicity risks of HCR 4141 are comparable to those of other acceptable substitutes in new household refrigerators and freezers, which also are used without exceeding their OELs.

Although we noted that the flammability of HCR 4141 may be greater than that of other available substitutes that have ASHRAE 1, 2 or 2L flammability classifications in the same end-use, we found its flammability risk to be not significant even under worst-case assumptions in this end-use when following the proposed use conditions.⁶³ Further, its flammability risk is comparable to that of other A3 refrigerants that the EPA has previously listed as acceptable in this end-use. We note that flammability risk can be minimized by use consistent with industry safety standards such as UL 60335-2-24—which would be required by the proposed use conditions—as well as recommendations in the manufacturers' SDS and other safety precautions common in the refrigeration and air conditioning industry. The proposed use conditions for household refrigerators and freezers would maintain low potential risk associated with the flammability of this alternative so that it would not pose greater overall risk than other acceptable substitutes in this end-use.

E. What use conditions is the EPA proposing in this action for the new listing for HCR 4141 in new household refrigerators and freezers?

The proposed use conditions described in this section would apply to new household refrigerators and freezers using HCR 4141. Many of the proposed use conditions mirror the SNAP program's historical approach to requirements for flammable refrigerants in this end-use. The proposed use condition related to use in new equipment only is consistent with previously listed higher flammability refrigerants in this end-use. The proposed use conditions related to labels and markings are very similar to what has previously been required by SNAP for higher flammability refrigerants in this end-use, with a few updates made specifically to better align the EPA requirements with updated industry safety standards. A use condition option that proposes to incorporate by reference the latest edition of UL 60335-2-24 is consistent with the EPA's historical practice for

listing flammable refrigerants in this end-use. The other co-proposed option, while different from the EPA's historical practice of incorporating portions of or entire industry consensus safety standards by reference, would address situations where the EPA's regulations require adherence to editions of industry consensus safety standards that have been updated and replaced subsequent to the issuance of a final rule. The EPA proposes the following use conditions:

1. New Equipment Only; Not Intended for Use as a Retrofit Alternative

The EPA is proposing that HCR 4141 may be used only in new equipment designed specifically and clearly identified for the refrigerant. In other words, this substitute must not be used as a conversion or "retrofit"⁶⁴ refrigerant for existing equipment designed for another refrigerant. The EPA has established this same requirement for other A3 refrigerants in this end-use and in certain other refrigeration and AC end-uses, such as vending machines, retail food refrigeration—stand-alone units, and very low temperature refrigeration. This requirement is intended to ensure that equipment using a higher flammability refrigerant is specifically designed to address flammability risks.

2. Labels

The EPA is proposing to require labeling of household refrigerators and freezers using HCR 4141. The following markings, or the equivalent, would need to be provided and be permanent:

a. "DANGER—Risk of fire or explosion. Flammable refrigerant used. Do not use mechanical devices to defrost refrigerator. Do not puncture refrigerant tubing." This marking would need to be located on or near any evaporators that can be contacted by the consumer.

b. "DANGER—Risk of fire or explosion. Flammable refrigerant used. To be repaired only by trained service personnel. Use only manufacturer-authorized service parts. Any repair equipment used must be designed for flammable refrigerants. Follow all manufacturer repair instructions. Do not puncture refrigerant tubing." This marking would need to be located near the machine compartment.

c. "CAUTION⁶⁵—Risk of fire or explosion. Dispose of refrigerator

⁶⁰ ICF, 2025h. Risk Screen on Substitutes in Household Refrigerators and Freezers (New Equipment); Substitute: HCR 4141.

⁶¹ 40 CFR 51.100(s).

⁶² ICF, 2025h. *Op. cit.*

⁶³ ICF, 2025h. *Op. cit.*

⁶⁴ Sometimes conversion refrigerant substitutes are inaccurately referred to as "drop in" replacements.

⁶⁵ The word "CAUTION" may be substituted with the word "WARNING."

properly in accordance with the applicable federal or local regulations. Flammable refrigerant used.” This marking would need to be located on the exterior of the refrigeration equipment.

d. “CAUTION⁶⁶—Risk of fire or explosion due to puncture of refrigerant tubing; follow handling instructions carefully. Flammable refrigerant used.” This marking would need to be located near all exposed refrigerant tubing.

Both the 3rd and 2nd editions of UL 60335–2–24 have required labels with the above text as a hazard warning on refrigerated equipment that uses a flammable refrigerant. The 3rd edition of UL 60335–2–24 has revised two requirements in the 2nd edition concerning warning labels. The first change was that one marking would no longer be required that stated, “CAUTION—Risk of fire or explosion. Flammable refrigerant used. Consult repair manual/owner’s guide before attempting to service this product. All safety precautions must be followed.” The EPA also would not require this marking in the proposed use conditions.

The second change to the labels in the 3rd edition of UL 60335–2–24 is that the height of the letters on the warning labels have changed from no less than 6.4 mm (¼ inch) to no less than 3.2 mm (⅛ inch), with the signal words “DANGER,” “WARNING,” and “CAUTION” being no less than 5.0 mm (0.2 inch). This would be a smaller font size that would allow for smaller labels that would be more convenient for manufacturers to apply. The EPA is instead proposing that the label text size be no less than 6.4 mm (¼ inch) to allow for greater visibility for technicians, consumers, recyclers, and first responders. The larger font size is also consistent with the font size that the EPA has previously required for these labels in other SNAP rules for refrigeration or AC equipment using flammable refrigerants.

3. Color-Coded Hoses and Piping

The EPA is proposing to require that equipment have distinguishing red (PMS #185 or RAL 3020) color-coded hoses and piping to indicate use of a flammable refrigerant. This color would need to be present at all service ports and other parts of the system where service puncturing or other actions creating an opening from the refrigerant circuit to the atmosphere might be expected, would need to extend a minimum of one inch (25 mm) in both directions from such locations, and

would need to be replaced if removed. The EPA has applied this proposed use condition in past actions for flammable refrigerants.⁶⁷

Red markings are a requirement of the 3rd edition of UL 60335–2–24. The standard allows for an exception if the labels are visible when a technician attempts to access a process tube. In addition, the 3rd edition of UL 60335–2–24 calls for red markings but does not specify any particular shade of red. The EPA’s proposal would not allow for this exception and is specifying particular shades of red, as in previous rules.

4. Use Condition Options Related to Equipment Certification or Industry Safety Standard Requirements

The EPA is co-proposing two options for a use condition related to equipment certification or industry safety standard requirements for equipment that uses HCR 4141 in household refrigerators and freezers. Under the first option, the EPA would incorporate by reference a new edition of the safety standard for this end-use. Under the second option, the EPA would require household refrigerators and freezers to be certified by an organization that is recognized as an NRTL to a U.S. industry consensus safety standard that is designed to allow for safe use of flammable refrigerants in household refrigerators and freezers. This is the same proposed approach discussed in Section IV.F.4.a.

For the most recent listings of flammable refrigerants used in household refrigerators and freezers, the EPA addressed design elements to reduce flammability risks by incorporating by reference the 2nd edition of UL 60335–2–24, “Household and Similar Electrical Appliances—Safety—Part 2–24: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers.”⁶⁸ The EPA is co-proposing an option to incorporate by reference UL 60335–2–24, 3rd edition (dated July 29, 2022, with revisions through February 29, 2024). As discussed in Section IV.F.4.b., the Agency recognizes that certain standards, including UL 60335–2–24, are under continuous maintenance, meaning that they are updated and superseded by newer editions. This often means that regulations and safety standards are out of step. Therefore, the EPA is proposing another option to streamline use conditions and to maintain consistency with the most current version of the

relevant standards. This potential option is discussed in Section V.E.4.b.

Each co-proposal in Sections IV.F.4.a. and IV.F.4.b. would include certain use conditions in addition to the common use conditions in Sections V.E.1., V.E.2., and V.E.3. (*i.e.*, for use in new equipment only, labels, and color-coded hoses and piping). The use conditions for HCR 4141 would apply to household refrigerators and freezers manufactured on and after the effective date of the final rule. The use conditions would be in a new appendix Z of 40 CFR part 82, subpart G.

a. Incorporate by Reference UL 60335–2–24, 3rd Edition Option

In this first co-proposal, the EPA proposes that the refrigerator HCR 4141 may be used only in equipment that meets all the requirements in UL 60335–2–24.⁶⁹ The EPA has set a similar requirement for the use of R–290, R–600a, and R–441A in household refrigerators and freezers,⁷⁰ where the Agency’s regulations require that those refrigerants be used only in equipment meeting the requirements of the 2nd edition⁷¹ of UL 60335–2–24, rather than the 3rd edition of that standard. In this proposed new listing for HCR 4141 in new household refrigerators and freezers, the EPA would incorporate by reference the standard UL 60335–2–24, “Safety Requirements for Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers.”⁷² This safety standard establishes requirements for the evaluation of household and similar electrical appliances, and safe use of flammable refrigerants. The EPA previously incorporated by reference UL 60335–2–24, 2nd edition for R–290, R–441A, and R–600a in our most recent rule on flammable refrigerants in household refrigerators and freezers.⁷³ This proposal would incorporate by reference the latest edition and revisions to that safety standard. Where the rule includes requirements that are different than those of UL 60335–2–24 (*e.g.*, font size), the EPA is proposing that the appliance would need to meet the requirements of the rule. UL 60335–2–24 establishes requirements for the evaluation of household and similar electrical appliances and the safe use of

⁶⁹ 3rd edition, July 29, 2022, with revisions through February 29, 2024.

⁷⁰ See 83 FR 38969; August 8, 2018, and appendix R of 40 CFR part 82, subpart G.

⁷¹ 2nd edition of UL 60335–2–24 dated April 28, 2017.

⁷² 3rd edition, July 29, 2022, with revisions through February 29, 2024.

⁷³ See 83 FR 38969; August 8, 2018.

⁶⁶ The word “CAUTION” may be substituted with the word “WARNING.”

⁶⁷ See 86 FR 24444, May 6, 2021, and 88 FR 26382, April 28, 2023.

⁶⁸ Dated April 28, 2017. See 83 FR 38969; August 8, 2018.

A2, A2L, or A3 refrigerants. The charge size limit for each separate refrigerant circuit (*i.e.*, compressor, condenser, evaporator, and refrigerant piping) is 150 grams (5.3 ounces), remaining the same in the 3rd edition as in the 2nd edition.

Both the 2nd and 3rd editions require testing of refrigeration appliances containing flammable refrigerants, including leakage tests, temperature and scratch tests, and heat testing requirements to address the hazards due to ignition of leaked refrigerant by potential ignition sources associated with the appliance. These tests are intended, among other things, to ensure that any leaks will result in concentrations well below the LFL, and that potential ignition sources will not be able to create temperatures high enough to start a fire. Specifically, the leakage test ensures that refrigerant concentrations do not reach or exceed 75 percent of the LFL inside any internal or external electrical component compartments. Appliances that comply with UL 60335–2–24 have passed appropriate ignition or leakage tests as stipulated in the standard. In addition, UL 60335–2–24, 3rd edition, includes labels and markings, as discussed in Sections V.E.2. and V.E.3. UL standard 60335–2–24 was developed using a consensus-based approach developed in cooperation with parties with an interest in participating in the development or use of the standard. For example, UL uses a process where experts with various interests, including manufacturers, experts in assessing the safety of products, government agencies, and academia, come together to agree on the safety requirements for a product, resulting in a standard that reflects a collective consensus on best practices for safety. While similar standards exist from other bodies such as the IEC, we are proposing in this option to use specific UL standards that are most applicable and used by U.S. manufacturers. The EPA used this approach in previous SNAP rules concerning lower and higher flammability refrigerants.⁷⁴ UL standard 60335–2–24 was developed using a consensus-based approach developed in cooperation with parties with an interest in participating in the development or use of the standard. For example, UL uses a process where experts with various interests, including manufacturers, experts in assessing the safety of products, government agencies, and academia, come together to agree on

the safety requirements for a product, resulting in a standard that reflects a collective consensus on best practices for safety. While similar standards exist from other bodies such as the IEC, we are proposing in this option to rely on specific UL standards that are most applicable and used by U.S. manufacturers. The approach of incorporating a UL standard by reference is the same as that in our previous rules on flammable refrigerants.⁷⁵

Under this incorporate by reference option, this listing would include the use conditions described in Sections V.E.1., V.E.2., and V.E.3. as well as a use condition that the refrigerant may only be used in equipment that meets all the requirements of UL 60335–2–24, 3rd edition.

The EPA performed an assessment to examine the human health and environmental risks of HCR 4141 in household refrigerators and freezers. This assessment is available in the docket.⁷⁶ The proposed regulatory text for this new listing under this option can be found in the docket under the title “Proposed Regulatory Text for SNAP Rule 27” in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Incorporate by Reference Option.”

b. Third-Party Certification Option

Under this second co-proposal, the EPA is proposing a use condition where all household refrigerators and freezers using HCR 4141 must be certified by an OSHA-recognized NRTL to a U.S. industry consensus safety standard that is designed to allow for safe use of flammable refrigerants in household refrigerators and freezers and mitigates risks such that the listed refrigerant can be used in a manner that does not pose a greater overall risk to human health and the environment than other substitutes in this end-use. The industry consensus safety standard must be designed for use in the United States and be consistent with best industry safety practices.⁷⁷ For further detail on requirements of applicable industry consensus safety standards that the EPA proposes to find necessary to sufficiently mitigate risks, see Section IV.F.4.b. While the EPA is proposing reliance on certification by these NRTLs, the EPA is not opening OSHA’s regulations at 29 CFR 1910.7 for

comment, including definitions or requirements, nor is the EPA seeking comment on the OSHA program itself. For further information on OSHA’s NRTL Program, see Section IV.F.4.b.

By not incorporating by reference a specific edition of a relevant safety standard in this use condition option, the EPA intends to increase efficiencies by not having to propose a new rule each time a standard is updated and to leverage OSHA’s NRTL Program. The EPA does not expect this option to pose significant additional burden on manufacturers or NRTLs because most manufacturers of household refrigerators and freezers have their equipment certified by an NRTL already. Manufacturers that do not already certify their equipment through an OSHA-recognized NRTL would need to do so beginning two years after the effective date of the final rule.

Under this third-party certification option, the listing would include the use conditions described in Sections V.E.1., V.E.2., and V.E.3. as well as a use condition that equipment be certified by an OSHA-recognized NRTL to a U.S. industry consensus safety standard that is designed to allow for safe use of flammable refrigerants in household refrigerators and freezers. The EPA proposes that the use conditions for HCR 4141 in new household refrigerators and freezers would apply on the effective date of the final rule.

The EPA performed an assessment to examine the human health and environmental risks of HCR 4141 in household refrigerators and freezers. This assessment is available in the docket.⁷⁸ Proposed regulatory text for the new listing for HCR 4141 in household refrigerators and freezers under this option can be found in the docket under the title “Proposed Regulatory Text for SNAP Rule 27” in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Third-Party Certification Option (co-proposed as an alternative to Section III).”

F. What additional information is the EPA including in this proposed listing?

The “Further Information” column of the proposed listing for HCR 4141 in household refrigerators and freezers includes applicable OSHA requirements at 29 CFR part 1910, suggestions on ventilation and PPE, appropriate type of fire extinguisher (Class B), and suggestions for technicians. Among the suggestions for technicians are the appropriate type of tools and equipment to use for servicing, conditions for

⁷⁴ See 76 FR 78832, December 20, 2011; 80 FR 19454, April 10, 2015; 86 FR 24444, May 6, 2021; 88 FR 26382, April 28, 2023.

⁷⁵ See 76 FR 78832, December 20, 2011; 80 FR 19454, April 10, 2015; 86 FR 24444, May 6, 2021; 88 FR 26382, April 28, 2023.

⁷⁶ ICF, 2025h. Risk Screen on Substitutes in Household Refrigerators and Freezers (New Equipment); Substitute: HCR 4141. 2025.

⁷⁷ *e.g.*, UL 60335–2–24.

⁷⁸ ICF, 2025h.

release of refrigerant if it is not recovered, and a recommendation that only technicians specifically trained in handling of flammable refrigerants service equipment containing the refrigerant.

The “Further Information” column of the listing for HCR 4141 under the third-party certification option would be the same as under the incorporation by reference of UL 60335–2–24 option.⁷⁹ In addition, because the EPA would not require use of UL 60335–2–24 in a use condition under the third-party certification option, the Agency would include a recommendation to follow the latest edition of UL 60335–2–24 or similar industry safety standard. While the statements in the “Further Information” column are not legally binding under the SNAP program, the EPA encourages users of HCR 4141 to apply all statements in the “Further Information” column in their use of this substitute.

VI. Water Coolers

A. What is the EPA proposing in this action?

The EPA is proposing to update use conditions for the previously listed refrigerant R–290 for use in water coolers. The EPA listed R–290 as acceptable, subject to use conditions, in new water coolers in SNAP Rule 21.⁸⁰ The industry consensus safety standard that was incorporated by reference at the time of the original listing has since been updated. The EPA is not proposing to move this listing from acceptable, subject to use conditions, to any other listing category (e.g., unacceptable).

The proposed updated use conditions include a requirement that R–290 be used in new equipment only, specific requirements for warning labels, and specific requirements for markings. As with some other listings in this rule, the EPA is co-proposing two options for an additional use condition related to equipment certification or industry safety standard requirements for R–290 in water coolers. The EPA intends to finalize one of these co-proposed options along with an appropriate transition period to provide manufacturers with opportunity for a smooth transition between the existing use conditions and the updated use conditions. Throughout this section, the term “updated use conditions” refers to the set of use conditions being proposed that would apply to new equipment manufactured after the effective date of the final rule. The updated use

conditions would neither apply to nor affect equipment manufactured before the effective date of the final rule.

The proposed regulatory text for this listing can be found in the docket for this rulemaking under the title “Proposed Regulatory Text for SNAP Rule 27” in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Incorporate by Reference Option” and in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Third-Party Certification Option (co-proposed as an alternative to Section III).” If one of the use condition options is finalized, the EPA would publish a corresponding finalized listing for R–290 in water coolers in appendix V to 40 CFR part 82, subpart G.

B. Background on Water Coolers

Water coolers are self-contained refrigerated units providing chilled water for drinking. They may or may not feature detachable containers of water. These devices are extensively used in homes, workplaces, public facilities, and warehouses typically employing a compact refrigeration system to chill water. Many models are self-contained, incorporating either bottle-fed or point-of-use water sources.

C. What are the ASHRAE groups for refrigerant flammability and toxicity?

See Section IV.C. for information on ASHRAE groups for refrigerant flammability and toxicity.

D. What is R–290 and how does it compare to other refrigerants in the water coolers end-use?

See Section IV.E. for information about R–290 and its environmental, flammability, and toxicity and exposure impacts. Redacted supporting documentation for R–290 in water coolers is provided in the docket. The EPA performed a risk screening assessment to examine the human health and environmental risks of R–290 in water coolers which also is available in the docket.⁸¹

Environmental information: See Section IV.D. for discussion of the EPA’s analysis of potential air quality impacts due to emissions of R–290 and other HC refrigerants that are VOCs under EPA’s regulatory definition of VOC.⁸² The analysis showed relatively minimal air quality impacts of R–290 released to the atmosphere from the end-uses where it is already listed as acceptable, subject to use conditions, including water coolers.

The EPA therefore concluded that R–290 does not have a greater overall impact on human health and the environment based on its effects on local air quality than other refrigerants listed as acceptable in the same end-uses.

The EPA previously exempted R–290 in water coolers from the venting prohibition under CAA section 608(c)(2), finding that such venting, release, or disposal does not pose a threat to the environment.⁸³ The EPA is not proposing to change either of these decisions and is not reopening them for comment.

Flammability information: R–290 exhibits higher flammability than other alternatives in this end-use and has an ASHRAE flammability classification of 3.

Toxicity and exposure data: R–290 has an ASHRAE toxicity classification of A (lower toxicity).

Comparison to other acceptable substitutes in the water coolers end-use: The atmospheric effects values can be found in the individual risk screen for R–290. These were determined consistent with the source information noted in Section III.C. above. Other acceptable substitutes for the water coolers end-use include R–480A, R–513A, HFC–134a, R–404A, and R–507A. The atmospheric effects for R–290 are better than or comparable to other listed substitutes. R–290 has an ODP of 0, which is lower than or identical to the ODPs of other alternatives in this end-use.

R–290 is a VOC, unlike the other substitutes listed in this end-use. However, because of the relatively minimal air quality impacts of R–290 if it is released to the atmosphere from the end-uses where it is listed as acceptable, subject to use conditions, even in a worst-case scenario, the EPA has previously concluded that R–290 does not have a greater overall impact on human health and the environment based on its effects on local air quality than other refrigerants listed as acceptable in the same end-use. When used in this end-use, workplace and consumer exposure to R–290 is not expected to exceed relevant exposure limits. Thus, R–290 does not pose significantly greater toxicity risks than other acceptable refrigerants in this end-use.

The flammability risks of R–290 in this end-use, determined by the likelihood of exceeding the LFL, are evaluated in the risk screen previously referenced. Other acceptable substitutes

⁷⁹ See section V.E.4.

⁸⁰ See 81 FR 86778; December 1, 2016.

⁸¹ ICF, 2025i. Risk Screen on Substitutes in Water Coolers (New Equipment); Substitute: Propane (R–290). 2025.

⁸² 40 CFR 51.100(s).

⁸³ See 81 FR 86778; December 1, 2016; 40 CFR 82.154(a)(1)(viii).

in this end-use category, including R-404A and HFC-134a, have an ASHRAE flammability class of 1. The proposed updated use conditions reduce the potential risk associated with the flammability of this alternative so it would not pose greater overall risk than other acceptable substitutes in this end-use. Updating the use conditions for this refrigerant would enable it to continue to be available and used safely in the industry. This proposed revised listing under SNAP would provide greater flexibility to use R-290, while maintain safe use in this end-use.

The EPA previously found R-290 acceptable, subject to use conditions, in new water coolers in SNAP Rule 21.⁸⁴ Those requirements are codified in appendix V of 40 CFR part 82, subpart G. The EPA provided information on the environmental and health properties of R-290 and the various substitutes available at that time for use in this end-use. The EPA's risk screen for R-290 in water coolers is available in the docket for that previous rulemaking.⁸⁵

The existing use conditions for R-290 in water coolers address safe use of this higher flammability refrigerant and include incorporation by reference of Supplement SB to UL 399, 7th edition, a requirement that the refrigerant only be used in new equipment that is designed specifically and clearly identified for the refrigerant, a requirement that the charge size not exceed 60 grams per refrigerant circuit in the water cooler, and requirements for markings and warning labels on equipment using the refrigerant to inform consumers and technicians of potential flammability hazards.

Without appropriate use conditions, the flammability risk posed by this refrigerant would be higher than nonflammable refrigerants because individuals may not be aware that their actions could potentially cause a fire, and because the refrigerant could be used in existing equipment that has not been designed specifically to minimize flammability risks. Our assessment and listing decisions in SNAP Rule 21⁸⁶ found that with the use conditions, the use of this substitute, including the risk due to flammability, does not present a greater overall risk in the end-use than other substitutes that are currently or potentially available for that same end-use. The EPA has not updated the use conditions for R-290 in water coolers since 2016.

In the Notice of Proposed Rulemaking for SNAP Rule 21, the EPA proposed

150 g of R-290 as the charge size limit.⁸⁷ This proposed charge size was greater than the 60 g charge size limit in the 7th edition of UL 399. Based upon the EPA's initial risk screen prepared for that rulemaking, a worst-case release of an entire charge of 150 g of R-290 in a small room could result in exceeding the LFL. The release of a charge of 120 g, as well as the 60 g charge limit in the 7th edition of UL 399, would not result in exceeding the LFL. Based upon public comment, the EPA revised its risk screen and finalized a 60 g charge limit to be consistent with the 60 g limit in the 7th edition of UL 399.

Based on additional risk screening and in response to a request from a manufacturer of water coolers, the EPA now proposes to find that the larger charge size of 130 g in the 8th edition of UL 399 with revisions through February 28, 2024, can be used safely through proposed, updated use conditions to address flammability risks.

E. What use conditions is the EPA proposing in this action for the updated listing for R-290 in new water coolers?

The use conditions that currently apply to R-290 in the water coolers end-use incorporate by reference an industry consensus safety standard⁸⁸ that has been updated since the listing decision was finalized. Similar to Section IV.F. for updated use conditions in the residential and light commercial AC and heat pumps end-use, the EPA is proposing to update the listing for R-290 in the water coolers end-use so that the use conditions reflect updated industry safety standards.

Many of the proposed use conditions described in this section mirror existing use conditions. A use condition option described that proposes to incorporate by reference the latest edition of UL 399 is consistent with the EPA's historical practice for listing flammable refrigerants in this end-use. The other co-proposed option, while different from the EPA's historical practice of incorporating portions of or entire industry consensus safety standards by reference, would address situations where the EPA regulations require adherence to editions of industry consensus safety standards that have been updated and replaced subsequent to the issuance of a final rule. The EPA proposes the following use conditions:

1. New Equipment Only; Not Intended for Use as a Retrofit Alternative

The EPA is proposing that R-290 may be used only in new equipment designed specifically and clearly identified for the refrigerant. In other words, this refrigerant must not be used as a conversion or "retrofit" refrigerant for existing equipment designed for another refrigerant. This is an existing use condition for R-290 in water coolers and the EPA is only addressing use of R-290 in new equipment which can be properly designed for higher flammability refrigerants.

2. Labels

The EPA is proposing to require labeling of water coolers using R-290. The following statements would need to be attached on labels at the locations provided and be permanent:

a. On or near any evaporators that the user can contact: "DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. Do Not Puncture Refrigerant Tubing."

b. On the inside of the water cooler near the compressor/condenser compartment: "DANGER—Risk of Fire or Explosion. Flammable Refrigerant Used. To Be Repaired Only by Trained Service Personnel. Do Not Puncture Refrigerant Tubing."

c. On the inside of the water cooler near the compressor/condenser compartment: "CAUTION—Risk of Fire or Explosion. Flammable Refrigerant Used. Consult Instruction Manual/Repair Manual/Owner's Guide Before Attempting to Install or Service This Product. All Safety Precautions Must be Followed."

d. On the outside of the water cooler: "CAUTION—Risk of Fire or Explosion. Dispose of Properly in Accordance With Federal Or Local Regulations. Flammable Refrigerant Used."

e. Near all exposed tubing: "CAUTION—Risk of Fire or Explosion Due To Puncture Of Refrigerant Tubing; Follow Handling Instructions Carefully. Flammable Refrigerant Used."

The proposed text of the labels is verbatim in language to those required by the section SB6.1.1 through SB6.1.5 of Supplement SB of both the 7th and 8th editions of UL 399. As required in section SB6.1.1 of both the 7th and 8th editions of UL 399, the minimum height for lettering must be ¼ inch (6.4 mm) for all these labels, making it easy for technicians, consumers, retail storeowners, first responders, and those disposing of the appliance to view the warning labels. These requirements are also aligned with previous labeling requirements for A3 refrigerants in

⁸⁴ See 81 FR 86778; December 1, 2016.

⁸⁵ EPA-HQ-OAR-2015-0663.

⁸⁶ See 81 FR 86778; December 1, 2016.

⁸⁷ See 81 FR 22810; April 18, 2016.

⁸⁸ UL 399, 7th edition.

SNAP Rule 21.⁸⁹ Under both the use condition options proposed and discussed in Sections VI.E.4.a. and VI.E.4.b., the proposed listing would maintain this use condition for labels.

3. Color-Coded Hoses and Piping

An existing use condition for R-290 in water coolers is that they must have distinguishing red (PMS #185) color-coded pipes, hoses, or other devices through which the refrigerant passes, to indicate the use of a flammable refrigerant. This color must be applied at all service ports and other parts of the system where service puncturing or other actions creating an opening from the refrigerant circuit to the atmosphere might be expected and must extend a minimum of one inch (25 mm) in both directions from such locations. If removed, these markings also shall be replaced. These markings are the same as those required in section SB6.1.6 of Supplement SB to the 7th and 8th editions of UL 399, although the exact wording of those requirements is slightly different (e.g., states “refrigerant tubing or other devices through which the refrigerant is intended to be serviced”). The EPA proposes that this same use condition continue to apply. This would be the case either for the incorporate by reference option described in Section VI.E.4.a. or for the third-party certification option described in Section VI.E.4.b.

4. Use Condition Options Related to Equipment Certification or Industry Safety Standard Requirements

In the initial listing of R-290 as acceptable, subject to use conditions, for use in water coolers, the EPA set two use conditions that relate to charge size and risk mitigation: (1) limiting the maximum charge of R-290 to 60 g in each refrigerant circuit and (2) requiring that water coolers using R-290 must meet all requirements of Supplement SB to the 7th edition of UL 399, dated August 22, 2008, with all revisions through October 18, 2013. Supplement SB to the 7th edition of UL 399 set a maximum refrigerant charge size of 2 ounces or 60 g for class 3 (higher flammability) refrigerants and other requirements such as construction requirements, performance testing, and marking requirements.

The latest revision to the 8th edition of UL 399 issued in February 2024 allows up to 130 g of A3 refrigerants, including R-290, in water coolers. The Agency’s most recent risk screening finds that R-290 may be used safely in new water coolers in accordance with

the 8th edition of UL 399 and a charge size of up to 130 g of R-290 to mitigate flammability risks.

These water coolers are factory charged with R-290 by the manufacturer. The risk of fire is minimal if water coolers meet the provisions of the 8th edition of UL 399 and have a charge size of R-290 no greater than 130 g. Water coolers containing R-290 should not be installed in enclosed areas and water coolers containing R-290 that are installed in lobbies or locations of egress (e.g., hallways) and would need to have a charge size no greater than three times the LFL, or 114 g of R-290, as stated in standards such as ASHRAE 15 and UL 399. Water coolers installed in locations with adequate space and/or ventilation in accordance with the EPA recommendations and requirements, industry consensus safety standards, and the installation and maintenance manuals for equipment using R-290, are unlikely to pose flammability risk and human health risk to end-users, personnel, or the general population when the proposed use conditions are followed. Thus, the EPA proposes to find that updating the charge size and being consistent with the 8th edition of UL 399 to address flammability risks from use of R-290 in water coolers is appropriate to protect against such risks.

EPA is proposing to update the condition to follow Supplement SB of the 7th edition of UL 399 and remove the existing, separate use condition to use a charge size of R-290 of no greater than 60 g. Supplement SB contains specific safety criteria for water coolers using flammable refrigerants such as R-290. These requirements, including testing to meet safety standards, are designed to mitigate risks associated with flammable refrigerants. EPA proposes to find that the requirements in the 8th edition of UL 399, including the larger charge size of 130 g, allow R-290 to be used in a manner that sufficiently addresses flammability risks.

The EPA is co-proposing two options for a use condition related to equipment certification or industry safety standard requirements for the use of R-290 in water coolers. Section VI.E.4.a. describes an option in which the EPA would incorporate by reference a new edition of the industry consensus safety standard for this end-use. Section VI.E.4.b. describes an option in which the EPA would require water coolers to be certified by an organization that is recognized as an NRTL to a U.S. industry consensus safety standard that is designed to allow for safe use of flammable refrigerants and mitigates

risks such that R-290 can be used in a manner that does not pose a greater overall risk to human health and the environment than other substitutes in this end-use.

a. Incorporate by Reference UL 399, 8th Edition Option

For background on the SNAP program’s recent approach to identifying use conditions for lower and higher flammability refrigerants, refer to Section IV.F.4.a. In this first co-proposed option, the EPA proposes that R-290 only be used in water coolers that meet all the requirements listed in Supplement SB of UL 399, 8th edition. The EPA is proposing to incorporate by reference Supplement SB of UL 399, “Standard for Safety: Drinking Water Coolers,” 8th edition, March 30, 2017, with revisions through February 28, 2024, which establishes requirements for the evaluation of household and similar electrical appliances, and safe use of flammable refrigerants. Where the rule requirements are different than those of UL 399, the EPA is proposing that the appliance would need to meet the requirements of the rule.

UL 399 establishes requirements for the evaluation of water coolers and the safe use of refrigerants with a flammability classification of A2, A2L, or A3. This section summarizes relevant requirements of UL 399 for information only and is not meant to be a complete review of the standard or how it is applied.

The EPA has evaluated the revisions to the standard published in the 8th edition and finds that construction and use of water coolers in accordance with the 8th edition would not pose greater overall risk to human health and the environment when compared to use in accordance with the 7th edition. The charge size limit for each separate refrigerant circuit (*i.e.*, compressor, condenser, evaporator, and refrigerant piping) is 130 grams (4.6 ounces), which is more than the 60 g limit in the 7th edition.

Both the 7th and 8th editions of UL 399 require testing of water coolers containing flammable refrigerants, including leakage tests, temperature and scratch tests, and heat testing requirements to address the hazards due to ignition of leaked refrigerant by potential ignition sources associated with the appliance. These tests are intended, among other things, to ensure that any leaks will result in concentrations well below the LFL, and that potential ignition sources will not be able to create temperatures high enough to start a fire. Water coolers that comply with UL 399 have passed

⁸⁹ See 81 FR 86778; December 1, 2016.

appropriate ignition or leakage tests as stipulated in the standard. Passing the leakage test ensures that refrigerant concentrations in the event of a leak do not reach or exceed 75 percent of the LFL inside any internal or external electrical component compartments. In addition, the 8th edition of UL 399 includes hazard warning labels and markings to make users, technicians, first responders, and others aware of flammability hazards. UL 399 was developed in an open and consensus-based approach, with the assistance of experts in the refrigeration and AC industry as well as experts involved in assessing the safety of products. More information about the way in which UL standards are developed can be found in Section IV.F.4.a. While similar standards exist from other bodies, we are proposing in this option to rely on specific UL standards that are most applicable and used by U.S. manufacturers. The EPA expects that there would be greater consistency for industry to move from an edition of a UL standard to another edition of the same UL standard than to change to a different standard from a different standards setting organization. This approach has also been taken in recent SNAP rules concerning lower and higher flammability refrigerants.⁹⁰

The EPA recognizes that in certain clauses, UL 399 refers to ASHRAE 15 for compliance. Consistent with previous listings for other flammable refrigerants in this end-use, the EPA is not proposing to include a use condition related to adherence to ASHRAE 15. The EPA proposes to find that these refrigerants can be used safely provided the use conditions in this proposed rule are followed, including compliance with the 8th edition of UL 399.

As stated in Section VI.A., the EPA is proposing to update the use conditions for the listing of R-290 for use in new water coolers. The updated use conditions would apply to equipment manufactured after the effective date of the final rule. The updated use conditions would neither apply to nor affect equipment manufactured before the effective date of the final rule.

Under this incorporate by reference option, the updated refrigerant listing would include the use conditions described in Sections VI.E.1., VI.E.2., and VI.E.3. as well as a use condition that the refrigerant may only be used in equipment that meets all the

requirements of Supplement SB of UL 399, 8th edition.

The EPA has conducted updated analysis to evaluate the environmental, health, and safety implications of designing and using water coolers using R-290 in accordance with UL 399, 8th edition and found that design and use in accordance with the 8th edition allows for safe use of R-290. This assessment is available in the docket.⁹¹ The proposed regulatory text for the updated listing under this option can be found in the docket under the title “Proposed Regulatory Text for SNAP Rule 27” in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Incorporate by Reference Option.”

b. Third-Party Certification Option

As explained in Section IV.F.4.b., the EPA is co-proposing a second use condition option to address flammability risks while recognizing that a specific edition of a relevant industry consensus safety standard applicable for the water coolers end-use may be replaced by a later edition. For listings in this end-use under this option, the EPA is proposing a use condition that relies on NRTLs certifying equipment to a U.S. industry consensus safety standard that mitigates risks.

Under this option, the EPA proposes that all new water coolers using R-290 would need to be certified by an OSHA-recognized NRTL to a U.S. industry consensus safety standard that is designed to allow for safe use of flammable refrigerants in water coolers and mitigates risks such that the listed refrigerant can be used in a manner that does not pose a greater overall risk to human health and the environment than other substitutes in this end-use. Under this option, the EPA would remove the use condition that incorporates by reference Supplement SB of the 7th edition of UL 399 for new equipment manufactured after the effective date of a final rule and instead require certification of equipment to a U.S. industry consensus safety standard by an NRTL. By not incorporating by reference a specific edition of a relevant safety standard, the EPA intends to increase efficiencies by avoiding questions about whether it should propose a new rule each time a standard is updated and to leverage OSHA's NRTL Program.⁹²

The industry consensus safety standard used to meet this proposed requirement would need to be designed for use in the United States and be consistent with best industry safety practices (e.g., UL 399). The EPA proposes to view UL 399 as one example of a U.S. industry consensus safety standard that could be used to meet this requirement, as the requirements of the standard align with the levels of safety that the EPA expects in terms of mitigating risks to human health and the environment. As discussed in Section VI.E.4.a., the EPA has evaluated the latest edition of UL 399 and finds that use of R-290 in water coolers consistent with this standard would not pose greater overall risk to human health and the environment than other acceptable substitutes in this end-use.

The certification process confirms that the design, manufacture, and operation of the water coolers meet industry safety standards such as UL 399 for higher flammability refrigerants including R-290. This includes ensuring refrigerant containment and mitigating risks associated with pressure and electrical safety, among other things.

The EPA is not proposing to establish specific requirements or protocols for laboratories because OSHA already has established such requirements and performs detailed reviews of equipment certification entities. More information about OSHA's review of NRTLs and the NRTL Program can be found in Section IV.F.4.b.

While the EPA is proposing reliance on certification by these NRTLs, the EPA is not opening OSHA's regulations at 29 CFR 1910.7 for comment, including definitions or requirements, nor is the EPA seeking comment on the OSHA program itself.

The EPA does not expect this option to pose significant additional burden on manufacturers or NRTLs because most manufacturers of water coolers have their equipment certified by an NRTL already. Manufacturers that do not already certify their equipment through an OSHA-recognized NRTL would need to do so beginning two years after the effective date of the final rule.

For further explanation about this co-proposed option, refer to the information provided in Section IV.F.4.b.

Under this third-party certification option, the updated listing for R-290 in water coolers would include the use conditions described in Sections VI.E.1., VI.E.2., and VI.E.3. as well as a use condition that equipment be certified by an OSHA-recognized NRTL to a U.S.

⁹⁰ See 76 FR 78832, December 20, 2011; 80 FR 19454, April 10, 2015; 81 FR 86778, December 1, 2016; 86 FR 24444, May 6, 2021; 88 FR 26382, April 28, 2023.

⁹¹ ICF, 2025i. Risk Screen on Substitutes in Water Coolers (New Equipment); Substitute: Propane (R-290).

⁹² Definitions and requirements for the OSHA NRTL Program can be found at 29 CFR 1910.7.

industry consensus safety standard that is designed to allow for safe use of flammable refrigerants in water coolers. The updated use conditions would apply to equipment manufactured after the effective date of the final rule. The updated use conditions would neither apply to nor affect equipment manufactured before the effective date of the final rule.

The EPA performed an assessment to examine the human health and environmental risks of R-290 in water coolers. This assessment is available in the docket.⁹³ Proposed regulatory text for the revised listing for R-290 in water coolers under this option can be found in the docket for this rulemaking under the title “Proposed Regulatory Text for SNAP Rule 27” in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Third-Party Certification Option (co-proposed as an alternative to Section III).”

5. When would the use conditions take effect?

The EPA is proposing to allow regulated entities to follow either the existing use conditions or the proposed updated use conditions from the effective date of the final rule until two years after that effective date.

If the EPA finalizes the third-party certification option, equipment manufactured between the effective date of a final rule and two years after the effective date of a final rule could follow either the existing use conditions (including the 7th edition of UL 399, the 60 g limit, and the existing labeling and marking requirements) or the updated use conditions that would include certification of equipment by an OSHA-recognized NRTL. The updated use conditions would neither apply to nor affect equipment manufactured before the effective date of the final rule.

F. What additional information is the EPA including in this proposed listing?

The EPA would retain the additional information provided in the existing listing for R-290 in water coolers in the “Further Information” column of the regulatory text, to protect personnel and users from the risks of using flammable refrigerants. Similar to our previous listings of flammable refrigerants, the EPA is including information on the OSHA requirements at 29 CFR part 1910, proper ventilation, PPE, fire extinguishers, use of spark-proof tools and equipment designed for flammable refrigerants, and training.

Under the third-party certification option, the EPA would also include a

sentence in stating that the EPA views UL 399 to be an example of an appropriate U.S. industry consensus safety standard that mitigates risks.

Since this additional information is not part of the regulatory decision under SNAP, these statements are not binding for use of the substitute under the SNAP program. While the statements in the “Further Information” column are not legally binding under the SNAP program, the EPA encourages users of R-290 to apply all statements in the “Further Information” column in their use of these substitutes.

VII. Chillers

A. What is the EPA proposing in this action?

The EPA is proposing to list R-516A as acceptable, subject to use conditions, for use in the centrifugal chillers and positive displacement chillers end-uses. This proposed listing for R-516A applies to all compressor types of chillers, *i.e.*, centrifugal and positive displacement (including reciprocating, screw, scroll, and rotary) chillers. The proposed listing is for comfort cooling applications of such chillers under the EPA’s proposed use conditions, including but not limited to use in commercial comfort AC.

The proposed use conditions for chillers are similar to those finalized for other lower flammability refrigerants in these end-uses.⁹⁴ The proposed use conditions include a requirement that R-516A be used in new equipment only, specific requirements for warning labels, specific requirements for markings, and requirements that the refrigerant be used only in chiller equipment that meets all the requirements of UL 60335-2-40 and ASHRAE 15-2024. See Section VII.E. for further discussion on the requirements of this standard that the EPA is incorporating by reference.

The regulatory text of the proposed decision appears in the docket under the title “Proposed Regulatory Text for SNAP Rule 27” in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Incorporate by Reference Option” and in the section “Proposed revisions to Appendices R, V, W, and new Appendix Z—Third-Party Certification Option (co-proposed as an alternative to Section III).” The text for this listing is identical in both sections. This text would be codified in appendix Z of 40 CFR part 82, subpart G. The proposed regulatory text contains listing decisions for the proposed end-uses. The EPA notes that

there may be other legal obligations pertaining to the manufacture, use, handling, and disposal of the proposed refrigerants that are not included in the information listed in the tables (*e.g.*, CAA section 608(c)(2) venting prohibition or DOT requirements for transport of flammable gases). Flammable refrigerants being recovered or otherwise disposed of from chillers are likely to be hazardous waste under RCRA (40 CFR parts 260–270). Lower flammability ignitable spent refrigerants, including R-516A, that are recycled for reuse can follow alternative standards under 40 CFR part 266, subpart Q, instead of the full RCRA Subtitle C hazardous waste requirements.

B. Background on Centrifugal Chillers and Positive Displacement Chillers

A chiller is a type of equipment using refrigerant that typically cools water or a brine solution, which is then pumped to fan coil units or other air handlers to cool the air that is supplied to the occupied spaces transferring the heat to the water. The heat absorbed by the water can then be used for heating purposes and/or can be transferred directly to the air (air-cooled), to a cooling tower or body of water (water-cooled), or through evaporative coolers (evaporative-cooled). A chiller or a group of chillers could similarly be used for district cooling where the chiller plant cools water or another fluid that is then pumped to multiple locations being served such as several different buildings within the same complex. Chillers may also be used to maintain operating temperatures in various types of buildings, for example, in data centers, server farms, and agricultural and food operations. This proposal applies to chillers that are covered by UL 60335-2-40 and ASHRAE 15-2024. EPA understands that the UL standard applies to chillers used for comfort cooling. The EPA is not proposing to list R-516A in chillers used in other applications such as IPR (*e.g.*, chillers used to cool process streams in industrial applications) and industrial process air conditioning (*e.g.*, chillers used for comfort cooling of operators or climate control and for protecting process equipment in industrial buildings).

Centrifugal chillers utilize a centrifugal compressor in a vapor-compression refrigeration cycle. Centrifugal chillers are typically used for commercial comfort AC, although other uses, that we are not proposing here, do exist. Centrifugal chillers tend to be used in larger buildings such as

⁹³ ICF, 2025i.

⁹⁴ See 88 FR 26382; April 28, 2023, and appendix X to 40 CFR part 82, subpart G.

office buildings, hotels, arenas, convention halls, and airport terminals.

Positive displacement chillers are those that utilize positive displacement compressors such as reciprocating, screw, scroll, or rotary types in a vapor-compression refrigeration cycle. Positive displacement chillers are applied in similar situations as centrifugal chillers, again primarily for commercial comfort AC, except they tend to be used for smaller capacity needs such as in mid- and low-rise buildings.

C. What are the ASHRAE classifications for refrigerant flammability and toxicity?

See Section IV.C. for information on ASHRAE classifications for refrigerant flammability and toxicity.

D. What is R-516A and how does it compare to other refrigerants in the centrifugal chillers and positive displacement chillers end-uses?

R-516A is a lower flammability refrigerant blend in the A2L Safety Group. See Section IV.D. for information on the chemical components of R-516A as well as environmental information, flammability information, and toxicity and exposure information on R-516A. The redacted submission and supporting documentation for R-516A is provided in the docket. The EPA performed a risk screening assessment to examine the human health and environmental risks of this substitute which also is available in the docket.⁹⁵

Comparison to other substitutes in the centrifugal chillers and positive displacement chillers end-uses: The specific atmospheric effects values can be found in the individual risk screen for R-516A. These were determined consistent with the source information noted in Section III.C. above (e.g., CAA, the AIM Act) as well as using the methodology for determining values for blends of chemicals (i.e., determined by the percentage of each component). The atmospheric effects for R-516A are overall better than or comparable to many of the substitutes currently listed as acceptable in this end-use such R-454C, R-454A, R-454B, HFC-32, R-452B, R-514A, R-1224yd(Z), HFO-1234yf, and HFO-1234ze. Furthermore, as noted above, the EPA does not intend to restrict a substitute if it has only marginally greater risk.

Toxicity risks of use, determined by the likelihood of exceeding the exposure limit of the refrigerant in these end-uses, are evaluated in the previously

referenced risk screen. The toxicity risks of using R-516A are comparable to or lower than toxicity risks of other available substitutes in the same end-uses.⁹⁶ Toxicity risks of the proposed refrigerants can be minimized by use consistent with the proposed use conditions and best industry practices.

The flammability risks associated with R-516A in these end-uses, determined by the likelihood of exceeding their respective LFLs, are evaluated in the previously referenced risk screen. In conclusion, while this refrigerant may pose greater flammability risk than other available substitutes in the same end-uses, this risk can be minimized by use consistent with the proposed use conditions, as well as recommendations in the manufacturers' SDS and other safety precautions common in the refrigeration and AC industry. The EPA is proposing use conditions that mitigate human health and environmental risks associated with the flammability of these alternatives so that they would not pose greater overall risk than other acceptable substitutes in these end-uses.

Given the wide range of applications for centrifugal chillers and positive displacement chillers, not all refrigerants listed as acceptable under SNAP will be suitable for the range of equipment in these end-uses. To provide additional options to ensure the availability of substitutes for the full range of comfort cooling chillers, the EPA is proposing the new listing for R-516A.

E. What use conditions is the EPA proposing in this action for the new listing for R-516A in new centrifugal chillers and positive displacement chillers?

The proposed use conditions described in this section would apply to new centrifugal chillers and new positive displacement chillers using R-516A. In summary, these use conditions are:

1. *New equipment only; not intended for use as a retrofit alternative:* The EPA is proposing that this refrigerant may be used only in new equipment designed to address concerns unique to flammable refrigerants. None of these substitutes may be used as a conversion or "retrofit" refrigerant for existing equipment.

2. *UL Standard:* This refrigerant may be used only in chiller equipment that meets all requirements listed in the 4th edition, dated December 15, 2022, of the

standard UL 60335-2-40, "Household and Similar Electrical Appliances—Safety—Part 2-40: Particular Requirements for Electrical Heat Pumps, Air Conditioners and Dehumidifiers." In cases where this rule includes requirements different than those of the 4th edition of UL 60335-2-40, the EPA is proposing that the appliance would need to meet the requirements of the rule.

3. *ASHRAE Standard:* This refrigerant may be used only in chillers that meet all requirements listed in ASHRAE 15-2024. ASHRAE 15-2024 is the latest version of the ASHRAE 15 standard. In cases where the rule includes requirements different than those of ASHRAE 15-2024, the EPA is proposing that the appliance would need to meet the requirements of the rule. The EPA is also proposing that in cases where similar requirements of ASHRAE 15-2024 and UL 60335-2-40 differ, the more stringent or conservative condition would apply unless superseded by the final rule.

4. *Labels:* The EPA is proposing that this refrigerant may be used only in equipment with appropriate warning labels. These warning labels are identical to those proposed as use conditions for A2L refrigerants as detailed in Section IV.F.2., other than the proposed label under paragraph for non-fixed equipment since chillers for comfort cooling are typically fixed equipment. These labels are similar or verbatim in language to those required by UL 60335-2-40. The warning labels would need to be provided in letters no less than 6.4 mm (1/4 inch) high and would need to be permanent.

5. *Color-coded hoses and piping:* The EPA is proposing to require that equipment have distinguishing red (PMS #185 or RAL 3020) color-coded hoses and piping to indicate use of a flammable refrigerant. The equipment would need to have marked service ports, pipes, hoses, and other devices through which the refrigerant is serviced. Markings would need to extend at least one inch (25 mm) from the servicing port and would need to be replaced if removed. This requirement is identical to the requirement proposed as a use condition for A2Ls as detailed in Section IV.F.3.

UL 60335-2-40 applies to chillers used for comfort cooling, among other things. A summary of the requirements of UL 60335-2-40 as they affect the refrigerants and end-uses in this proposal can be found in Section IV.F.4.a.

UL 60335-2-40, 4th edition indicates that refrigerant charges greater than a specific amount (called "m3" in the UL

⁹⁵ ICF, 2025j. Risk screen on Substitutes in Chillers (New Equipment); Substitute: R-516A (Forane® 516A).

⁹⁶ See previous listing decisions for information regarding the toxicity of other available alternatives (<https://www.epa.gov/snap/substitutes-chillers>).

standard and based on the refrigerant's LFL) are beyond its scope and that national standards apply, such as ASHRAE 15–2024. Given that either UL 60335–2–40 or ASHRAE 15–2024 would apply, depending on the charge size of the equipment, the EPA is proposing adherence to both standards as use conditions for chillers. Where similar requirements of ASHRAE 15–2024 and UL 60335–2–40 differ, the EPA is proposing that the more stringent or conservative condition would apply unless superseded by this rule.

The EPA is proposing that new chillers using R–516A would need to adhere to ASHRAE 15–2024, “Safety Standard for Refrigeration Systems,” including all addenda published by the date of this proposal. Where the requirements specified in this rule and ASHRAE 15–2024 are different, the requirements of this rule would apply. The EPA understands that ASHRAE 15–2024 was published early to align the standard with the model code revision cycle. Incorporating by reference ASHRAE 15–2024 would align the SNAP requirements with the latest industry best practices and model code requirements.

The 2024 edition of ASHRAE 15 incorporates ASHRAE 15–2022 and Addenda a, b, c, e, f, g, h, i, l, m, o, p, q, r, t, v, w, and ab. Most addenda to the 2022 edition address some aspect of flammable refrigerant use. Key changes include updated best practices for handling, transport, and storage of flammable refrigerants, and the installing, servicing, and decommissioning of equipment containing flammable refrigerants. ASHRAE 15–2024 provides information regarding machinery rooms including revised ventilation requirements in machinery rooms, information on what types of equipment are generally expected to be in a machinery room, types of equipment and materials that should not be located in a machinery room, and authorized personnel requirements for accessing a machinery room.

This section summarizes relevant aspects of ASHRAE 15–2024 for information only and is not meant to be a complete review of the standard or how it is applied. ASHRAE 15–2024 specifies requirements for refrigeration systems based on the safety group of the refrigerant used, the type of occupancy in the location where the system is used, and whether refrigerant-containing parts of the system enter the space or ductwork such that leakage in the space is deemed “probable.” “High-probability” installations are those where leaks or failures result in

refrigerant entering occupied space. Occupancies are divided into six classifications: institutional, public assembly, residential, commercial, large mercantile, and industrial. Examples of these include jails, theaters, apartment buildings, office buildings, shopping malls, and chemical plants, respectively.

Sections 7.2 and 7.3 of ASHRAE 15–2024 determine the maximum amount of refrigerant allowed in the system. Section 7.4 provides an option to locate equipment outdoors or in a machinery room constructed and maintained under conditions specified in the standard. Section 7.6 addresses A2L refrigerants when used for human comfort in “high-probability” systems, including requirements for nameplates, labels, refrigerant detection systems (under certain conditions), airflow initiation, activation of safety shutoff valves, other actions if a rise in refrigerant concentration is detected, and other restrictions.

ASHRAE 15 undergoes regular revision cycles with publication of periodic addenda and is typically updated and republished every three years. While the EPA is proposing to incorporate ASHRAE 15–2024 and all addenda published by the date of this proposal, there may be additional changes to ASHRAE 15–2024 by the time the EPA issues a final rule. Because the EPA would not have reviewed those changes, the EPA is not proposing to incorporate by reference any addenda or other changes made to ASHRAE 15–2024 after the date of the publication of this proposed rule.

F. What additional information is the EPA including in this proposed listing?

The EPA is providing additional information related to this proposed listing, found in the “Further Information” column of the regulatory text, to protect personnel from the risks of using a lower flammability refrigerant such as R–516A. Similar to our previous listings of lower flammability refrigerants, the EPA is including information on the OSHA requirements at 29 CFR part 1910, proper ventilation, PPE, fire extinguishers, use of spark-proof tools and equipment designed for flammable refrigerants, and training. Since this additional information is not part of the regulatory decision under SNAP, these statements are not binding for use of the substitute under the SNAP program. While the statements in the “Further Information” column are not legally binding under the SNAP program, the EPA encourages users of substitutes to apply all statements in the

“Further Information” column in their use of these substitutes.

VIII. Motor Vehicle Air Conditioning

A. What is the EPA proposing in this action?

The EPA is proposing to list HFO–1234yf as acceptable, subject to use conditions, for use in new MVACs in HDOH vehicles and buses.

The EPA is proposing for retrofit equipment the following listings:

- HFO–1234yf, R–444A, R–456A, and R–480A as acceptable, subject to use conditions, for retrofit of LMDV MVACs;
- R–444A, R–456A, and R–480A as acceptable, subject to use conditions, for retrofit of MVACs in HD pickup trucks and vans (both complete and incomplete);
- R–456A and R–480A as acceptable, subject to use conditions, for retrofit of HDOH MVACs; and
- R–453A, R–456A, and R–480A as acceptable, subject to use conditions, for retrofit of MVACs in buses and trains.

The proposed retrofit listings would allow for retrofits of CFC–12 or HCFC–22 MVACs as well as for retrofits of MVACs using any of the refrigerants the SNAP program lists as acceptable, including HFC–134a and HFO–1234yf. None of these substitutes have been listed for retrofit applications previously, and with the exception of HFO–1234yf, none have been listed for use in MVACs previously.

The EPA also is proposing to modify the unacceptable listing of flammable refrigerants in MVACs to exclude R–444A and HFO–1234yf when used in retrofit equipment. These two refrigerants are lower flammability and are being proposed as acceptable, subject to use conditions, as retrofits in MVAC in this action.

The EPA is proposing to consider certain stand-alone battery thermal management systems (BTMS) on electric HD and nonroad vehicles as part of the MVAC end-use under the SNAP program. Refrigerants listed for use in MVACs in a given vehicle type would also be acceptable for use in BTMS onboard those vehicle types.

Finally, the EPA is proposing non-substantive changes to existing listings to reduce redundancy and improve clarity. The EPA is proposing to consolidate several listings for HFO–1234yf in appendix B of 40 CFR part 82, subpart G that share the same use conditions. For example, the EPA proposes to consolidate the listings for HFO–1234yf in five types of nonroad equipment that share the same use conditions into a single row. The EPA

is also proposing to reformat and clarify the existing listings for refrigerants in the table titled “Refrigerants—Unacceptable Substitutes” in appendix B of 40 CFR part 82, subpart G, by publishing the end-use for each row. The EPA is also proposing to number each row in the tables titled “Refrigerants—Acceptable Subject to Use Conditions,” “Refrigerants—Acceptable Subject to Narrowed Use Conditions,” and “Refrigerants—Unacceptable Substitutes” in appendix B of 40 CFR part 82, subpart G.

B. Background on Motor Vehicle Air Conditioning

The SNAP program uses the term MVAC broadly to describe a wide variety of non-stationary air conditioning systems that provide passenger comfort cooling for LMDVs, HD vehicles, nonroad vehicles, buses, and trains. The SNAP MVAC end-use includes systems that may also be subject to other CAA regulatory programs, including for example, where those systems fit within the regulatory definition of “MVAC” under 40 CFR 82.32,⁹⁷ or the definition of an “MVAC-like appliance”⁹⁸ or “appliance” under 40 CFR 82.152, or both.

To appropriately evaluate human health and environmental risks, the SNAP program considers the type of vehicle in which the proposed alternative would be used. The EPA is proposing listings for refrigerants used in MVACs in LMDVs (*e.g.*, common passenger vehicles such as sedans, small pickup trucks, and sport utility vehicles), complete and incomplete HD pickup trucks and vans (*e.g.*, large passenger vehicles such as large pickup trucks or vans), HDOH vehicles (*e.g.*, vocational or commercial vehicles such as tractor-trailers and box trucks), buses, and trains.

MVACs across all vehicle types are typically charged during vehicle

manufacture apart from incomplete HD vehicles. Incomplete HD vehicles are modified by secondary manufacturers and may involve the installation of additional AC or refrigeration equipment—for example, AC for the rear compartment of an ambulance or van.

The class I ODS refrigerant, CFC-12 was the refrigerant historically used in MVACs for passenger vehicles and trucks. HFC-134a, amongst other substitutes, was listed as acceptable for use in new and retrofit MVACs, including light-duty (LD) vehicles, in the initial SNAP rulemaking.⁹⁹ Since then, the EPA has listed additional alternatives for MVACs as acceptable, subject to use conditions, for use in new LMDV, including HFO-1234yf, HFC-152a, and carbon dioxide (R-744).

HFO-1234yf is the predominant refrigerant used in new LMDVs that are manufactured and imported in the United States. Older vehicles continue to use HFC-134a and in some cases, CFC-12. HFC-134a is the predominant refrigerant used in new HDOH and bus MVACs. The Class II ODS refrigerant HCFC-22 was historically used in buses and trains while newer buses and passenger trains often use HFC-134a or R-407C.

As noted above, the EPA considers other relevant regulatory programs when developing listing decisions and use conditions. For example, CAA section 609 and implementing regulations in 40 CFR part 82, subpart B address the repair and servicing of MVACs as well as technician training and certification. CAA section 608 and implementing regulations in 40 CFR part 82, subpart F restrict the sale of refrigerant and address disposal and other activities involving MVACs that are not regulated under CAA section 609.

The EPA notes that by considering the regulatory requirements that already exist consistent with the SNAP program’s guiding principles, the EPA has been able to limit the use conditions the Agency would have otherwise considered particularly for retrofits. Under CAA section 609 and its implementing regulations, no person may perform any service on an MVAC that involves refrigerant for consideration (*i.e.*, payment or bartering) without properly using¹⁰⁰

refrigerant recovery, recycling, and recharging equipment approved by the EPA or an EPA-approved independent standards organization. Individuals not accepting payment (also known as do-it-yourselfers or DIYers) are exempt from the certification requirements. The regulations under CAA section 609 prohibit refrigerant recovered from an MVAC to be recharged into an MVAC, including the MVAC it was extracted from, unless it has been recycled.¹⁰¹ Recycling may be done through the use of EPA-approved equipment that recovers and subsequently recycles refrigerant before returning it to an MVAC. Alternatively, when using EPA-approved recover-only equipment the refrigerant must be sent offsite for reclamation as described in the definition of “properly using.” While there are circumstances in which refrigerant recovered from MVACs is sent offsite to be reclaimed,¹⁰² onsite recovery, recycling, and recharging of single-component MVAC refrigerants is currently the most common practice.

The EPA’s regulatory approach under CAA sections 609 and 612 for MVACs seeks to mitigate refrigerant mixing and refrigerant emissions while accommodating the practice of onsite recycling. SNAP program requirements in appendix D of 40 CFR part 82, subpart G include specifications for unique fittings,¹⁰³ labeling of retrofit MVACs, and a prohibition against “topping off” an MVAC that uses

in 40 CFR 82.36(a) and appendices A, B, C, D, E, and F to that subpart, as applicable. In addition, this term includes operating the equipment in accordance with the manufacturer’s guide to operation and maintenance and using the equipment only for the controlled substance for which the machine is designed. For equipment that extracts and recycles refrigerant, properly using also means to recycle refrigerant before it is returned to an MVAC or MVAC-like appliance, including to the MVAC or MVAC-like appliances from which the refrigerant was extracted. For equipment that only recovers refrigerant, properly using includes the requirement to recycle the refrigerant onsite or send the refrigerant off-site for reclamation.

¹⁰¹ 40 CFR 82.34(d)(1).

¹⁰² As defined in 40 CFR 82.152, reclaim means to reprocess recovered refrigerant to all of the specifications in appendix A to subpart F of 40 CFR part 82 (based on AHRI Standard 700–2016, Specifications for Refrigerants) that are applicable to that refrigerant and to verify that the refrigerant meets these specifications using the analytical methodology prescribed in section 5 of appendix A of this subpart.

¹⁰³ A unique set of fittings is required for each refrigerant approved for use in MVACs under the SNAP program. These fittings are attachment points on the service ports of the MVAC itself, on all recovery and recycling equipment, on large refrigerant containers, and taps on small cans of refrigerant. The unique set of fittings for each refrigerant prevents the accidental mixing of different refrigerants. This helps protect the purity of the refrigerant. An adapter may not be used to make a fitting compatible with a refrigerant for which it was not intended.

⁹⁷ As defined in 40 CFR 82.32, Motor vehicle air conditioners means mechanical vapor compression refrigeration equipment used to cool the driver’s or passenger’s compartment of any motor vehicle. This definition is not intended to encompass the hermetically sealed refrigeration systems used on motor vehicles for refrigerated cargo and the air conditioning systems on passenger buses using HCFC-22 refrigerant. See also 40 CFR 82.152 (defining MVAC to mean “any appliance that is a motor vehicle air conditioner as defined in subpart B of 40 CFR part 82”).

⁹⁸ As defined in 40 CFR 82.152 MVAC-like appliance means a mechanical vapor compression, open-drive compressor appliance with a full charge of 20 pounds or less of refrigerant used to cool the driver’s or passenger’s compartment of off-road vehicles or equipment. This includes, but is not limited to, the air-conditioning equipment found on agricultural or construction vehicles. This definition is not intended to cover appliances using R-22 refrigerant.

⁹⁹ See 59 FR 13044; March 18, 1994.

¹⁰⁰ As defined in 40 CFR 82.32(e)(1) properly using means using equipment in conformity with the regulations set forth in subpart B of 40 CFR part 82, including but not limited to the prohibitions and required practices set forth in 40 CFR 82.34, and the recommended service procedures and practices for the containment of refrigerant set forth

another refrigerant. Together with the CAA section 609 requirement to use certified servicing equipment, these provisions minimize refrigerant mixing and cross contamination while allowing for onsite recovery, recycling, and recharging.

This framework for onsite refrigerant recycling relies on industry safety standards for refrigerant purity and the use of EPA-approved recover, recycle, and recharge equipment. For example, SAE International, previously known as the Society of Automotive Engineers (SAE) establishes requirements (*e.g.*, SAE J2843) for equipment used to recycle HFO–1234yf. The EPA did not change this framework in the 2024 Emissions Reduction and Reclamation (ER&R) final rule.¹⁰⁴ Subsection (h)(2)(B) of the AIM Act states that a “regulated substance used as a refrigerant that is recovered shall be reclaimed before the regulated substance is sold or transferred to a new owner, except where the recovered regulated substance is sold or transferred to a new owner solely for the purposes of being reclaimed or destroyed.” As discussed in that rule, the EPA did not propose or establish requirements implementing subsection (h)(2)(B) for MVAC servicing facilities that currently reclaim or recycle recovered MVAC refrigerant. The EPA recognized the longstanding practice of onsite recovery and recycling to relevant MVAC safety standards (*e.g.*, SAE J2099) and that industry plans to develop relevant safety standards for recover, recycle, and recharge equipment for MVAC refrigerant blends, including those proposed in this action. As discussed in the ER&R final rule, the Agency intends to propose regulations for this sector after it has clarity on the development of such a safety standard and its likely content. Additionally, the EPA may need to consider potential approaches for recycling and/or reclaiming MVAC refrigerant blends, which may include HFCs and/or substitutes for HFCs, particularly given that refrigerant blends are currently not used in MVACs.¹⁰⁵

Lastly, the EPA has received inquiries regarding the use of BTMS in HD and nonroad vehicles. In some cases, BTMS in these vehicle types may be separate from the AC systems that cool the passenger cabins of these vehicles. The EPA is proposing to consider these BTMS on HD and nonroad vehicles to be MVAC under the SNAP program. Thus, refrigerants listed as acceptable in MVACs in a given vehicle type would

also be acceptable for use in BTMS in that same vehicle type. This interpretation would also mean that use conditions applicable to refrigerants in MVACs would apply to these refrigerants when used in BTMS. Requirements may include, but are not limited to, use of unique service port fittings, labeling, and compliance with industry safety standards. Note that this proposed interpretation would only apply to the SNAP program and would not change the treatment of MVACs under other EPA regulatory programs.¹⁰⁶

In written correspondence, the EPA has previously said that “stand-alone” BTMS falls under other SNAP end-uses depending on the equipment configuration, such as non-mechanical heat transfer. However, upon further consideration, the EPA is proposing the aforementioned interpretation to ensure consistency in how BTMS are classified and clarity about what substitutes are acceptable.

The EPA is basing this proposed interpretation on similarities in risk profiles between BTMS and traditional MVACs that primarily provide comfort cooling for passengers. Both may be subject to collisions at high speeds, vibrations, and vehicle occupants who spend prolonged periods of time in the enclosed passenger cabin. Substitutes listed as acceptable for use in MVAC have already been screened taking these risk factors into consideration. Substitutes listed in other SNAP end-uses that predominantly consider use cases in stationary equipment would not have considered these factors and may not be appropriate for use in BTMS.

Further, the standard setting bodies are the same for both traditional MVACs and BTMS in HD and nonroad vehicles. HD and nonroad vehicles typically follow standards set by SAE, and the EPA understands that SAE is currently researching alternative refrigerants and technologies to improve and optimize electric vehicle thermal management systems. The EPA expects that SAE would apply existing standards or would develop new standards to BTMS systems.

Finally, this interpretation aligns the SNAP classification of stand-alone BTMS in HD and nonroad vehicles with the program’s treatment of combined BTMS/passenger cooling systems that are common in LMDVs. SNAP has consistently treated combined systems as MVAC. Classifying stand-alone BTMS as any other end-use under SNAP would subject these systems to a

different slate of acceptable refrigerants and different use conditions that have not been evaluated for use in vehicles, which would create inconsistency and lack of clarity. The EPA’s proposed interpretation means that stand-alone BTMS systems will have an analogous slate of alternatives and use conditions as combined systems across different vehicle types. This proposed interpretation would clearly identify acceptable refrigerants for use in BTMS in HD and nonroad vehicles, providing clarity for industry about the refrigerants acceptable in this application.

C. What are the ASHRAE classifications for refrigerant flammability and toxicity used in MVACs?

ASHRAE 34–2024 categorizes HFO–1234yf and R–444A as being in the A2L Safety Group and R–453A, R–456A, and R–480A in the A1 Safety Group. Refer to Section IV.C. for a description of the ASHRAE classifications for refrigerant flammability and toxicity.

The SNAP program has listed flammable refrigerants as unacceptable in MVAC end-uses for both new and retrofit equipment, with the exception of HFO–1234yf and HFC–152a in new MVACs under the use conditions in appendix B of 40 CFR part 82, subpart G. Within the SNAP program, unacceptable substitutes may not be used unless and until the listing has been revised to acceptable, which we expect would involve the substitute undergoing a risk assessment and the necessary reviews by the SNAP program, generally including a notice and comment rulemaking.

This action proposes to list HFO–1234yf, as acceptable, subject to use conditions, in new MVACs in HDOH vehicles and buses, and as a retrofit for LMDV MVACs. The EPA understands that the submitter intends to market HFO–1234yf as a retrofit for other listed substitutes for LMDVs, specifically HFC–134a. The EPA conducted risk screens for these end-uses and proposes to find HFO–1234yf acceptable, subject to use conditions, for these end-uses. Similarly, the EPA conducted risk screens of R–444A as a retrofit in LMDV and HD pickup trucks and vans, and proposes to find it acceptable, subject to use conditions, in these end-uses. The EPA proposes to amend the restrictions on flammable refrigerants in MVACs to include these listings.¹⁰⁷

¹⁰⁴ 89 FR 82862; October 11, 2024.

¹⁰⁵ 89 FR 82827; October 11, 2024.

¹⁰⁶ *e.g.*, the 609 program or the Technology Transitions rules.

¹⁰⁷ See section VIII.F.

D. What are refrigerants HFO-1234yf, R-444A, R-453A, R-456A, and R-480A and how do they compare to other refrigerants in the same end-use?

1. How do HFO-1234yf, R-444A, R-456A, and R-480A compare to other refrigerants for retrofit in the LDMV MVAC end-use?

The EPA is proposing to list HFO-1234yf, R-444A, R-456A, and R-480A as acceptable, subject to use conditions, for retrofit of LMDV MVACs. HFO-1234yf is also known as R-1234yf or 2,3,3,3-tetrafluoropropene.¹⁰⁸ R-444A is a refrigerant blend consisting of 12 percent HFC-32 (also known as difluoromethane or methylene fluoride; CAS Reg. No. 75-10-5), 5 percent HFC-152a (also known as 1,1-difluoroethane; CAS Reg. No. 75-37-6), and 83 percent HFO-1234ze(E) (also known as *trans*-1,3,3,3-tetrafluoroprop-1-ene; CAS Reg. No. 29118-24-9). R-456A is a refrigerant blend consisting of 6 percent HFC-32, 45 percent HFC-134a (also known as 1,1,1,2-tetrafluoroethane; CAS Reg. No. 811-97-2), and 49 percent HFO-1234ze(E). R-480A is a refrigerant blend consisting of 5 percent R-744 (CAS Reg. No. 124-38-9), 86 percent HFO-1234ze(E), and 9 percent HFC-227ea (also known as 1,1,1,2,3,3,3-heptafluoropropane; CAS Reg. No. 431-89-0).

Redacted submissions and supporting documentation for these four proposed refrigerants are provided in the docket. The EPA performed risk screening assessments to examine the human health and environmental risks of each of these substitutes which also are available in the docket.^{109 110 111 112}

Environmental information: The specific atmospheric effects values can be found in the individual risk screens for HFO-1234yf, R-444A, R-456A, and R-480A. These were determined consistent with the source information noted in Section III.C. above (*e.g.*, CAA, the AIM Act) as well as using the

methodology for determining values for blends of chemicals (*i.e.*, determined by the percentage of each component).

HFO-1234yf and the components of R-444A, R-456A, and R-480A are excluded from the EPA's regulatory definition of VOC¹¹³ for the purpose of addressing the development of SIPs to attain and maintain the NAAQS.

HFO-1234yf and HFC-134a (a component of R-453A and R-456A) can break down into TFA in the atmosphere. HFO-1234yf is almost completely transformed into TFA, while the yield of TFA from HFC-134a is estimated to be 7 to 20 percent.¹¹⁴ For more information on TFA, see the response to comments section of SNAP Rule 26.¹¹⁵

Flammability information: R-456A and R-480A are nonflammable refrigerant blends (ASHRAE flammability classification 1). Of the components of R-456A, HFC-134a is nonflammable, while HFC-32 and HFO-1234ze(E) are classified as A2L refrigerants. Of the components of R-480A, R-744 and HFC-227ea are nonflammable, while HFO-1234ze(E) is classified as an A2L refrigerant. Based on their ASHRAE safety group as A1, these refrigerants will not propagate a flame, and use of these refrigerants is not expected to pose flammability risk in LMDV MVACs.

HFO-1234yf and R-444A are lower flammability refrigerants (ASHRAE flammability classification 2L). HFO-1234yf and R-444A may pose greater flammability risk than nonflammable substitutes in retrofit LMDV MVACs. The flammability risk, determined by the likelihood of exceeding their respective LFLs, are evaluated in the risk screens referenced in this section. The EPA is proposing to determine that these substitutes may be used safely since flammability risk can be mitigated by use consistent with the proposed labeling requirements in appendix D of 40 CFR part 82, subpart G, recommendations in the manufacturers' SDS, and other safety precautions common in the refrigeration and AC industry.

The flammability characteristics of HFO-1234yf make the risk of ignition low. HFO-1234yf requires an open flame to ignite, such as a match or a cigarette lighter, because of its relatively high minimum ignition energy of greater

than 5,000 mJ.¹¹⁶ HFO-1234yf has an LFL of 62,000 ppm,¹¹⁷ and has a low burning velocity¹¹⁸ compared to refrigerants with flammability classification of 2 such as HFC-152a¹¹⁹ or with flammability classification of 3 such as HC refrigerants.¹²⁰ As a result of these flammability characteristics, HFO-1234yf is difficult to ignite, and is generally unable to propagate a flame once ignited (*i.e.*, flames resulting from HFO-1234yf put themselves out).

Under this proposal, HFO-1234yf could be used to retrofit MVACs originally designed for an A1 refrigerant. The EPA considered if this could create additional flammability risk distinct from its use in a new MVAC that is specifically designed with mitigation measures to use a flammable refrigerant. The original submission for HFO-1234yf in new vehicles included analyses that evaluated the flammability and toxicity risks of HFO-1234yf in MVACs that were originally designed for HFC-134a. The vehicles in these analyses did not feature any design changes to address potential flammability. In this way, MVACs used in the original analysis were analogous to vehicles that would be retrofit under this proposal.¹²¹

These analyses consisted of reports published in 2008, 2009, and 2013 from the SAE Cooperative Research Program (CRP). The 2008 report found that the

¹¹⁶ B. Minor, D. Herrmann, and B. Gravell. (111g) Flammability Characteristics of Low GWP Refrigerant HFO-1234yf. AICHE 2009 Spring Meeting & 5th Global Congress on Process Safety. Available online at: <https://proceedings.aiche.org/conferences/aiche-spring-meeting-and-global-congress-on-process-safety/2009/proceeding/paper/111g-flammability-characteristics-low-gwp-refrigerant-hfo-1234yf>. Minor et al., 2009.

¹¹⁷ Manufacturer's Safety Data Sheet for HFO-1234yf. Honeywell, 23 May 2019. Also see Minor et al., 2009.

¹¹⁸ A2L refrigerants have a burning velocity of less than 0.1 meters/second, per International Standards Organization 817 and ASHRAE 34-2024. HFO-1234yf has a burning velocity of 0.015m/s, per Minor et al., 2009.

¹¹⁹ The burning velocity of HFC-152a is measured at approximately 0.236 m/s. Kenji Takizawa, Akifumi Takahashi, Kazuaki Tokuhashi, Shigeo Kondo, and Akira Sekiya. Burning velocity measurement of fluorinated compounds by the spherical-vessel method, *Combustion and Flame*, Volume 141, Issue 3, Pages 298-307, 2005. Available online at <https://doi.org/10.1016/j.combustflame.2005.01.009>. Takizawa et al., 2005.

¹²⁰ The burning velocity of R-290 is at least 0.4 m/s, depending on temperature and pressure. M. Metghalchi and J.C. Keck. Laminar Burning Velocity of Propane-Air Mixtures at High Temperature and Pressure. *Combustion And Flame* 38: 143-154 (1980). Available online at: <https://james-keck-memorial-collection.unibs.it/JCkeck-papers/MetghalchiKeck-CombustionFlame-38-143-1980.pdf>. Metghalchi and Keck, 1980.

¹²¹ Gradient Corporation, 2008. Risk Assessment For Alternative Refrigerant HFO-1234yf. (Phase I) Prepared for the Society of Automotive Engineers (SAE) Cooperative Research Project 150.

¹⁰⁸ CAS Reg. No. 754-12-1.

¹⁰⁹ ICF. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Light-Duty and Medium-Duty Vehicles) (Retrofit Equipment); Substitute: HFO-1234yf (Solstice® yf or Solstice® 1234yf). 2025. (ICF, 2025k).

¹¹⁰ ICF. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Light-Duty Vehicles, Medium-Duty Vehicles, and Heavy-Duty Vehicles) (Retrofit Equipment); Substitute: R-444A (Klea® 444A). 2025. (ICF, 2025l).

¹¹¹ ICF. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Light-Duty Vehicles, Medium-Duty Vehicles, and Heavy-Duty Vehicles) (Retrofit Equipment); Substitute: R-456A (Klea® 456A). 2025. (ICF, 2025m).

¹¹² ICF. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Light-Duty Vehicles, Medium-Duty Vehicles, and Heavy-Duty Vehicles) (Retrofit Equipment); Substitute: R-480A (RS-20). 2025. (ICF, 2025n).

¹¹³ 40 CFR 51.100(s).

¹¹⁴ EEAP, 2023. Environmental Effects of Stratospheric Ozone Depletion, UV Radiation, and Interactions with Climate Change. 2022 Assessment Report. UNEP, Environmental Effects Assessment Panel. March, 2023. Available at: <https://ozone.unep.org/system/files/documents/EEAP-2022-Assessment-Report-May2023.pdf>.

¹¹⁵ See 88 FR 50457-8.

increased flammability risk of HFO-1234yf in a vehicle designed for use with HFC-134a is well below those commonly accepted by the general public.¹²² A revised 2009 report found that the risks of HFO-1234yf were low overall, and somewhat less than the toxicity risks posed by R-744.¹²³ The submitter of HFO-1234yf provided these analyses to the EPA to support the EPA's original consideration of HFO-1234yf in new vehicles, and the EPA based its listing of acceptability in part on the findings of these analyses. The Agency concluded that the risks of HFO-1234yf are comparable to or less than the risks from other available or potentially available alternatives in this end-use that the EPA had already listed or proposed as acceptable (e.g., HFC-152a, HFC-134a, and R-744).¹²⁴

SAE revised its assessment of HFO-1234yf and released a supplemental report in 2013 that contained two new fault tree analyses that included additional "worst-case scenarios."¹²⁵ The report revised the probability of a vehicle fire due to ignition of HFO-1234yf in a system featuring no design changes compared to an HFC-134a system to about 3×10^{-12} events per hour of vehicle operation. This probability remains extremely remote and is several orders of magnitude below other commonly accepted risks, including the probability of dying during a plane trip (7×10^{-8}), the probability of being in a police-reported vehicle collision (4×10^{-5}), and the probability of a vehicle fire due to any cause (1×10^{-6}).

The submitter of HFO-1234yf in retrofit LMDV MVACs provided an updated fault tree analysis that evaluated the additional risk associated with use of HFO-1234yf specifically in retrofit applications and the EPA considered this new analysis in our review of HFO-1234yf.¹²⁶ The analysis only considered scenarios that increased the flammability risk in a retrofit (such as increased risk of mechanical fan failure and electrical fires and less

consistent presence and deployment of airbags) and did not consider scenarios that reduced the flammability risk in a retrofit (such as the larger cabin size in older vehicles that would be retrofit). The overall estimated risk was about 8×10^{-12} events per operating hour, which is similar to the risk of vehicle fire due to HFO-1234yf ignition in new MVAC equipment (5×10^{-12} events per operating hour).¹²⁷ The actual increased risk is likely lower than this, as the evaluation only considered circumstances that would increase the probability of a vehicle fire and did not consider circumstances that would reduce the probability.

The EPA conducted a risk screen for HFO-1234yf use in retrofit LMDVs. The risk screen found that concentrations of HFO-1234yf did exceed the LFL in the passenger compartment under certain worst-case scenarios but remained well below the LFL in more realistic industry consortium field testing. For example, using a simple box model, combining the highest ratio of refrigerant charge to observed passenger compartment size with a catastrophic release of 60 percent of the charge in 60 seconds resulted in a maximum instantaneous charge of 172,000 ppm, compared to an LFL of 62,000 ppm. However, analysis using the more accurate technique of computational fluid dynamics modeling found the instantaneous concentration of HFO-1234yf to vary from 65,000 ppm to 34,000 ppm. The industry consortium field testing found a maximum instantaneous concentration of HFO-1234yf of 29,774 ppm when a vehicle's full charge was released.¹²⁸

The EPA's original risk analysis of HFO-1234yf for use in new LMDVs also identified scenarios in which concentrations exceeded the LFL. The EPA listed HFO-1234yf as acceptable, subject to use conditions, in new LMDVs leveraging this risk analysis.¹²⁹ In the EPA's original listing, the Agency stated that it found that the use of HFO-1234yf in new passenger vehicle and LD truck MVACs, subject to the use conditions adopted in that listing, does not present a greater overall risk to human health and the environment compared to the currently approved MVAC alternatives or as compared to R-

744.¹³⁰ The EPA has also subsequently listed R-744 as acceptable, subject to use conditions, in new LMDV MVACs.

Finally, HFO-1234yf in new LMDV MVACs has been widely adopted since being listed in 2012. In MY2023, the share of new LMDVs sold in the United States with HFO-1234yf reached 97 percent.¹³¹ Even with its broad use, the EPA is not aware of any real-world instances in which HFO-1234yf has ignited and caused a vehicle fire, which further augments the record for this refrigerant. R-444A is also an A2L refrigerant. The EPA understands that the submitter of this refrigerant intends to market it to be used as a retrofit in MVACs, including those charged with HFO-1234yf. Based on review of materials available in the docket, the EPA is proposing to determine that R-444A is acceptable, subject to use conditions, for use in retrofit LMDV MVACs because the flammability risk associated with such use is low and is comparable to the flammability risk associated with the same use of HFO-1234yf.¹³²

Similar to HFO-1234yf, the EPA conducted a risk screen of R-444A which identified certain scenarios in which concentrations exceed the LFL of R-444A. Using a simple box model, combining the highest ratio of refrigerant charge to observed passenger compartment size with a catastrophic release of 60 percent of the charge in 60 seconds resulted in a maximum instantaneous charge of 140,200 ppm, compared to an LFL of 82,000 ppm. However, analysis using computational fluid dynamics modeling found the instantaneous concentration of HFO-1234yf to vary from 40,000 ppm to 76,000 ppm, which are below the LFL of R-444A. Further, the EPA's evaluation of flammability risks of R-444A in retrofit LMDV MVACs included a fault-tree analysis that evaluated the risk of a vehicle occupant being exposed to a flame resulting from R-444A ignition. This analysis found that risk to be slightly lower than the risk of an occupant being exposed to a flame resulting from HFO-1234yf ignition.¹³³

SAE J1661 currently provides guidance on how to retrofit a vehicle originally charged with CFC-12 to HFC-

¹²² Gradient Corporation, 2008. Risk Assessment for Alternative Refrigerant HFO-1234yf. Confidential report prepared for SAE International Cooperative Research Program 1234. February 2008.

¹²³ Gradient Corporation, 2009. Risk Assessment for Alternative Refrigerants HFO-1234yf and R-744 (CO₂). Confidential report prepared for SAE International Cooperative Research Program 1234. December 17, 2009.

¹²⁴ See 76 FR 17491; March 29, 2011.

¹²⁵ Gradient Corporation, 2013a. Additional Risk Assessment of Alternative Refrigerant R-1234yf. Confidential report prepared for SAE International Cooperative Research Program 1234-4. July 24, 2013.

¹²⁶ Gradient Corporation, 2023a. Retrofit Analysis Letter. Prepared for Honeywell International. September 26, 2023.

¹²⁷ Gradient Corporation, 2009. Risk Assessment for Alternative Refrigerants HFO-1234yf and R-744 (CO₂). Confidential report prepared for SAE International Cooperative Research Program 1234. December 17, 2009.

¹²⁸ ICF, 2025k.

¹²⁹ ICF 2009 Risk Screen on Substitutes for CFC-12 in Motor Vehicle Air Conditioning: Substitute: HFO-1234yf. (ICF, 2009).

¹³⁰ See SNAP Rule 16, 76 FR 17488; March 29, 2011.

¹³¹ U.S. EPA, 2024. EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975. US EPA. November, 2024.

¹³² Gradient Corporation, 2013b. Risk Assessment for Alternative Refrigerants R-445A and R-1234yf. Phase III. Prepared for SAE International MRB CRP. December 30, 2013. See Appendix B, Fault Trees for R-1234yf and Appendix C, Fault Trees for R-444A.

¹³³ *Id.*

134a. The EPA anticipates that SAE would develop an analogous standard or revise this standard for retrofitting vehicles using newer refrigerants, including those proposed as acceptable, subject to use conditions, for retrofitting in this proposal. Following such standards may further reduce the flammability risk associated with retrofitting MVACs, which is already expected to be extremely small in magnitude.

Given the findings of the evaluation materials available in the docket and, in the case of HFO-1234yf, its widespread adoption without documented flammability issues, the EPA is proposing that HFO-1234yf and R-444A may be safely used for retrofit of LMDV MVACs.

The other refrigerants that the EPA is proposing to list for retrofit of LMDV MVACs, R-456A and R-480A, are both nonflammable (ASHRAE classification of A1) and thus are comparable to or lower in their flammability risks than other acceptable substitutes for the same uses.

Toxicity information: Toxicity risk, determined by the likelihood of exceeding the exposure limits in these end-uses, are evaluated in the previously referenced risk screens. HFO-1234yf, R-444A, R-456A, and R-480A are lower toxicity (ASHRAE toxicity group A) refrigerants or refrigerant blends. ASHRAE has adopted OELs for these refrigerants of 500 ppm, 850 ppm, 900 ppm, and 900 ppm, respectively. The toxicity risks of using the proposed refrigerants in retrofit LMDV MVACs are comparable to or lower than that of other available substitutes in the same end-use, including HFC-134a and HFO-1234yf.¹³⁴ Toxicity risks of the proposed refrigerants can be mitigated by use consistent with applicable industry safety standards, recommendations in the manufacturers' SDS, and other safety precautions common in the refrigeration and AC industry.

HFO-1234yf is subject to a significant new use rule (SNUR) under 40 CFR 721.10182(a). Significant new uses under this requirement include:

(A) Use other than as a refrigerant: in MVAC systems in new passenger cars and vehicles (as defined in 40 CFR 82.32(c) and (d)), in stationary and transport refrigeration, or in stationary AC.

(B) Commercial use other than: in passenger cars and vehicles in which

the original charging of MVAC systems with the pre-manufacture notice (PMN) substance was done by the motor vehicle original equipment manufacturer (OEM), in stationary and transport refrigeration, or in stationary AC.

(C) Use in consumer products other than products used to recharge the MVAC systems in passenger cars and vehicles in which the original charging of MVAC systems with the PMN substance was done by the motor vehicle OEM.

Use in all MVAC end-uses, except for when originally charged with HFO-1234yf, would fall under (B) or (C) as commercial or consumer use to recharge an MVAC in which the original charging of the MVAC was with a substance other than HFO-1234yf. The EPA considers retrofitting a vehicle to use HFO-1234yf that was not originally charged by the OEM with HFO-1234yf to be a significant new use of HFO-1234yf under this SNUR. Significant new uses require the chemical producer to submit a significant new use notice to the EPA for review of a substance before introducing the substance into interstate commerce in the significant new use.

Comparison to other substitutes in these end-uses: The specific atmospheric effects values can be found in the individual risk screens for R-444A, R-456A, and R-480A. These were determined consistent with the source information noted in Section III.C. above (e.g., CAA, the AIM Act) as well as using the methodology for determining values for blends of chemicals (i.e., determined by the percentage of each component). The atmospheric effects for HFO-1234yf, R-444A, R-456A, and R-480A are overall better than or comparable to many of the substitutes currently listed as acceptable in this end-use, such as HFC-134a and HFC-152a. The EPA acknowledges that the atmospheric effects of one substitute, HFO-1234yf, may be lower than the three blends; however, the EPA is proposing to list R-444A, R-456A, and R-480A for retrofit use only where HFC-134a is the only available substitute currently listed as acceptable for retrofit of LMDV MVACs. Furthermore, as noted above, the EPA does not intend to restrict a substitute if it has only marginally greater risk. The EPA's analysis found that the effects on human health and the environment associated with retrofitting LMDV MVACs with the proposed alternatives are comparable to one

another, and much lower than that of HFC-134a.¹³⁵

The EPA is aware that the submitter of R-444A may market this substitute to retrofit MVACs originally charged with HFO-1234yf. The submitter provided information and analysis on R-444A which posits that the overall environmental impact of this substance used in retrofits for LMDV MVAC is comparable to that of HFO-1234yf. According to the submitter, this is because R-444A is expected to leak less and slower than HFO-1234yf due to its higher viscosity, and because R-444 has a slightly higher coefficient of performance, which allows R-444A MVACs to cool a given amount with less fuel. These improvements in leakage rate and efficiency may offset atmospheric effects of R-444A so that when it is used to retrofit MVACs originally charged with HFO-1234yf, its overall environmental effect is comparable to that of HFO-1234yf. The analysis supports the submitter's conclusion, that when evaluated using a more holistic approach, the use of R-444A is unlikely to have a greater overall environmental impact.

The EPA's risk screens for HFO-1234yf, R-444A, R-456A, and R-480A in LMDV MVACs found that these substitutes can be used without exceeding their recommended OELs of 500 ppm (8-hr OEL), 900 ppm (8-hr OEL), 850 ppm (8-hr OEL), and 900 ppm (8-hr OEL) respectively; thus, the toxicity risks of these refrigerants are comparable to those of other acceptable substitutes in MVACs, which also are used without exceeding their OELs.^{136 137 138 139}

R-480A and R-456A are nonflammable refrigerants. The flammability of HFO-1234yf and R-444A may be greater than that of other available substitutes in the same end-use that have an ASHRAE flammability classification of 1. The EPA's analysis of the flammability risks of HFO-1234yf and R-444A found that when used in accordance with the proposed use conditions, these A2L refrigerants may be safely used in this end-use without presenting additional adverse effects to human health and the environment than other alternatives. HFO-1234yf has been used for over a decade in new LMDV MVACs without any reported harm or incidences of fire. R-444A is also an

¹³⁵ The EPA is aware that the submitters of HFO-1234yf, R-456A, and R-480A are likely to market these substitutes to retrofit MVACs originally charged with HFC-134a.

¹³⁶ ICF, 2025k.

¹³⁷ ICF, 2025l.

¹³⁸ ICF, 2025m.

¹³⁹ ICF, 2025n.

¹³⁴ See previous listing decisions for information regarding the toxicity of other available alternatives. (<https://www.epa.gov/snap/substitutes-motor-vehicle-air-conditioning>).

A2L refrigerant with a similar flammability profile. We note that flammability risk can be minimized by use consistent with applicable industry safety standards as well as recommendations in the manufacturers' SDS and other safety precautions common in the MVAC industry and any difference in flammability can be addressed by the existing labeling requirements in appendix D of 40 CFR part 82, subpart G.¹⁴⁰

These proposed refrigerants provide additional retrofit options and would not pose additional adverse effects to human health or the environment when used in accordance with existing and proposed requirements and as intended by the submitter. To provide additional options for the full range of MVACs, the EPA is proposing the listings for HFO-1234yf, R-444A, R-456A, and R-480A as acceptable, subject to use conditions, for retrofit of LMDV MVACs.

2. How do R-444A, R-456A, and R-480A compare to other refrigerants for retrofit in the HD pickup trucks and HD vans MVAC end-uses?

The EPA is proposing to list R-444A, R-456A, and R-480A as acceptable, subject to use conditions, for retrofit of HD pickup trucks and HD van MVACs (complete and incomplete). Information about R-444A, R-456A, and R-480A and their components is described in Section VIII.D.1. Environmental, flammability, and toxicity information about these proposed substitutes are also described in Section VIII.D.1. and does not differ between end-uses.

Redacted submissions and supporting documentation for R-456A and R-480A are provided in the docket. The EPA performed a risk screening assessment to examine the human health and environmental risks of each of these substitutes in these end-uses which also are available in the docket.^{141 142 143}

Comparison to other substitutes in these end-uses: The Agency understands that these substitutes will be marketed as retrofit options for different refrigerants, including HFC-134a and HFO-1234yf. HFC-134a is the only available refrigerant listed as acceptable for retrofit of MVACs in HD pickup trucks and vans, and HFO-1234yf is the primary refrigerant used in new HD pickup truck and van MVACs. For a comparison of the flammability, health, and environmental characteristics of these refrigerants to one another and to HFO-1234yf and HFC-134a, refer to Section VIII.D.1.

These proposed refrigerants provide additional retrofit options and would not pose additional adverse effects to human health or the environment when used in accordance with existing and proposed requirements and as intended by the submitter. To provide additional options for the full range of MVACs, the EPA is proposing the listings for R-444A, R-456A, and R-480A as acceptable, subject to use conditions, for retrofit of HD pickup truck and van MVACs.

3. How do HFO-1234yf, R-456A, and R-480A compare to other refrigerants in the HDOH MVAC end-use?

The EPA is proposing to list HFO-1234yf as acceptable, subject to use conditions, in new HDOH MVACs. The EPA is also proposing to list R-456A and R-480A for use in retrofit of HDOH MVACs. Environmental and toxicity information and information about the components of these proposed substitutes is described in Section VIII.D.1. and does not differ between end-uses.

Redacted submissions and supporting documentation for HFO-1234yf, R-456A, and R-480A are provided in the docket. The EPA performed a risk screening assessment to examine the human health and environmental risks of each of these substitutes which also are available in the docket.^{144 145 146}

Flammability information: Flammability information about R-456A and R-480A is described in Section VIII.D.1. and does not differ between end-uses. HFO-1234yf is a lower flammability refrigerant with an ASHRAE classification of 2L. The EPA's risk screen found that concentrations of HFO-1234yf in this end-use could exceed the LFL in feasible worst-case scenarios. As discussed in Section VIII.D.1., HFO-1234yf is difficult to ignite and, in the event of ignition, flames are unlikely to propagate.

The EPA reviewed risk assessments for HFO-1234yf from the submitter in addition to developing its own risk screen. Fault tree analysis for use of HFO-1234yf in HDOH MVACs, which is included in the docket, demonstrates that even in worst-case scenarios, risk probabilities are relatively small. The fault tree analysis determined that the risk of exposure to a vehicle fire due to HFO-1234yf ignition was 2.8×10^{-9} per vehicle engine hour (non-collision) and 2×10^{-14} per vehicle engine hour

(collision).¹⁴⁷ This risk is equal to or below other risks in HDOH MVAC applications including: risk of an HD truck or bus experiencing a serious collision (1×10^{-5} per vehicle engine hour),¹⁴⁸ risk of a highway fire in a freight road transport vehicle (2×10^{-6} per vehicle engine hour), and the acceptable risk for road vehicles in the ISO 26262 standard "Road vehicles—Functional safety" (1×10^{-9} per vehicle engine hour).¹⁴⁹ The risk of a fire occurring in a new HDOH MVAC that uses HFO-1234yf is sufficiently small in magnitude so as to not be substantive; therefore, the EPA is proposing to list HFO-1234yf as acceptable, subject to use conditions, in new HDOH MVACs.

The worst-case flammability scenario that the EPA modelled for HDOH MVACs was for class 7 or 8 tractors. The probability of occupant exposure to a refrigerant leak from a class 7 or 8 HDOH tractor during use may be higher than in other MVACs due to the nature of how these vehicle types are used. For example, occupants of class 7 and 8 tractors may spend protracted lengths of time in the passenger cabin and may be sleeping or living in the vehicle. The EPA's review of a fault tree analysis of HFO-1234yf for use in new HDOH vehicles found that the flammability risks were not substantively different from that of HFO-1234yf in other MVAC end-uses or from that of other substitutes that the EPA has listed as acceptable (e.g., R-744). Additionally, when HFO-1234yf is ignited in real-world tests it is unable to propagate a flame due to its high minimum ignition energy, its relatively high LFL, and its lower burning velocity.¹⁵⁰ These risks may be mitigated by use in accordance with the proposed use conditions and recommendations in the manufacturers' SDS, and other safety precautions common in the refrigeration and AC industry.

Comparison to other substitutes in these end-uses: The EPA is proposing to list HFO-1234yf as acceptable, subject to use conditions, in new HDOH vehicles and to list R-456A and R-480A as acceptable, subject to use conditions, for retrofit of HDOH MVACs. HFC-134a is the principal refrigerant currently acceptable for use in new HDOH vehicles, and the only refrigerant acceptable for retrofit of HDOH MVACs. For a comparison of the flammability,

¹⁴⁷ *Id.*

¹⁴⁸ "Engine hour" is the terminology used in this fault tree analysis. Engine hour is synonymous with "operating hour."

¹⁴⁹ Gradient Corporation. 2023b. Gradient Risk Analysis for Heavy-Duty On-Highway Vehicles. 2023. (Gradient HDOH risk analysis, 2023b).

¹⁵⁰ *Id.*

¹⁴⁰ Described in section VIII.E.1.

¹⁴¹ ICF, 2025l.

¹⁴² ICF, 2025m.

¹⁴³ ICF, 2025n.

¹⁴⁴ ICF, 2025o. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Heavy-Duty On-Highway (HDOH) Vehicles) (New Equipment); Substitute: HFO-1234yf (Solstice® yf or Solstice® 1234yf). 2025.

¹⁴⁵ ICF, 2025m.

¹⁴⁶ ICF, 2025n.

health, and environmental characteristics of these refrigerants to one another and to HFC-134a, refer to Section VIII.D.1.

HFO-1234yf has a higher flammability risk than other substitutes available in HDOH MVACs. Flammability risk in HDOH vehicles may be higher than in other vehicle types due to the charge size to cabin volume ratio and the fact that drivers may spend prolonged periods in the vehicle with the engine running. However, as noted earlier, the risk of HFO-1234yf ignition in HDOH MVACs is sufficiently remote to not be substantively different from the risk of HFO-1234yf ignition in other MVAC applications.

We note that while the flammability of HFO-1234yf may be greater than that of other available substitutes in the same end-use, this risk can be minimized by use consistent with recommendations in the manufacturers' SDS and other guidance, the proposed use conditions, and other safety precautions common in the MVAC industry. Any difference in flammability can be addressed by the proposed use conditions described in Section VIII.E.1. Further, HFO-1234yf has lower environmental risks than other substitutes acceptable in this end-use.

These proposed refrigerants would not pose additional adverse effects to human health or the environment when used in accordance with the proposed use conditions and existing requirements and as intended by the submitter. These proposed listings would provide additional options to promote the availability of refrigerants for the full range of MVACs, thereby lowering overall risk to human health and the environment.

4. How do HFO-1234yf, R-453A, R-456A, and R-480A compare to other refrigerants in the bus and train MVAC end-uses?

The EPA is proposing to list HFO-1234yf as acceptable, subject to use conditions, in new bus MVACs. The EPA is also proposing to list R-453A, R-456A, and R-480A as acceptable, subject to use conditions, for retrofit of bus and train MVACs. Information about the components of R-456A and R-480A is described in Section VIII.D.1. and does not differ between end-uses.

R-453A is a refrigerant blend consisting of 20 percent HFC-32, 20 percent HFC-125 (also known as pentafluoroethane; CAS Reg. No. 354-33-6), 53.8 percent HFC-134a, 5 percent HFC-227ea, 0.6 percent R-600 (CAS Reg. No. 75-28-5), and 0.6 percent R-601a (also known as isopentane; CAS Reg. No. 78-78-4).

Redacted submissions and supporting documentation for HFO-1234yf, R-453A, R-456A, and R-480A are provided in the docket. The EPA performed a risk screening assessment to examine the human health and environmental risks of each of these substitutes which also are available in the docket.^{151 152 153 154 155}

Environmental information:

Environmental information about HFO-1234yf, R-456A, and R-480A is described in Section VIII.D.1. and does not differ between end-uses.

The specific atmospheric effects values of R-453A can be found in the individual risk screen for R-453A. These were determined consistent with the source information noted in Section III.C. above (e.g., CAA, the AIM Act) as well as using the methodology for determining values for blends of chemicals (i.e., determined by the percentage of each component). The atmospheric effects of R-453A are comparable to or lower than other acceptable refrigerants used in retrofits of MVACs for buses and trains, such as HFC-134a. Components of R-453A making up 98.6 percent of the composition are excluded from the EPA's regulatory definition of VOC¹⁵⁶ for the purpose of addressing the development of SIPs to attain and maintain the NAAQS. The remaining two components, R-600 and R-601a, are VOCs under that definition. The reactivity of these two compounds in the lower atmosphere is not significantly different than that of other saturated HCs that the EPA has evaluated and the total amount of these two compounds used as refrigerants is significantly lower than that of other saturated HCs that the EPA has evaluated for potential impacts on local air quality.¹⁵⁷

Flammability information: R-453A is a nonflammable blend. Based on this blend's ASHRAE classification as an A1 refrigerant, use of this refrigerant is not expected to pose flammability risk.

¹⁵¹ ICF, 2025s.

¹⁵² ICF, Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Buses) (New and Retrofit Equipment); Substitute: HFO-1234yf (Solstice® yf or Solstice® 1234yf). 2025. (ICF, 2025p).

¹⁵³ ICF, Risk Screen on Substitutes in Motor Vehicle Air Conditioning—Buses and Passenger Rail (Retrofit Equipment); Substitute: R-453A (RS-70). 2025. (ICF, 2025q).

¹⁵⁴ ICF, Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Buses and Passenger Rail) (Retrofit Equipment); Substitute: R-456A (Klea® 456A). 2025. (ICF, 2025r).

¹⁵⁵ ICF, Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Retrofit Equipment); Substitute: R-480A (RS-20). 2025. (ICF, 2025s).

¹⁵⁶ 40 CFR 51.100(s).

¹⁵⁷ See section IV.D. for a discussion of the EPA's analyses of air quality impacts of HC refrigerants.

Flammability information about R-456A and R-480A is described in Section VIII.D.1. and does not differ between end-uses.

HFO-1234yf is a lower flammability (ASHRAE classification of 2L) refrigerant. Although HFO-1234yf is more flammable than other refrigerants currently available in the new buses MVAC end-use, the EPA's risk screen of HFO-1234yf in this end-use found that concentrations of HFO-1234yf in the passenger cabin of buses did not exceed the LFL even in the feasible worst-case scenarios. To further mitigate flammability risk, the EPA is proposing use conditions as discussed in Section VIII.E.

Toxicity information: Toxicity information about HFO-1234yf, R-456A, and R-480A is found in Section VIII.D.1.

R-453A is a lower-toxicity (ASHRAE classification A) refrigerant blend. The toxicity risks of using R-453A for retrofit of bus and train MVACs are comparable to or lower than toxicity risks of other available substitutes in the same end-use, including HFC-134a. Toxicity risks of the proposed refrigerants can be mitigated by use consistent with applicable industry safety standards; recommendations in the manufacturers' SDS; and other safety precautions common in the refrigeration and AC industry.

HFO-1234yf is subject to a SNUR under 40 CFR 721.10182(a). Significant new uses under this requirement include:

(A) *Use other than as a refrigerant:* in MVACs in new passenger cars and vehicles (as defined in 40 CFR 82.32(c) and (d)), in stationary and transport refrigeration, or in stationary AC.

(B) *Commercial use other than:* in passenger cars and vehicles in which the original charging MVACs with the PMN substance was done by the motor vehicle OEM, in stationary and transport refrigeration, or in stationary AC.

(C) Use in consumer products other than products used to recharge MVACs in passenger cars and vehicles in which the original charging of MVACs with the PMN substance was done by the motor vehicle OEM.

This use of HFO-1234yf in new bus MVACs would fall under (A) and thus would not be a significant new use.

Comparison to other substitutes in these end-uses: The EPA is proposing to list HFO-1234yf as acceptable, subject to use conditions, in new bus MVACs, and R-453A, R-456A, and R-480A as acceptable, subject to use conditions, for retrofits of bus and train MVACs.

Buses historically used HCFC-22, a class II ODS, in MVACs. HFC-134a, HCFC-22, and R-407C historically have been the most used refrigerants in new bus and train MVACs, and HFC-134a and R-407C are the acceptable refrigerants most often used for retrofit of bus and train MVACs.¹⁵⁸ For a comparison of the environmental, health, and safety characteristics of HFO-1234yf, R-456A, and R-480A to HFC-134a and to one another, refer to Section VIII.D.1.

As stated above, the specific atmospheric effects values can be found in the individual risk screen for R-453A. The atmospheric effects for R-453A are overall better than or comparable to other refrigerants currently available in this end-use including HCFC-22, HFC-134a, R-407A, and R-407C. R-453A may be used without exceeding its OEL of 1,000 ppm; therefore, its toxicity risks are comparable to other substitutes available in this end-use.¹⁵⁹ R-453A is nonflammable with an ASHRAE flammability classification of 1; therefore, its flammability risks are comparable to other acceptable refrigerants in this end-use.

The EPA is aware that the submitter of R-453A may market this substitute to retrofit bus and train MVACs charged with HCFC-22, a class II ODS. Some refrigerants already listed as acceptable for retrofits in MVACs for buses and trains (e.g., HFC-134a) operate at a lower pressure range than HCFC-22. These refrigerants may not be practical to use when retrofitting equipment originally charged with HCFC-22. Listing R-453A as acceptable, subject to use conditions, would provide a high-pressure alternative that is practical for retrofitting bus and train MVACs originally designed for HCFC-22. The EPA's analysis found that when used as intended by the submitter to retrofit bus and train MVACs originally charged with HCFC-22, and in accordance with the proposed use conditions described in Section VIII.E.4., this refrigerant does not pose increased risk to human health or the environment.

This proposed listing of R-453A, R-456A, and R-480A would allow for buses and trains currently using ozone-depleting HCFC-22, which has been phased out under the CAA, to be retrofitted to non-ozone depleting alternatives.

The EPA is proposing to list HFO-1234yf as acceptable, subject to use

conditions, in new bus MVACs. HFO-1234yf, an A2L refrigerant, is more flammable than other refrigerants currently available in this end-use; however, the EPA's risk screen of HFO-1234yf in this end-use found that concentrations of HFO-1234yf that leaked in the passenger cabin did not exceed its LFL in worst-case scenarios. Thus, use of HFO-1234yf in this end-use does not result in greater flammability risk than other acceptable substitutes for new bus MVACs. Additionally, buses are maintained by technicians in workplace settings as part of fleets. These technicians are trained and have experience working with flammable substances, using safe practices in locations such as repair garages that have sufficient ventilation and other safeguards that can mitigate flammability risk. The risk associated with flammability in this application may be mitigated by use consistent with recommendations in the manufacturers' SDS and other guidance, the proposed use conditions in Section VIII.E.3., and other safety precautions common in the MVAC industry.

The proposed refrigerants can provide additional options and would not pose additional adverse effects to human health or the environment when used in accordance with the proposed use conditions and existing requirements and as intended by the submitter. All the refrigerants proposed in this rule in this end-use have better or comparable atmospheric effect values and toxicity. Any difference in flammability can be addressed by the proposed use conditions described in Section VIII.E.3. Furthermore, as noted above, the EPA does not intend to restrict a substitute if it has only marginally greater risk. The EPA does not consider any of these substitutes to pose significantly greater risks than other acceptable substitutes.

To provide additional options to promote the availability of refrigerants for the full range of MVACs, thereby lowering overall risk to human health and the environment, the EPA is proposing the listings for HFO-1234yf as acceptable, subject to use conditions, in new bus MVACs and for R-453A, R-456A, and R-480A as acceptable, subject to use conditions, for use for retrofit of bus and train MVACs.

E. What use conditions is the EPA proposing in this action that apply to proposed listings in this end-use?

1. What use conditions is the EPA proposing for HFO-1234yf, R-444A, R-456A, and R-480A for retrofit of MVACs in LMDVs, for R-444A, R-456A, and R-480A for retrofit of MVACs in HD pickup trucks and vans, and for R-456A

and R-480A for retrofit of MVACs in HDOH MVACs; and what existing requirements apply to these refrigerants?

Appendix D of 40 CFR part 82, subpart G specifies requirements for unique fittings for new and retrofit MVAC listings, specifies information that must appear on a new label when a retrofit is performed, and outlines requirements for how the retrofit is completed including specifications for how unique fittings must be applied when performing a retrofit. The requirements for labeling, unique fittings, and the performance of the retrofit would apply to all proposed acceptability listings for MVAC retrofits in this action. The EPA is proposing minor adjustments to these retrofit specifications and labeling requirements. These existing requirements and proposed amendments are described fully in Section VIII.G.

The requirements for labeling and for service port conversion assemblies would minimize the risk of mixing refrigerant by serving as a mechanical barrier to inadvertent refrigerant mixing and ensuring that technicians are aware of the contents of the MVAC. Refrigerant that differs from its initial composition may compromise the purity of the refrigerant supply and the practice of onsite recovery, recycling, and recharging common in the MVAC sector. For additional discussion of onsite recovery, recycling, and recharging in MVACs, refer to Section VIII.B. For discussion of the environmental risks of refrigerant mixing, refer to Section VIII.D.1. Existing use conditions under appendix D of 40 CFR part 82, subpart G would mitigate the environmental risks associated with mixing refrigerants.

In the case of HFO-1234yf and R-444A, the requirement to include a label would mitigate flammability risk by ensuring that technicians are aware that the MVAC contents is flammable.

The EPA is proposing specifications for unique fittings for R-444A, R-456A, and R-480A when used to retrofit MVACs in LMDVs, HD pickup trucks and vans, and HDOH vehicles. The specifications of these fittings, along with the unique fittings proposed for the high and low side service ports and 30-lb cylinders, would be added to appendix B of 40 CFR part 82, subpart G. These proposed specifications can be found in the docket for this rulemaking under the title "Proposed Regulatory Text for SNAP Rule 27."

The EPA's SNAP program has a longstanding approach of requiring unique fittings for use with each

¹⁵⁸ Newly produced class I and II ODS including HCFC-22 cannot be used in manufacturing new MVACs per the statutory prohibition in CAA section 605.

¹⁵⁹ ICF, 2025q.

refrigerant in MVACs. Appendix D of 40 CFR part 82, subpart G requires that each refrigerant be used with a set of fittings that is unique to that refrigerant. This is intended to prevent cross contamination of different refrigerants, preserve the purity of recycled refrigerants, and ultimately to avoid venting of refrigerant consistent with requirements under CAA section 608(c), codified at 40 CFR 82.154(a). In the 1996 SNAP Rule requiring the use of unique fittings on all refrigerants submitted for use in MVACs, the EPA urged industry to develop mechanisms to ensure that the venting prohibition under CAA section 608(c) and the implementing regulations at 40 CFR 82.154 are observed.¹⁶⁰ The EPA has issued multiple SNAP rules requiring the use of fittings unique to a refrigerant for use on “containers of the refrigerant, on can taps, on recover, recycle, and recharge equipment, and on all [motor vehicle] air conditioning system service ports.”¹⁶¹

The manufacturer of R-444A and R-456A has stated that they intend to use fittings for small cans of refrigerant that are the same as the fittings previously assigned to R-416A and Freeze 12. The EPA is proposing use of these fittings, even though they previously were assigned to R-416A and Freeze 12, because the EPA listed those refrigerants as unacceptable in SNAP Rule 20.¹⁶² Thus, the EPA presumes that the fittings corresponding to R-416A and Freeze 12 are no longer in use and may be available to be used with other refrigerants. Permitting the use of smaller fittings previously assigned to refrigerants that are no longer in use would be less burdensome than requiring development of other, likely large fittings.

Currently, there are no approved recover, recycle, and recharge equipment or industry safety standards for the refrigerant blends in this end-use.¹⁶³ The EPA is aware that the submitters of these blends are working with SAE and equipment manufacturers. In the future, the EPA could pursue a notice and comment rulemaking under CAA 609 to potentially incorporate new or revised industry standards, amongst other things. In the absence of certified equipment and industry safety standards, these refrigerants may be inappropriately mixed or released. Mixing refrigerant may also lead directly to release due to certain

mixtures having higher pressures than either component alone. Thus, pressure-sensitive components, such as air purge devices on recycling machines and relief devices on MVACs, may be activated by these mixtures, venting the refrigerant to the atmosphere. Inappropriately mixed refrigerants are also less attractive for the aftermarket because they are difficult to separate and return to the AHRI-700 purity standard.

Until certified equipment and relevant safety standards are developed, only recovery-only machines may be used to recover the refrigerant blends proposed for use in MVACs, consistent with requirements under CAA section 609. Recovery-only machines would allow for the refrigerants to be recovered (but not recycled or recharged) onsite and subsequently sent for reclamation. Development of industry safety standards and machines would allow for technicians to recover, recycle, and recharge these newer refrigerants onsite within the same framework as the currently listed refrigerants and would prevent inappropriate mixing of these refrigerants. Further, the EPA expects that the companies selling refrigerants intended to be used as retrofits would make appropriate unique fittings and refrigerant labels available to certified technicians and DIYers to allow them to conduct a retrofit in a manner that meets requirements under the CAA.

The EPA acknowledges that DIYers would not have the appropriate equipment to recover the original refrigerant from the MVAC prior to performing a retrofit. Instead, DIYers would likely need to bring their vehicles to a service shop or other facility to have the existing refrigerant recovered before the retrofit. Further, DIYers may not know how to prevent or fix leaks in an MVAC and may add additional refrigerant to the existing charge (*i.e.*, topping-off). DIYers also are less likely to be trained to safely handle flammable refrigerant compared to technicians working in professional settings.

The EPA considered, but is not proposing, restricting retrofits of MVACs using these refrigerants in LMDVs, HD pickup trucks and vans, and HDOH vehicles to professional settings. The EPA considered this alternative as it may mitigate adverse effects to human health and the environment resulting from the release of these refrigerants, and because technicians in professional settings likely would be better able to handle flammable refrigerants for the reasons stated above. However, the EPA views existing regulatory requirements, such as those under CAA section 609, and the

proposed use conditions as sufficient in addressing these concerns. As proposed, compliance with the use conditions should prevent knowingly venting or otherwise releasing refrigerants and allow for DIYers to retrofit their MVACs.

2. What use conditions is the EPA proposing for HFO-1234yf for use in new HDOH and bus MVACs; and what existing requirements apply to this refrigerant?

These proposed use conditions are designed to ensure that HDOH and bus MVACs using HFO-1234yf operate safely under normal and foreseeable conditions while mitigating risks associated with refrigerant leakage and flammability.

The EPA is proposing that the MVAC connections (*e.g.*, any points where components of an MVAC join together) either be located outside of the airflow path of the passenger cabin or be designed to prevent leaks into the passenger cabin. This requirement currently applies to use of HFO-1234yf in new passenger vehicles.¹⁶⁴ This use condition would further mitigate flammability risks associated with leaks of HFO-1234yf into the passenger cabin.

The EPA is also proposing that the manufacturer of MVACs and vehicles (*i.e.*, the OEM) to conduct and keep records of a Failure Mode and Effects Analysis (FMEA), a type of risk assessment, for at least three years from the date of creation. SAE J1739¹⁶⁵ provides applicable guidance. The EPA understands it is standard industry practice to perform the FMEA and to keep it on file while the vehicle is in production and for several years afterwards. Note that the EPA is not proposing to establish specific requirements or protocols for conducting and recording an FMEA, nor is the EPA requiring that manufacturers follow SAE J1739. This use condition currently applies to use of HFO-1234yf in new passenger vehicles, and as previously noted, HDOH vehicles have large charge sizes and drivers may frequently spend prolonged periods in the passenger cabin. The requirement to conduct FMEAs and retain them for three years would serve to identify and address flammability risks associated with system failures.

The EPA currently requires that new MVACs charged with HFO-1234yf on other vehicle types (including LMDVs

¹⁶⁴ New passenger vehicles charged with HFO-1234yf are subject to a use condition that they follow all requirements of SAE standard J639, which includes this requirement.

¹⁶⁵ SAE J1739, “Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA-MSR, and Process FMEA”. Dated January 2021.

¹⁶⁰ See 61 FR 54032; October 16, 1996.

¹⁶¹ See appendix D of 40 CFR part 82, subpart G.

¹⁶² See 80 FR 42870; July 20, 2015.

¹⁶³ *i.e.*, R-444A, R-456A, and R-480A.

and nonroad vehicles) comply with all requirements of SAE J639, and the EPA understands that most HDOH vehicles typically follow this standard. The EPA considered, but is not proposing, a requirement that new MVACs in bus and HDOH vehicles comply with all requirements of SAE J639. Instead, the EPA is proposing the aforementioned use conditions which mirror the safety requirements associated with HFO-1234yf in SAE J639. The use conditions as currently proposed would apply similar safety requirements to HFO-1234yf when used in bus and HDOH vehicles without incorporating a standard by reference. Several other refrigerants proposed in this rule do not have associated standards that may be incorporated by reference. Further, the EPA understands that buses may not typically follow SAE J639, and this standard may not be appropriate for equipment in this end-use. This approach as currently proposed establishes similar safety requirements while maintaining parity between the refrigerants proposed in this rule.

Existing requirements in appendix D of 40 CFR part 82, subpart G require that this substitute be used with unique service port fittings. Service port fittings for HFO-1234yf were previously established and are identified in appendix B of 40 CFR part 82, subpart G. For additional discussion of this requirement, refer to Section VIII.E.1.

EPA is proposing to require a label on the MVAC of new bus and HDOH vehicles that use HFO-1234yf. The label would have the following characteristics:

- The label must include the statement “This refrigerant is FLAMMABLE. Take appropriate precautions.”
- The label must be large enough to be easily read and must be permanent.
- The label must be affixed to the system over information related to the previous refrigerant, in a location not normally replaced during vehicle repair.
- Testing of labels must meet ANSI/UL 969–1991.

This proposed use condition would mitigate flammability risk associated with HFO-1234yf by ensuring that technicians are aware that the contents of the MVAC is flammable. For discussion of the flammability risk associated with HFO-1234yf, refer to Section VIII.D.3. These requirements mirror existing requirements for flammable refrigerants when used in retrofit MVACs.

3. What use conditions is the EPA proposing for R-453A, R-456A, and R-480A for retrofit of MVAC in buses and

trains; and what existing requirements apply to this refrigerant?

These proposed use conditions for R-453A, R-456A, and R-480A for retrofit of MVAC in buses and trains are designed to ensure that buses and trains operate safely under normal and foreseeable conditions.

The EPA is proposing that the labeling requirements in paragraph 2 of appendix D of 40 CFR part 82, subpart G apply to these listings in buses and trains. Labeling requirements ensure that technicians are aware of the MVAC contents, thereby promoting proper refrigerant handling, preventing the inadvertent mixing of refrigerant, and preventing waste and refrigerant emissions during servicing. The EPA is proposing minor adjustments to these provisions. For a full discussion see Section VIII.G.

Existing technician certification requirements under CAA sections 608 and 609 apply to the retrofit of AC appliances on buses. Buses that use high-pressure AC appliances such as those charged with HCFC-22 or R-407C can only be serviced by a CAA section 608 certified technician. Buses that do not use high-pressure AC systems (such as those originally charged with CFC-12 or HFC-134a) are considered MVACs under CAA section 609. For additional discussion of the EPA’s requirements under CAA sections 608 and 609, refer to Section VIII.B.

The requirements at 40 CFR 82.156 includes requirements for the proper evacuation of appliances, MVACs, and MVAC-like appliances prior to being opened.¹⁶⁶ Refrigerants must be evacuated from the appliance to the specified level using certified equipment prior to the installation of a new service port conversion fitting and charging with the retrofit refrigerant. These existing requirements mitigate adverse effects to human health and the environment that would otherwise be associated with venting or intentional releases of refrigerant.

Buses and trains are typically serviced in professional settings as part of fleets. The EPA does not expect that significant numbers of DIYers would retrofit bus and train MVACs. For this reason, the EPA considered but is not proposing to require retrofits to these refrigerants on buses and trains be performed in professional settings.

F. Modification of “Unacceptability” Listing Applicable to Flammable Refrigerants in Motor Vehicle Air Conditioning

Per appendix B of 40 CFR part 82, subpart G, flammable refrigerants in MVACs, both new and retrofit, are currently listed as unacceptable. Unacceptability does not apply to HFO-1234yf and HFC-152a when used in new MVAC equipment. The EPA is proposing to amend this provision so that unacceptability also would not apply to R-444A and HFO-1234yf used in retrofit MVACs.

The EPA had initially restricted the use of flammable refrigerants in MVACs because of the higher risks associated with that end-use, such as the risk of leaks due to collisions and punctures right behind the grille, and because the risks of these refrigerants had not been addressed by a risk assessment.¹⁶⁷ As described in Section VIII.D.1., the EPA is proposing to determine that HFO-1234yf and R-444A may be used safely in retrofit MVACs since flammability risk can be mitigated by use consistent with the proposed use conditions, recommendations in the manufacturers’ SDS, and other safety precautions common in the refrigeration and AC industry.

G. Modifications to MVAC SNAP Requirements

The EPA is proposing a change to paragraph 2 in appendix D of 40 CFR part 82, subpart G related to labeling requirements for MVAC retrofits. These labeling requirements are applicable to all listing of MVAC retrofits and help to handle refrigerants safely and to avoid unintentional mixing of refrigerants. The EPA is proposing to remove the requirement in 2.c that the background color of the label be unique to the refrigerant. Removing this requirement would better align the label with industry safety standards and because the other required labeling provisions are sufficient to alert technicians of the refrigerant being used in the MVAC and whether that refrigerant is flammable.

The EPA is also proposing to replace references to “CFC-12 service ports” to “original service ports” in paragraphs 1.a. and 1.d. of appendix D of 40 CFR part 82, subpart G. The revised language would be as follows:

1.a. When original service ports are retrofitted, conversion assemblies shall attach to the original fitting with a thread lock adhesive and/or a separate mechanical latching mechanism in a manner that permanently prevents the assembly from being removed.

¹⁶⁶ See 40 CFR 82.156(a), (c), and (d).

¹⁶⁷ See June 13, 1995, 60 FR 31092.

1.d. All original service ports not retrofitted with conversion assemblies shall be rendered permanently incompatible for use with service equipment related to the original refrigerant by fitting with a device attached with a thread lock adhesive and/or a separate mechanical latching mechanism in a manner that prevents the device from being removed.

The EPA is proposing this change because new refrigerants have become available since these requirements were originally established, and retrofits may be performed on vehicles that were not originally charged with CFC-12. This update would ensure that the requirements are applied consistently across the MVAC end-use.

The EPA is also proposing several non-substantive changes to existing listings to reduce redundancy and improve clarity. These edits would not change the effect of the regulatory requirements. First, the EPA is proposing to collapse existing listings for HFO-1234yf in appendix B of 40 CFR part 82, subpart G in new LD passenger vehicles, new medium-duty passenger vehicles, new HD pickup trucks, new complete vans, and new HD nonroad vehicles into a single row since the use conditions are the same for all these end-uses. This change would simplify and shorten the existing regulatory text. The EPA is also proposing to reformat the existing listings for refrigerants listed in the table titled “Refrigerants—Unacceptable Substitutes” in appendix B of 40 CFR part 82, subpart G by publishing a single end-use in each row. The EPA is lastly proposing to number each row in the tables titled “Refrigerants—Acceptable Subject to Use Conditions”, “Refrigerants, Acceptable Subject to Narrowed Use Conditions”, and “Refrigerants, Unacceptable Substitutes”, in appendix B of 40 CFR part 82, subpart G to facilitate cross references within a table.

IX. Fire Suppression and Explosion Protection

A. What is the EPA proposing in this action?

The EPA is proposing to list the 50/50 blend of 2-BTP/CO₂ as acceptable, subject to use conditions, as a total flooding agent in normally unoccupied spaces for use in aircraft engine nacelles, APUs, and cargo bays. While the EPA’s SNAP program has not previously listed a blend containing both 2-BTP and CO₂, SNAP has listed 2-BTP and CO₂ separately. The EPA previously listed 2-BTP as acceptable, subject to use conditions, for use in:

- Engine nacelles and APUs on aircraft in total flooding fire suppression systems;¹⁶⁸

- Aircraft as a streaming agent;¹⁶⁹
- Normally unoccupied spaces under 500 cubic feet in total flooding fire suppression systems;¹⁷⁰ and
- Non-residential applications, other than for commercial home office and personal watercraft, as a streaming agent.¹⁷¹

The EPA previously listed CO₂ as acceptable for use as a total flooding agent and streaming agent.¹⁷²

B. Background on Total Flooding Fire Suppression

In the United States, approximately 90 percent of installed total flooding systems protect anticipated hazards from ordinary combustibles (*i.e.*, Class A fires), while the remaining ten percent protect against applications involving flammable liquids and gases (*i.e.*, Class B fires). Approximately 75 percent of total flooding systems protect electronics (*e.g.*, computers, telecommunications, process control areas), while the remaining 25 percent protect civil aviation (*e.g.*, engine nacelles/APUs, cargo compartments, lavatory trash receptacles), military weapons systems (*e.g.*, combat vehicles, machinery spaces on ships, aircraft engines and tanks), oil/gas and manufacturing industries (*e.g.*, oil/gas pumping, compressor stations), and maritime uses (*e.g.*, machinery spaces, cargo pump rooms).

Total flooding systems, which historically have employed halon 1301 as a fire suppression agent, are used in both normally occupied and normally unoccupied areas. The EPA bases the terms “occupied areas” and “normally unoccupied areas” on definitions in the National Fire Protection Association (NFPA) 2001 “Standard on Clean Agent Fire Extinguishing Systems.” NFPA 2001 defines “normally unoccupied enclosure or space” as “an enclosure or space not normally occupied but one that could be entered occasionally by one or more persons for brief periods.” The standard defines an “unoccupiable enclosure or space” as an “enclosure or space that has dimensional or other physical characteristics such that it could not be entered by a person.” Engine nacelles and APUs are considered unoccupiable spaces, and cargo bays are considered normally unoccupied spaces.

¹⁶⁸ See 81 FR 86778; December 1, 2016.

¹⁶⁹ *Id.*

¹⁷⁰ See 88 FR 26382; April 28, 2023.

¹⁷¹ *Id.*

¹⁷² See 59 FR 13044; March 18, 1994.

C. What is 2-BTP/CO₂ and how does it compare to other fire suppressants in the same end-use?

2-BTP/CO₂ is the 50/50 blend of 2-BTP and CO₂ which contains 50 percent 2-BTP (2-bromo-3,3,3-trifluoropropene)¹⁷³ and 50 percent CO₂.¹⁷⁴

The redacted submission and supporting documentation for 2-BTP/CO₂ is provided in the docket. The EPA performed assessments to examine the human health and environmental risks of this substitute during production operations and the filling of fire extinguishers as well as in the case of an inadvertent discharge of the system during maintenance activities on the fire extinguishing system. These assessments are available in the docket.¹⁷⁵

Environmental information: The specific atmospheric effects values can be found in the risk screen for 2-BTP/CO₂. Of note this blend has an ODP of 0.0014.¹⁷⁶ As reported in the 2025 Technology and Economic Assessment Panel (TEAP) Progress Report,¹⁷⁷ and as noted in Section III of this proposed rule, under some broad definitions of PFAS (*e.g.*, European Chemicals Agency (ECHA) 2023 proposal), 2-BTP could be considered a PFAS. The EPA notes that the U.S. government has not adopted a single definition of PFAS and has not included 2-BTP in any PFAS-related restrictions. Moreover, listing decisions consider whether substitutes present risks that are lower than or comparable to risks from other substitutes that are currently or potentially available in the end-uses under consideration. The EPA does not assume any substitute is risk free. The EPA is not proposing or seeking comment on PFAS definitions in this rulemaking.

2-BTP is considered a VOC and is not excluded from the EPA’s regulatory definition of VOC¹⁷⁸ for the purpose of addressing the development of SIPs to attain and maintain the NAAQS. To assess the potential impact of this compound on local air quality, the EPA assumed that 2.5 percent of the intended U.S. annual market for 2-BTP

¹⁷³ CAS Reg. No. 1514–82–5.

¹⁷⁴ CAS Reg. No. 124–38–9.

¹⁷⁵ ICF, Risk Screen on Substitutes in Total Flooding Systems in Normally Unoccupied Spaces; Substitute: VERDAGENT®, 2025. (ICF, 2025t).

¹⁷⁶ The ODP for 2-BTP/CO₂ is based on the ODP of 2-BTP that was used in previous SNAP listings (see 81 FR 86778 and 88 FR 26382).

¹⁷⁷ Report of the Technology and Economic Assessment Panel, May 2025, Volume 1: Progress report. Available online at: ozone.unep.org/system/files/documents/TEAP-May2025-Progress-Report-vol1.pdf (TEAP, 2025).

¹⁷⁸ 40 CFR 51.100(s).

in total flooding fire suppression applications would be released annually.¹⁷⁹ This would result in release of about one metric ton of 2-BTP into the atmosphere annually from this proposed end-use¹⁸⁰ which translates to an extremely small proportion relative to total annual anthropogenic VOC emissions in the United States.¹⁸¹ The Agency assumes that emissions would not occur in one location at one time, but instead much less than one metric ton would be emitted at different locations. Further, this analysis does not account for the fact that some releases could occur on aircraft flying at cruising altitude (e.g., 35,000 ft), where releases would not have a significant impact on tropospheric ozone.¹⁸² Given that annual 2-BTP emissions would be many orders of magnitude lower than annual emissions of other anthropogenic VOC emissions, and that some portion of these emissions are likely to occur at aircraft cruising altitude, the EPA does not consider the environmental impacts of this VOC to be a significant concern. This aligns with the EPA's review of pure 2-BTP for use as a total flooding agent.¹⁸³

CO₂ is excluded from the EPA's regulatory definition of VOC¹⁸⁴ for the purpose of addressing the development of SIPs to attain and maintain the NAAQS.

Flammability information: 2-BTP/CO₂ is nonflammable. The individual components, 2-BTP and CO₂, are also nonflammable.

Toxicity and exposure data: The EPA assessed potential health risks from exposure to the proposed substitute as a total flooding agent in normally unoccupied spaces. To assess potential health risks from exposure to the proposed substitute for personnel during manufacturing, EPA developed a New Chemical Exposure Limit (NCEL) of 1 ppm for 2-BTP based on review of available toxicity studies.¹⁸⁵ CO₂ has an OSHA PEL of 5,000 ppm.¹⁸⁶ These exposure limits represent the maximum eight-hour TWA exposure at which personnel in an occupational

environment can be exposed regularly without adverse effects.

2-BTP is subject to a SNUR under 40 CFR 721.10966. Significant new uses under this requirement include any use other than as either a total flooding agent in unoccupied spaces, specifically engine nacelles and APUs in aircraft; or as a streaming fire extinguishing agent for use only in handheld extinguishers in aircraft. This SNUR also contains requirements for workplace protections and for hazard communication.

According to the SDS, exposure to this blend following a discharge may be hazardous if inhalation, skin contact, or eye contact with the proposed substitute occurs at sufficiently high levels. The most likely pathway of exposure is through inhalation. Overexposure via inhalation to the proposed substitute may cause central nervous system effects, such as dizziness, confusion, physical incoordination, drowsiness, anesthesia, or unconsciousness. At concentrations of 1.0 percent, or 10,000 ppm, or higher, the proposed substitute may cause increased sensitivity of the heart to adrenaline which might cause irregular heartbeats and possibly ventricular fibrillation or death. In the case that the proposed substitute is inhaled, person(s) should be immediately removed and exposed to fresh air. The SDS recommends that if breathing is difficult, person(s) should seek medical attention.

Short ocular, dermal, or ingestion exposures are not expected to pose a hazard. However, in case of ocular exposure, the SDS for the proposed substitute recommends that person(s) immediately flush the eyes, including under the eyelids, with water and move to a non-contaminated area. Medical attention should be sought if irritation develops or persists. In the case of dermal exposure, the SDS recommends that person(s) immediately wash the affected area with large amounts of water and remove all contaminated clothing and footwear to avoid irritation. If water is not available, cover the affected area with a clean, soft cloth. Medical attention should be sought if irritation develops or persists. The proposed substitute is not likely to be hazardous by ingestion; however, in case of ingestion, the SDS recommends the person(s) consult a physician immediately. Do not induce vomiting without medical advice.

Vapors from 2-BTP/CO₂ can cause suffocation by reducing oxygen available for breathing, causing asphyxiation in high concentrations. Such vapors pose a potential hazard if large volumes are trapped in enclosed or low places. If person(s) are exposed to

high concentrations, the person(s) will likely not realize that he/she is suffocating, but may experience central nervous system effects, such as drowsiness and dizziness.

The risks and procedures after exposure to the proposed substitute are similar for other common fire suppressants. The potential health effects of exposure to this substitute can be minimized by following the exposure guidelines, ventilation, and PPE recommendations in the installation and use manual for this proposed substitute. In addition, industry safety standards such as the NFPA 2001 standard for clean agent fire extinguishing systems and the NFPA 12 standard for CO₂ extinguishing systems provide guidelines for safe use of the components of this fire suppressant blend.

The EPA also evaluated the risks associated with potential exposures to the blend during manufacture (e.g., filling total flooding systems), in the case of an inadvertent discharge of the system during installation and maintenance activities, and during clean up after system discharge.

The risks to workers are expected to be sufficiently mitigated when the engineering controls and PPE recommendations referenced in the SDS for this proposed substitute are followed. For operations requiring handling of the substitute, engineering controls should include adequate ventilation systems and enclosed or confined operations to ensure exposure levels are below the NCEL. Appropriate protective measures should be taken, and proper training administered for the manufacture, clean up, and disposal of this product.

In general, use of appropriate PPE is recommended, specifically respirators, during activities in which exposure to 2-BTP/CO₂ cannot be controlled through other means. If handled in enclosed spaces where exposure limits might be exceeded, a self-contained breathing apparatus (SCBA) should be used. When handling a leak in a storage container, protective clothing is recommended as well as vapor-in air detection systems. If detected in the workplace atmosphere, there may be a need to purge the gas from the confined space (e.g., with air, or an inert gas followed by air), followed by additional testing of the space to ensure it has been removed completely from the atmosphere. Furthermore, gloves (e.g., neoprene, polyvinyl chloride, or polyvinyl alcohol) should be worn when handling equipment containing the proposed substitute for prolonged periods. The combination of appropriate

¹⁷⁹ The EPA's Vintaging Model assumes an average annual leak rate of 2.5 percent for total flooding systems (EPA, 2022).

¹⁸⁰ Based on the 2022 annual total VOC emissions for the United States as reported in the National Emissions Inventory (ICF, 2025t).

¹⁸¹ Emissions of one metric ton of 2-BTP is approximately 7.5×10^{-8} percent of total U.S. VOC emissions.

¹⁸² Emission estimates calculated using CBI data.

¹⁸³ See 88 FR at 26408–26409; April 28, 2023.

¹⁸⁴ 40 CFR 51.100(s).

¹⁸⁵ See 40 CFR 721.10966.

¹⁸⁶ Available at: <http://www.cdc.gov/Niosh/npg/npgd0103.html>.

engineering controls and the use of PPE would ensure exposure levels are below the NCEL.

When used as intended by the submitter and in accordance with the proper safety and disposal precautions as listed in the risk screen and in the NFPA 2001 and NFPA 12 standards,¹⁸⁷ releases of this proposed substitute are not expected to cause a significant risk to the environment and human health in the general population when manufactured or used in normally unoccupied and unoccupiable spaces.

Comparison to other fire suppressants: The atmospheric effects of 2-BTP/CO₂ are comparable to or lower than other listed substitutes in this end-use including substitutes with ODPs such as phosphorus tribromide and trifluoromethyl iodide (CF₃I). Other alternatives with comparable or better overall atmospheric effect profiles have not proven viable for certain aviation applications such as cargo bays. 2-BTP is considered a VOC and is not excluded from the EPA's regulatory definition of VOC¹⁸⁸ for the purpose of addressing the development of SIPs to attain and maintain the NAAQS. Other acceptable fire suppression agents currently in use in this end-use are also VOC (e.g., pure 2-BTP, C6-perfluoroketone). 2-BTP/CO₂ is anticipated to pose no greater risk as a VOC than other alternatives listed as acceptable in this end-use (e.g., C6-perfluoroketone) and would present half the risk from VOC impacts of pure 2-BTP. 2-BTP/CO₂ is nonflammable, as are all other available total flooding agents. The extinguishing cylinders for 2-BTP/CO₂ can weigh less and/or take up less space than cylinders such as those that contain CO₂ alone, since CO₂ typically requires a larger amount of substance to extinguish fires. This is particularly important for fire suppression aboard aircraft where transition from the class I ODS fire suppression agents (e.g., halon 1301 and halon 1211) has been particularly challenging. The EPA is aware that other listed alternatives may not be viable especially for aircraft cargo bays. The EPA is proposing to find 2-BTP/CO₂ as acceptable, subject to use conditions, as a total flooding agent for use in normally unoccupied spaces in aircraft engine nacelles, APUs, and cargo bays because the overall human health and environmental risk posed by the substitute is lower than or comparable to the overall risk posed by

other alternatives listed as acceptable in the same end-use.

D. What use conditions is the EPA proposing?

The EPA is proposing to list 2-BTP/CO₂ as acceptable, subject to use conditions, as a total flooding agent. The use condition is that this substitute be used only in normally unoccupied spaces, specifically only in aircraft engine nacelles, APUs, or cargo bays. The Agency notes that engine nacelles and APUs are unoccupiable spaces. Cargo bays are normally unoccupied, but people could enter cargo bays (e.g., when loading or unloading cargo) and live animals may be transported in cargo bays.

This proposal includes the EPA's recommendation that this substitute be used as intended by the submitter and in accordance with the proper safety and disposal precautions as listed in the risk screen.¹⁸⁹ While this recommendation would not be legally binding under the SNAP program, the EPA would encourage users of this substitute to apply these recommendations, and others listed in the risk screen, in their use of this substitute as best practices for safer use.

E. Why is the EPA proposing these specific use conditions?

The EPA is proposing to list 2-BTP/CO₂ as acceptable as a total flooding agent with the use condition that it is only acceptable for use onboard aircraft in engine nacelles, APUs, and cargo bays which are considered normally unoccupied spaces. These applications are consistent with the information submitted to the EPA supporting use in normally unoccupied spaces and as requested by the submitter.

F. What additional information is the EPA including in this proposed listing?

Emissions of 2-BTP/CO₂ should be controlled by adhering to standard industry practices. Toxicity risks can be minimized by use consistent with the NFPA 2001 and 12 standards,¹⁹⁰ recommendations in the SDS, and other safety precautions common in the fire suppression industry.

X. On which topics is the EPA specifically requesting comment?

A. Residential and Light Commercial AC and Heat Pumps, Household Refrigerators and Freezers, and Water Coolers

1. The EPA is requesting comment on requiring labeling, the height of the lettering, and the likelihood of labels remaining on a product throughout the lifecycle of the product, including its disposal. This request is applicable to all proposed listings in Sections IV. through VI.

2. The EPA is requesting comment on whether specifying a particular shade of red for the color-coded hoses and piping is necessary to mitigate risks associated with using flammable refrigerants, or if a requirement for red markings, without specifying a particular shade, would be sufficiently protective. This request is applicable to all proposed listings in Sections IV. through VI.

3. The EPA is requesting comment on the two co-proposed options for use conditions related to equipment certification or industry safety standard requirements, described in Sections IV.F.4., V.E.4., and VI.E.4. This request is applicable to all proposed listings in Sections IV. through VI.

4. With respect to the proposed listing for household refrigerators and freezers under the incorporate by reference option described in Section V.E.4.a., the EPA is requesting comment on the risk mitigation offered by compliance with the current version of the standard proposed as use conditions, i.e., 3rd edition of UL 60335-2-24, the nature of any updates proposed for this standard, and the expected timeline for those updates.

5. With respect to the proposed listing for water coolers under the incorporate by reference option described in Section VI.E.4.a., the EPA is requesting comment on whether the proposed listing of R-290 in water coolers should be updated to use conditions consistent with UL 399, 8th edition or should remain as currently listed, consistent with the requirements of UL 399, 7th edition.

6. Regarding the third-party certification option discussed in Sections IV.F.4.b., V.E.4.b., and VI.E.4.b., the EPA is requesting comment on the proposed use condition that would require equipment in these three end-uses to be certified by an OSHA-recognized NRTL. The EPA is requesting comment on the applicability of OSHA's NRTL Program to all applications within these three end-uses. Specifically, the EPA requests comments about whether there are

¹⁸⁷ ICF, 2025t. Risk Screen on Substitutes in Total Flooding Systems in Normally Unoccupied Spaces; Substitute: VERDAGENT®.

¹⁸⁸ 40 CFR 51.100(s).

¹⁸⁹ ICF, 2025t. Risk Screen on Substitutes in Total Flooding Systems in Normally Unoccupied Spaces; Substitute: VERDAGENT®.

¹⁹⁰ NFPA 2001, "Standard on Clean Agent Fire Extinguishing Systems."

situations under these end-uses where certification by an NRTL would not occur. The EPA is requesting comment on any safety or environmental concerns that would not be addressed through this proposed use condition option when compared to the use conditions that the EPA previously listed for these end-uses or when compared to the incorporation by reference option.

7. Regarding the proposed timing for when the updated use conditions would take effect for proposed updates to refrigerant listings in the residential and light commercial AC and heat pumps and water coolers end-uses, the EPA is requesting comment on the proposal that users (*e.g.*, manufacturers) be able to follow either the existing use conditions or the proposed updated use conditions from the effective date of the final rule until two years after that effective date to allow adequate time to transition from the existing to the new use conditions. The Agency also requests comment on the proposed timing for when the use conditions would be required for use of HCR 4141 in household refrigerators and freezers, *i.e.*, on and after the effective date of the final rule.

B. Chillers

1. The EPA is requesting comment on the proposed use conditions for use of R-516A, including the proposed requirements to comply with both the 4th edition of UL 60335-2-40 and ASHRAE 15-2024 including published addenda. The EPA is requesting comment on the risk mitigation offered by compliance with the current version of these standards proposed as use conditions, the nature of any updates to these standards that are expected to be adopted, and the expected timeline for those updates.

2. The EPA is requesting comment on the applicability of UL 60335-2-40, 4th edition to chillers, including which chillers and under which applications the standard applies, as well as on the applicability of ASHRAE 15-2024 with the addenda published to date.

C. Motor Vehicle Air Conditioning

1. The EPA is requesting comment on the proposal to consider BTMS in nonroad and HD vehicles as MVACs under SNAP. The EPA is requesting comment on whether existing use conditions for MVACs in these vehicle types would be suitable for BTMS. The Agency also requests comment on whether stand-alone BTMS exist in other vehicle types (such as LMDVs) and whether the EPA should expand this interpretation to include stand-alone BTMS in other vehicle types.

2. The EPA is requesting comment on the proposed use conditions intended to mitigate potential flammability risk from the refrigerants with an ASHRAE flammability rating of 2L, namely HFO-1234yf for use in new HDOH MVACs and the flammability risk of retrofits using HFO-1234yf and R-444A in LMDV. Specifically, retrofitting MVACs designed for a nonflammable refrigerant such as HFC-134a to use a flammable refrigerant may present new risks. The EPA seeks comment on whether additional strategies to mitigate the flammability risk of A2L refrigerants are necessary and suggestions of what those strategies may be.

3. The EPA is requesting comment on the unique service fittings proposed for use with R-444A and R-456A. The unique fittings proposed to be used were originally assigned to other refrigerants that are now listed as unacceptable and should no longer be in use. The EPA requests data on whether Freeze-12 and R-416A may still be in use in MVACs and whether that could raise concerns the proposal to reassign these unique fittings to other refrigerants.

4. The EPA is requesting comment on the environmental impacts of the use of R-444A in retrofit LMDVs. The EPA seeks comment on our evaluation that the overall environmental impact is comparable between R-444A and HFO-1234yf.

5. The EPA is requesting comment on whether to require as a use condition that new HDOH vehicles and new buses charged with HFO-1234yf follow the requirements of SAE J639. As discussed in Sections VIII.E.2. and VIII.E.3., the EPA is not proposing a use condition that new MVACs in buses comply with all requirements of SAE J639. The EPA is proposing that use conditions mirror the safety requirements associated with HFO-1234yf in SAE J639.

D. Fire Suppression and Explosion Protection

People are not normally present in cargo bays of civilian aircraft, although workers could be exposed in an accidental discharge of the fire suppression system (*e.g.*, during servicing of the system). In addition, there is the occasional presence of living animals in cargo bays for the duration of a flight who could be exposed to the fire suppression agent in the event of a system discharge (*e.g.*, cargo fire) until the aircraft can safely land. The EPA is requesting comments on exposure of personnel and animals to 2-BTP/CO₂ in aircraft cargo bays.

XI. Statutory and Executive Order Reviews

Additional information about these statutes and Executive Orders can be found at <https://www.epa.gov/laws-regulations/laws-and-executive-orders>.

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

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

B. Executive Order 14192: Unleashing Prosperity Through Deregulation

This action is expected to be an Executive Order 14192 deregulatory action. This proposed rule is expected to provide burden reduction by proposing to list more alternatives that would be available for use by industry, and in certain end-uses, better align EPA requirements with updated industry standards.

C. Paperwork Reduction Act (PRA)

This action does not impose any new information collection burden under the PRA. OMB has previously approved the information collection activities contained in the existing regulations and has assigned OMB control number 2060-0226. This rule contains no new requirements for reporting or recordkeeping.

D. Regulatory Flexibility Act (RFA)

I certify that this action will not have a significant economic impact on a substantial number of small entities under the RFA. In making this determination, the EPA concludes that the impact of concern for this rule is any significant adverse economic impact on small entities and that the agency is certifying that this rule will not have a significant economic impact on a substantial number of small entities because the rule has no net burden on the small entities subject to the rule. This action proposes to add the additional options under SNAP of using 2-BTP/CO₂, HCR 4141, HFO-1234yf, HFO-1234ze(E), R-444A, R-453A, R-456A, R-480A and R-516A in the specified end-uses but does not mandate such use. Because equipment for HCR 4141 using residential and light commercial AC and heat pumps—self-contained room air conditioners and HFO-1234ze(E) using residential and light commercial AC and heat pumps, and R-516A using residential and light commercial AC and heat pumps is not manufactured yet in the United States, no change in business practice is

required to meet the use conditions, resulting in no adverse impact compared with the absence of this rule. The revised use conditions for R-290 in water coolers and for HFC-32, R-290, R-441A, R-454A, R-454B, R-454C, and R-457A in residential and light commercial AC and heat pumps were requested by industry and allow for consistency with the latest, updated standards; these would allow for greater consistency in business practices for different types of equipment using the same refrigerants, as well as provide greater flexibility in designing and manufacturing equipment. Equipment using the proposed refrigerants already manufactured prior to the effective date of the final rule would not be required to be changed. Water coolers using R-290 and residential and light commercial AC and heat pumps using HFC-32, R-290, R-441A, R-454A, R-454B, R-454C, or R-457A have been subject to similar use conditions and would allow for use consistent with industry safety standards, and thus the updated requirements would result in no adverse impact compared with the absence of this rule. Thus, if the rule were finalized as proposed, it would not impose new costs on small entities. We have therefore concluded that this action will have no net regulatory burden for all directly regulated small entities.

E. Unfunded Mandates Reform Act (UMRA)

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

F. 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.

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

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

specified in Executive Order 13175. Thus, Executive Order 13175 does not apply to this action.

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

Executive Order 13045 directs federal agencies to include an evaluation of the health and safety effects of the planned regulation on children in federal health and safety standards and explain why the regulation is preferable to potentially effective and reasonably feasible alternatives. This action is not subject to Executive Order 13045 because it is not a significant regulatory action under section 3(f)(1) of Executive Order 12866, and because the EPA does not believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. While the EPA has not conducted a separate analysis of risks to infants and children associated with this rule, the rule does contain use conditions that would reduce exposure risks to the general population, with the reduction of exposure being most important to the most sensitive individuals. This action's health and risk assessments are contained in the comparisons of toxicity for the various substitutes, as well as in the risk screens for the substitutes that are listed in this proposed rule. The risk screens are in the docket. However, the EPA's *Policy on Children's Health* applies to this action.

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

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

J. National Technology Transfer and Advancement Act

This action involves technical standards. The EPA proposes to incorporate by reference the 4th edition (2022) of UL 60335–2–40, which establishes requirements for the evaluation of AC and heat pump equipment and safe use of flammable refrigerants, among other things. This standard is discussed in greater detail in Section IV.F.4. The EPA also proposes to incorporate by reference the 3rd edition (2023) of UL 60335–2–24, which establishes requirements for the evaluation of household refrigerators and freezers and related small, household refrigerated appliances and safe use of flammable refrigerants, among other things. This standard is discussed in greater detail in Section

V.E.4. The EPA also proposes to incorporate by reference Supplement SB of the 8th edition of UL 399, which establishes requirements for the evaluation of water coolers and safe use of flammable refrigerants, among other things. This standard is discussed in greater detail in Section VI.E.4.

The 4th edition of UL 60335–2–40, “Household and Similar Electrical Appliances—Safety—Part 2–40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers”, dated December 15, 2022, is available at: <https://www.shopulstandards.com/ProductDetail.aspx?productId=UL60335-2-40>. The 3rd edition of UL 60335–2–24, “Household and Similar Electrical Appliances—Safety—Part 2–24: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers,” dated July 29, 2022, and revisions through February 20, 2024, is available at: <https://www.shopulstandards.com/ProductDetail.aspx?UniqueKey=43189>. The 8th edition of UL 399, “Drinking Water Coolers,” dated March 30, 2017, and revisions through February 28, 2024, is available at https://www.shopulstandards.com/ProductDetail.aspx?productId=UL399_8_S_20170330. All three UL standards may be purchased by mail at: COMM 2000, 151 Eastern Avenue, Bensenville, IL 60106; Email: orders@shopulstandards.com; Telephone: 1–888–853–3503 in the United States or Canada (other countries dial 1–415–352–2178); internet address: <https://ulstandards.ul.com> or <https://www.shopulstandards.com>. The cost of the 4th edition (2022) of UL 60335–2–40 is \$521 for an electronic copy and \$652 for a hard copy. The cost of the 3rd edition (2022) of UL 60335–2–24, is \$555 for an electronic copy and \$694 for a hard copy. The cost of the February 2024 revision to the 8th edition of UL 399 is \$798 for an electronic copy and \$998 for a hard copy. UL also offers a subscription service to the Standards Certification Customer Library that allows unlimited access to their standards and related documents. The cost of obtaining this standard is not a significant financial burden for equipment manufacturers and purchase is not necessary for those selling, installing, and servicing the equipment. Therefore, the EPA concludes that the UL standards the EPA is proposing to incorporate by reference are reasonably available.

The EPA is also proposing to incorporate by reference ASHRAE 15–2024, which specifies requirements for the safe design, construction,

installation, and operation of refrigeration systems, among other things. This standard is discussed in greater detail in Section VII.E. ANSI/ASHRAE Standard 15–2024, “Safety Standard for Refrigeration Systems,” is available at <https://www.ashrae.org/technical-resources/bookstore/ashrae-refrigeration-resources>, and may be purchased by mail at: 180 Technology Parkway NW, Peachtree Corners, Georgia 30092; by email at store@techstreet.com; by telephone: 1–800–527–4723 in the United States or Canada; or at internet address: https://store.accustech.com/ashrae/standards/ashrae-15-2024-packaged-w-standard-34-2024?product_id=2922394. ASHRAE 15–2024 and ASHRAE 34–2024 are available as a bundle costing \$178.00 for an electronic copy or hard copy. The cost of obtaining these standards is not a significant financial burden for equipment manufacturers or for those selling, installing and servicing the equipment. Therefore, the EPA concludes that the ASHRAE standard the EPA is proposing to incorporate by reference is reasonably available.

The EPA is proposing to incorporate by reference several industry safety standards from SAE in the use conditions for use of HFO–1234yf in MVACs in several types of equipment: SAE J639 (revised November 2020), “Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems;” SAE J1739 (revised January 2021), “Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA–MSR, and Process FMEA;” and SAE J2844 (revised January 2013), “R–1234yf (HFO–1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems.” These standards may be purchased by mail at: SAE Customer Service, 400 Commonwealth Drive, Warrendale, PA 15096–0001; by telephone: 1–877–606–7323 in the United States or 724–776–4970 outside the United States or in Canada. The cost of SAE J639, SAE J1739, and SAE J2844 is \$85 each for an electronic or hardcopy. The cost of obtaining these standards is not a significant financial burden for manufacturers of MVACs and purchase is not required for those selling, installing, and servicing the systems. Therefore, the EPA proposes to conclude that the use of SAE J639, SAE J1739, and SAE J2844 are reasonably available.

XII. References

Unless specified otherwise, all documents are available electronically at <https://>

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ICF, 2025e. Risk Screen on Substitutes in Residential and Light Commercial Air Conditioning and Heat Pumps (New Equipment); Substitute: R–441A.

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ICF, 2025g. Risk Screen on Substitutes in Residential and Light Commercial Air Conditioning and Heat Pumps Commercial Ice Machines (New Equipment); Substitute: R–457A (Forane® 457A).

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ICF, 2025j. Risk Screen on Substitutes in Chillers (New Equipment); Substitute: R–516A (Forane® 516A).

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List of Subjects in 40 CFR Part 82

Environmental protection,
Administrative practice and procedure,
Air pollution control, Chemicals.

Lee Zeldin,

Administrator.

[FR Doc. 2025–19812 Filed 11–7–25; 8:45 am]

BILLING CODE 6560–50–P



FEDERAL REGISTER

Vol. 90

Monday,

No. 215

November 10, 2025

Part III

Environmental Protection Agency

40 CFR Part 63

National Emission Standards for Hazardous Air Pollutants From Hazardous Waste Combustors: Residual Risk and Technology Review; Withdrawal of Proposed Revisions to Standards for Periods of Malfunction Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 63

[EPA-HQ-OAR-2004-0022; FRL-10654-01-OAR]

RIN 2060-AV96

National Emission Standards for Hazardous Air Pollutants From Hazardous Waste Combustors: Residual Risk and Technology Review; Withdrawal of Proposed Revisions to Standards for Periods of Malfunction

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule and withdrawal of proposed rule.

SUMMARY: This proposal presents the results of the U.S. Environmental Protection Agency's (EPA) residual risk and technology review for the National Emission Standards for Hazardous Air Pollutants (NESHAP) from Hazardous Waste Combustors (HWC) as required under the Clean Air Act (CAA). In this action, the EPA is proposing to establish emission limits and work practice standards for hydrogen fluoride and hydrogen cyanide emissions from HWC incinerators, cement kilns, solid fuel boilers, and liquid fuel boilers; eliminate the startup, shutdown, and malfunction (SSM) exemption; add a work practice standard for periods of SSM; add electronic reporting procedures and requirements; allow states to choose to exempt area sources from certain permitting requirements; and other clarifications and corrections. In response to comments received on certain aspects of the July 24, 2024, proposed revisions for periods of malfunction, the EPA is withdrawing that proposed rule and instead proposing different provisions to address periods of SSM.

DATES:

Comments. Comments must be received on or before December 26, 2025. As of November 10, 2025, the proposed rule published on July 24, 2024, at 89 FR 59867, is withdrawn. Under the Paperwork Reduction Act (PRA), comments on the information collection provisions are best assured of consideration if the Office of Management and Budget (OMB) receives a copy of your comments on or before December 10, 2025.

Public hearing: If anyone contacts us requesting a public hearing on or before November 15, 2025, we will hold a virtual public hearing. See

SUPPLEMENTARY INFORMATION for information on requesting and registering for a public hearing.

ADDRESSES: You may send comments, identified by Docket ID No. EPA-HQ-OAR-2004-0022, by any of the following methods:

- *Federal eRulemaking Portal:* <https://www.regulations.gov/> (our preferred method). Follow the online instructions for submitting comments.
- *Email:* a-and-r-docket@epa.gov. Include Docket ID No. EPA-HQ-OAR-2004-0022 in the subject line of the message.
- *Mail:* U.S. Environmental Protection Agency, EPA Docket Center, Docket ID No. EPA-HQ-OAR-2004-0022, Mail Code 28221T, 1200 Pennsylvania Avenue NW, Washington, DC 20460.
- *Hand/Courier Delivery:* EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Avenue NW, Washington, DC 20004. The Docket Center's hours of operation are 8:30 a.m.-4:30 p.m., Monday-Friday (except Federal holidays).

Instructions: All submissions received must include the Docket ID No. for this rulemaking. Comments received may be posted without change to <https://www.regulations.gov/>, including any personal information provided. For detailed instructions on sending comments and additional information on the rulemaking process, see the **SUPPLEMENTARY INFORMATION** section of this document.

FOR FURTHER INFORMATION CONTACT: For information about this proposed rule, contact U.S. EPA, Attn: Rachel Smoak, Mail Drop: E143-02, 109 T.W. Alexander Drive, P.O. Box 12055, RTP, North Carolina 27711; telephone number: (919) 541-0253; and email address: smoak.rachel@epa.gov. For specific information regarding the risk modeling methodology, contact U.S. EPA, Attn: Matt Woody, Ph.D., Mail Drop: C539-02, 109 T.W. Alexander Drive, P.O. Box 12055, RTP, North Carolina 27711; telephone number: (919) 541-1535; and email address: woody.matt@epa.gov.

SUPPLEMENTARY INFORMATION:

Participation in virtual public hearing.

To request a virtual public hearing, contact the public hearing team at (888) 372-8699 or by email at SPPDpublichearing@epa.gov. If requested, the hearing will be held via virtual platform on November 25, 2025. The EPA may close a session 15 minutes after the last pre-registered speaker has testified if there are no additional speakers. The EPA will announce further details at <https://www.epa.gov/stationary-sources-air-pollution/hazardous-waste-combustors-national-emission-standards-hazardous>.

The EPA will begin pre-registering speakers for the hearing no later than one business day after a request has been received. To register to speak at the virtual hearing, please use the online registration form available at <https://www.epa.gov/stationary-sources-air-pollution/hazardous-waste-combustors-national-emission-standards-hazardous> or contact the public hearing team at (888) 372-8699 or by email at SPPDpublichearing@epa.gov. The last day to pre-register to speak at the hearing will be November 22, 2025. Prior to the hearing, the EPA will post a general agenda that will list pre-registered speakers at: <https://www.epa.gov/stationary-sources-air-pollution/hazardous-waste-combustors-national-emission-standards-hazardous>.

The EPA will make every effort to follow the schedule as closely as possible on the day of the hearing; however, please plan for the hearings to run either ahead of schedule or behind schedule. Each commenter will have four minutes to provide oral testimony. The EPA encourages commenters to submit the text of your oral testimony as written comments to the rulemaking docket. The EPA may ask clarifying questions during the oral presentations but will not respond to the presentations at that time. Written statements and supporting information submitted during the comment period will be considered with the same weight as oral testimony and supporting information presented at the public hearing.

Please note that any updates made to any aspect of the hearing will be posted online at <https://www.epa.gov/stationary-sources-air-pollution/hazardous-waste-combustors-national-emission-standards-hazardous>. While the EPA expects the hearing to go forward as set forth above, please monitor this website or contact the public hearing team at (888) 372-8699 or by email at SPPDpublichearing@epa.gov to determine if there are any updates. The EPA does not intend to publish a document in the **Federal Register** (FR) announcing updates.

If you require special accommodation such as audio description, please pre-register for the hearing with the public hearing team and describe your needs by November 17, 2025. The EPA may not be able to arrange accommodations without advanced notice.

Docket. The EPA has established a docket for this proposed rule under Docket ID No. EPA-HQ-OAR-2004-0022. All documents in the docket are listed in the <https://www.regulations.gov/> index. Although listed in the index, some information is

not publicly available, *e.g.*, Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the internet and will be publicly available only as Portable Document Format (PDF) versions that can only be accessed on the EPA computers in the docket office reading room. Certain databases and physical items cannot be downloaded from the docket but may be requested by contacting the docket office at 202–566–1744. The docket office has up to 10 business days to respond to these requests. With the exception of such material, publicly available docket materials are available electronically at <https://www.regulations.gov>.

Written Comments. Submit your comments, identified by Docket ID No. EPA–HQ–OAR–2004–0022, at <https://www.regulations.gov> (our preferred method), or the other methods identified in the **ADDRESSES** section. Once submitted, comments cannot be edited or removed from the docket. The EPA may publish any comment received to its public docket. Do not submit to the EPA's docket at <https://www.regulations.gov> any information that you consider to be CBI or other information whose disclosure is restricted by statute. This type of information should be submitted as discussed in the *Submitting CBI* section of this document.

The EPA is soliciting comment on numerous aspects of the proposed rule. The EPA has indexed each comment solicitation with a unique identifier (*e.g.*, “C–1,” “C–2,” “C–3” . . .) to provide a consistent framework for effective and efficient provision of comments. Accordingly, we ask that commenters include the corresponding identifier when providing comments relevant to that comment solicitation. We ask that commenters include the identifier either in a heading or within the text of each comment (*e.g.*, “In response to C–1, . . .”) to make clear which comment solicitation is being addressed. We emphasize that we are not limiting comment to these identified areas and encourage provision of any other comments relevant to this proposed action.

Multimedia submissions (audio, video, etc.) must be accompanied by a written comment. The written comment is considered the official comment and should include discussion of all points you wish to make. The EPA will generally not consider comments or comment contents located outside of the primary submission (*i.e.*, on the Web, cloud, or other file sharing system).

Please visit <https://www.epa.gov/dockets/commenting-epa-docket> for additional submission methods; the full EPA public comment policy; information about CBI or multimedia submissions; and general guidance on making effective comments.

The <https://www.regulations.gov> website allows you to submit your comment anonymously, 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 email comment directly to the EPA without going through <https://www.regulations.gov>, your email 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 digital storage media 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 not include special characters or any form of encryption and should be free of any defects or viruses.

Submitting CBI. Do not submit information containing CBI to the EPA through <https://www.regulations.gov>. Clearly mark the part or all of the information that you claim to be CBI. For CBI information on any digital storage media that you mail to the EPA, note the docket ID, mark the outside of the digital storage media as CBI, and identify electronically within the digital storage media the specific information that is claimed as CBI. In addition to one complete version of the comments that includes information claimed as CBI, you must submit a copy of the comments that does not contain the information claimed as CBI directly to the public docket through the procedures outlined in *Written Comments* above. If you submit any digital storage media that does not contain CBI, mark the outside of the digital storage media clearly that it does not contain CBI and note the docket ID. Information not marked as CBI will be included in the public docket and the EPA's electronic public docket without prior notice. Information marked as CBI will not be disclosed except in accordance with procedures set forth in 40 Code of Federal Regulations (CFR) part 2.

Our preferred method to receive CBI is for it to be transmitted electronically using email attachments, File Transfer Protocol (FTP), or other online file

sharing services (*e.g.*, Dropbox, OneDrive, Google Drive). Electronic submissions must be transmitted directly to the OAQPS CBI Office at the email address oaqps_cbi@epa.gov, and as described above, should include clear CBI markings and note the docket ID. If assistance is needed with submitting large electronic files that exceed the file size limit for email attachments, and if you do not have your own file sharing service, please email oaqps_cbi@epa.gov to request a file transfer link. If sending CBI information through the postal service, please send it to the following address: OAQPS Document Control Officer (C404–02), OAQPS, U.S. Environmental Protection Agency, 109 T.W. Alexander Drive P.O. Box 12055 RTP, North Carolina 27711, Attention Docket ID No. EPA–HQ–OAR–2004–0022. The mailed CBI material should be double wrapped and clearly marked. Any CBI markings should not show through the outer envelope.

Preamble acronyms and abbreviations. Throughout this preamble the use of “we,” “us,” or “our” is intended to refer to the EPA. We use multiple acronyms and terms in this preamble. While this list may not be exhaustive, to ease the reading of this preamble and for reference purposes, the EPA defines the following terms and acronyms here:

AEGL acute exposure guideline level
 AERMOD air dispersion model used by the HEM model
 APCD air pollution control device
 AWFCO automatic waste feed cutoff
 CAA Clean Air Act
 CalEPA California EPA
 CBI Confidential Business Information
 CEDRI Compliance and Emissions Data Reporting Interface
 CEMS continuous emission monitoring system
 CFR Code of Federal Regulations
 CfPT confirmatory performance test
 CMS continuous monitoring system
 CPT comprehensive performance test
 DRE destruction and removal efficiency
 EPA Environmental Protection Agency
 ERPG emergency response planning guideline
 ERT Electronic Reporting Tool
 HAP hazardous air pollutant(s)
 HBEL health-based emission limit
 HCl hydrochloric acid
 HCN hydrogen cyanide
 HEM Human Exposure Model
 HF hydrogen fluoride
 HI hazard index
 HQ hazard quotient
 HWC hazardous waste combustor
 ICR information collection request
 IRIS Integrated Risk Information System
 km kilometer
 LOAEL lowest-observed-adverse-effect level
 MACT maximum achievable control technology
 mg/kg-day milligrams per kilogram per day

mg/m3 milligrams per cubic meter
 MIR maximum individual risk
 NAAQS National Ambient Air Quality Standards
 NAICS North American Industry Classification System
 NESHAP national emission standards for hazardous air pollutants
 NOAEL no-observed-adverse-effect level
 NRC National Research Council
 NTTAA National Technology Transfer and Advancement Act
 OAQPS Office of Air Quality Planning and Standards
 OECA Office of Enforcement and Compliance Assurance
 OMB Office of Management and Budget
 PAH polycyclic aromatic hydrocarbons
 PB-HAP hazardous air pollutants known to be persistent and bioaccumulative in the environment
 PCDD/PCDF polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans
 PM particulate matter
 POM polycyclic organic matter
 ppm parts per million
 REL reference exposure level
 RFA Regulatory Flexibility Act
 RfC reference concentration
 RfD reference dose
 RTR residual risk and technology review
 SAB Science Advisory Board
 SBA Small Business Administration
 SSM startup, shutdown, and malfunction
 TEQ toxic equivalency quotient
 TOSHI target organ-specific hazard index
 tpy tons per year
 TRIM.FaTE Total Risk Integrated Methodology, Fate, Transport, and Ecological Exposure model
 UF uncertainty factor
 µg/m3 micrograms per cubic meter
 UMRA Unfunded Mandates Reform Act
 UPL upper prediction limit
 URE unit risk estimate
 VCS voluntary consensus standards

Table of Contents

- I. General Information
 - A. Does this action apply to me?
 - B. Where can I get a copy of this document and other related information?
- II. Background
 - A. What is the statutory authority for this proposed action?
 - B. What is this source category and how does the current NESHAP regulate its HAP emissions?
 - C. What data collection activities were conducted to support this action?
 - D. What other relevant background information and data are available?
- III. Analytical Procedures and Decision-Making
 - A. How do we consider risk in our decision-making?
 - B. How do we perform the technology review?

- C. How do we estimate post-MACT risk posed by the source category?
- IV. Analytical Results and Proposed Decisions
 - A. What actions are we proposing pursuant to CAA sections 112(d)(2) and 112(d)(3)?
 - B. What are the results of the risk assessment and analyses?
 - C. What are our proposed decisions regarding risk acceptability, ample margin of safety, and adverse environmental effect?
 - D. What are the results and proposed decisions based on our technology review?
 - E. What other actions are we proposing?
 - F. What compliance dates are we proposing?
- V. Summary of Cost, Environmental, and Economic Impacts
 - A. What are the affected sources?
 - B. What are the air quality impacts?
 - C. What are the cost impacts?
 - D. What are the economic impacts?
 - E. What are the benefits?
 - F. What analysis of children's environmental health did we conduct?
- VI. Request for Comments
- VII. Submitting Data Corrections
- VIII. Statutory and Executive Order Reviews
 - A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review
 - B. Executive Order 14192: Unleashing Prosperity Through Deregulation
 - C. Paperwork Reduction Act (PRA)
 - D. Regulatory Flexibility Act (RFA)
 - E. Unfunded Mandate Reform Act (UMRA)
 - F. Executive Order 13132: Federalism
 - G. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments
 - H. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks
 - I. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use
 - J. National Technology Transfer and Advancement Act (NTTAA)

I. General Information

A. Does this action apply to me?

Table 1 of this preamble lists the NESHAP and associated regulated industrial source categories that are the subject of this proposal. Table 1 is not intended to be exhaustive but rather provides a guide for readers regarding the entities that this proposed action is likely to affect. The proposed standards, if finalized, would be directly applicable to the affected sources. State, local, and Tribal government entities do not own or operate sources that would

be affected by this proposed action. The hazardous waste combustor (HWC) source category, which is the subject of this proposal, is regulated under 40 CFR part 63, subpart EEE, the National Emission Standards for Hazardous Air Pollutants from Hazardous Waste Combustors (HWC NESHAP). The HWC NESHAP includes hazardous waste combusting sources from five initial source categories: Hazardous Waste Incineration, Portland Cement Manufacturing, Clay Products Manufacturing (including lightweight aggregate kilns), Industrial Boilers, and Hydrochloric Acid (HCl) Production.

Hazardous waste combusting sources from five initial source categories are regulated as HWCs under 40 CFR part 63, subpart EEE, the HWC NESHAP. As defined in the *Initial List of Categories of Sources Under Section 112(c)(1) of the Clean Air Act Amendments of 1990* (57 FR 31576, July 16, 1992) and *Documentation for Developing the Initial Source Category List, Final Report* (EPA-450/3-91-030, July 1992), the “Hazardous Waste Incineration” source category includes any source that incinerates hazardous waste in “any furnace, or other device, used in the process of burning waste for the primary purpose of reducing the volume of the waste by removing combustible matter.” The “Portland Cement Manufacturing” source category includes “any facility engaged in manufacturing Portland cement by either the wet or dry process.” The “Clay Products Manufacturing” source category includes lightweight aggregate kilns and is defined as “any facility engaged in manufacturing of clay products such as brick, vitrified clay pipe, structural clay tile, and clay refractories.” The “Industrial Boilers” source category includes “boilers used in manufacturing, processing, mining, and refining or any other industry to provide steam, hot water, and/or electricity.” In 2004, the Industrial Boilers source category was combined with the Institutional/Commercial Boilers and the Process Heaters source categories into the Industrial/Commercial/Institutional Boilers and Process Heaters source category.¹ The “Hydrochloric Acid Production” source category includes “any facility engaged in the production of hydrochloric acid.”

¹ 70 FR 37819 (June 30, 2005).

TABLE 1—NESHAP AND SOURCE CATEGORIES AFFECTED BY THIS PROPOSED ACTION

Source category	NESHAP	NAICS code ¹
Petroleum and coal products manufacturing	40 CFR part 63, subpart EEE	3241
Chemical manufacturing	40 CFR part 63, subpart EEE	325
Cement and concrete product manufacturing	40 CFR part 63, subpart EEE	3273
Other nonmetallic mineral product manufacturing	40 CFR part 63, subpart EEE	3279
Hazardous waste treatment and disposal	40 CFR part 63, subpart EEE	562211
Remediation and other waste management services	40 CFR part 63, subpart EEE	5629

¹ North American Industry Classification System.

B. Where can I get a copy of this document and other related information?

In addition to being available in the docket, an electronic copy of this action is available on the internet. In accordance with 5 U.S. Code (U.S.C.) 553(b)(4), a brief summary of this rule may be found at <https://www.regulations.gov>, Docket ID No. EPA-HQ-OAR-2004-0022. Following signature by the Administrator, the EPA will post a copy of this proposed action at <https://www.epa.gov/stationary-sources-air-pollution/hazardous-waste-combustors-national-emission-standards-hazardous>. Following publication in the **Federal Register**, the EPA will post the **Federal Register** version of the proposal and key technical documents at this same web page. Information on the overall residual risk and technology review (RTR) program is available at <https://www.epa.gov/stationary-sources-air-pollution/risk-and-technology-review-national-emissions-standards-hazardous>.

A memorandum showing the rule edits that would be necessary to incorporate the changes to 40 CFR part 63, subpart EEE, proposed in this action is available in the docket (Docket ID No. EPA-HQ-OAR-2004-0022). Following signature by the Administrator, the EPA also will post a copy of this document to <https://www.epa.gov/stationary-sources-air-pollution/hazardous-waste-combustors-national-emission-standards-hazardous>.

II. Background

A. What is the statutory authority for this proposed action?

The statutory authority for this proposed action is provided by CAA sections 112, 301(a), and 502(a) (42 U.S.C. 7412, 7601(a), 7661a(a)). CAA section 112 establishes a two-stage regulatory process to develop standards for emissions of hazardous air pollutants (HAP) from stationary sources. Generally, the first stage involves establishing technology-based standards that reflect the maximum

achievable control technology (MACT) or an appropriate alternative.² The second stage involves evaluating those standards within eight years to determine whether additional standards are needed to address any remaining risk associated with HAP emissions.³ This second stage is commonly referred to as the “residual risk review.” In addition to the residual risk review, CAA section 112 also requires the EPA to review the standards every eight years and “revise as necessary” taking into account “developments in practices, processes, or control technologies.”⁴ This review is commonly referred to as the “technology review.” When the two reviews are combined into a single rulemaking, it is commonly referred to as the “risk and technology review” (RTR). The discussion that follows identifies the most relevant statutory sections and briefly explains the contours of the methodology used to implement these statutory requirements.

In the first stage of the CAA section 112 standard-setting process, the EPA promulgates technology-based standards under CAA section 112(d) for categories of sources identified as emitting one or more of the HAP listed in CAA section 112(b). Sources of HAP emissions are either major sources or area sources, and CAA section 112 establishes different requirements for major and area source standards. “Major sources” are those that emit or have the potential to emit 10 tons per year (tpy) or more of a single HAP or 25 tpy or more of any combination of HAP.⁵ All other sources are “area sources.”⁶ For major sources, CAA section 112(d)(2) provides that the technology-based NESHAP must reflect the maximum degree of emission reductions of HAP achievable (after considering cost, energy requirements, and non-air quality health and environmental impacts). These standards are commonly referred to as

MACT standards. CAA section 112(d)(3) also establishes a minimum control level for MACT standards, known as the MACT “floor,” based on emission controls achieved in practice by the best performing sources. In certain instances, as provided in CAA section 112(h), the EPA may set work practice standards in lieu of numerical emission standards. Under CAA section 112(h), the EPA may adopt a work practice standard in lieu of a numerical emission standard if it is “not feasible in the judgment of the Administrator to prescribe or enforce an emission standard for control of a hazardous air pollutant.”⁷ CAA section 112(h)(2)(A) defines this phrase as applying in any situation where a HAP “cannot be emitted through a conveyance designed and constructed to emit or capture such pollutant, or that any requirement for, or use of such a conveyance would be inconsistent with any Federal, State or local law.”⁸ This phrase is further defined in CAA section 112(h)(2)(B) as applying where “the Administrator determines that the application of measurement methodology to a particular class of sources is not practicable due to technological and economic limitations.”⁹ The EPA has long considered situations where the majority of the measurements are below the detection limit as being a situation where measurement is not “technologically practicable” within the meaning of CAA section 112(h)(2)(B). Additionally, unreliable measurements raise issues of practicability, feasibility and enforceability. The application of measurement methodology in this situation would also not be “practicable due to . . . economic limitation” within the meaning of CAA section 112(h)(2)(B) because it would just result in cost expended to produce analytically

² 42 U.S.C. 7412(d)(1)–(4).

³ *Id.* 7412(f)(2).

⁴ *Id.* 7412(d)(6).

⁵ 42 U.S.C. 7412(a)(1).

⁶ *Id.* 7412(a)(2).

⁷ *Id.* 7412(h)(1). *Sierra Club v. EPA*, 479 F.3d 875, 883–84 (D.C. Cir. 2007); The EPA may “adopt[] a method to account for measurement imprecision that has a rational basis in the correlation between increased emission values and increased testing precision.” *Nat’l Ass’n of Clean Water Agencies v. EPA*, 734 F.3d 1115, 1154–55 (D.C. Cir. 2013).

⁸ 42 U.S.C. 7412(h)(2)(A).

⁹ 42 U.S.C. 7412(h)(2)(B).

suspect measurements. The EPA also considers control options that are more stringent than the floor.¹⁰ Standards more stringent than the floor are commonly referred to as “beyond-the-floor” standards. For area sources, CAA section 112(d)(5) allows the EPA to set standards based on generally available control technologies or management practices (GACT standards) in lieu of MACT standards.

For categories of major sources and any area source categories subject to MACT standards, the second stage focuses on identifying and addressing any remaining (*i.e.*, “residual”) risk within eight years pursuant to CAA section 112(f). Specifically, CAA section 112(f)(2) requires the EPA to determine not later than eight years after establishment of the MACT standards whether promulgation of additional standards is needed to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect. CAA section 112(d)(5) provides that this residual risk review is not required for categories of area sources subject to GACT standards. CAA section 112(f)(2)(B) expressly preserves the EPA’s use of the two-step approach for developing standards to address any residual risk and the Agency’s interpretation of “ample margin of safety” developed in the *National Emissions Standards for Hazardous Air Pollutants: Benzene Emissions from Maleic Anhydride Plants, Ethylbenzene/Styrene Plants, Benzene Storage Vessels, Benzene Equipment Leaks, and Coke By-Product Recovery Plants* (“Benzene NESHAP”).¹¹ The EPA notified Congress in the Residual Risk Report that the Agency intended to use the Benzene NESHAP approach in making CAA section 112(f) residual risk determinations (EPA-453/R-99-001, p. ES-11). The EPA subsequently adopted this approach in its residual risk determinations, and the United States Court of Appeals for the District of Columbia Circuit upheld the EPA’s interpretation that CAA section 112(f)(2) incorporates the approach established in the Benzene NESHAP. See *NRDC v. EPA*, 529 F.3d 1077, 1083 (D.C. Cir. 2008).

The approach incorporated into the CAA and used by the EPA to evaluate residual risk and develop standards under CAA section 112(f)(2) is also a two-step approach. In the first step, the EPA determines whether risks are acceptable. This determination “considers all health information, including risk estimation uncertainty,

and includes a presumptive limit on maximum individual lifetime [cancer] risk (MIR) of approximately 1 in 10 thousand”.¹² If risks are unacceptable, the EPA must determine the emission standards necessary to reduce risk to an acceptable level without considering costs. In the second step of the approach, the EPA considers whether the emission standards provide an ample margin of safety to protect public health “in consideration of all health information, including the number of persons at risk levels higher than approximately 1 in 1 million, as well as other relevant factors, including costs and economic impacts, technological feasibility, and other factors relevant to each particular decision”.¹³ The EPA must promulgate emission standards necessary to provide an ample margin of safety to protect public health or determine that the standards being reviewed provide an ample margin of safety without any revisions. After conducting the ample margin of safety analysis, we consider whether a more stringent standard is necessary to prevent, taking into consideration costs, energy, safety, and other relevant factors, an adverse environmental effect.

CAA section 112(d)(6) separately requires the EPA to review standards promulgated under CAA section 112 and revise them “as necessary (taking into account developments in practices, processes, and control technologies)” no less often than every eight years. In conducting this review, which we call the “technology review,” the EPA is not required to recalculate the MACT floors that were established during earlier rulemakings.¹⁴ The EPA may consider cost in deciding whether to revise the standards pursuant to CAA section 112(d)(6).¹⁵

CAA sections 112(c)(3) and (k) require the EPA to identify and list the area source categories that represent 90 percent of the emissions of the 30 urban air toxics associated with area sources and subject them to standards under the CAA. CAA section 112(k)(3), which cross-references CAA section 112(c)(3), requires the EPA to identify a list of at least 30 air toxics that pose the greatest potential health threat in urban areas (the “urban” HAP). Taken together,

these requirements are known as the Urban Air Toxics Strategy. These are the HAP that present the greatest threat to public health in the largest number of urban areas (CAA section 112(k)(3)(B)(i)). CAA sections 112(k)(3)(B)(ii) and 112(c)(3) also require the EPA to “assure that sources accounting for 90 percent or more of the 30 identified hazardous air pollutants are subject to standards.”

In *Louisiana Environmental Action Network (LEAN) v. EPA*, the D.C. Circuit held that the EPA must address missing MACT standards for listed HAP known to be emitted from a major source category as part of its periodic review of MACT standards under CAA section 112(d)(6). 955 F.3d 1088 (D.C. Cir. 2020). In October 2022, Earthjustice filed an action in the U.S. District Court for the District of Columbia to compel the EPA to review and revise the HWC NESHAP under CAA sections 112(d)(6) and (f)(2) (*i.e.*, complete the RTR). In December 2024, the district court issued an order requiring that the EPA sign the final RTR rule for this source category by December 31, 2025, and establish standards for any previously unregulated HAP in the final RTR. Order, *Blue Ridge Env'tl. Def. League v. Regan*, 22–cv–3134 (APM), at 4 (D.D.C. Dec. 12, 2024). The EPA is proposing this action in response to that court order.

Further, under CAA section 301(a) “[t]he Administrator is authorized to prescribe such regulations as are necessary to carry out his functions.” The EPA is also required to specify relevant test methods, best practices, procedures, or protocols and recordkeeping requirements for standards promulgated under CAA section 112.

Finally, CAA section 502(d)(l) requires each state to develop and submit to the EPA an operating permit program to meet the requirements of title V of the CAA and the EPA’s implementing regulations at 40 CFR part 70 (“title V”). Major stationary sources of air pollution and certain other non-major sources are required to apply for and operate in accordance with title V operating permits that include emission limitations and other conditions as necessary to assure compliance with applicable requirements of the CAA, including the requirements of the applicable implementation plan.

B. What is this source category and how does the current NESHAP regulate its HAP emissions?

HWCs are incinerators, cement kilns, lightweight aggregate kilns, boilers, or HCl production furnaces that combust

¹² 54 FR 38045, Sept. 14, 1989. Although defined as “maximum individual risk,” MIR refers only to cancer risk. MIR, one metric for assessing cancer risk, is the estimated risk if an individual were exposed to the maximum level of a pollutant for a lifetime.

¹³ *Id.*

¹⁴ *Ass’n of Battery Recyclers, Inc. v. EPA*, 716 F.3d 667, 673–674 (D.C. Cir. 2013); *NRDC*, 529 F.3d at 1084.

¹⁵ 42 U.S.C. 7412(d)(2), (6); *Ass’n of Battery Recyclers*, 617 F.3d at 673–74.

¹⁰ *Id.* 7412(d)(2).

¹¹ 54 FR 38044, Sept. 14, 1989.

hazardous waste for waste reduction, thermal energy recovery, and/or production of a product. Hazardous waste is defined under the Resource Conservation and Recovery Act (RCRA), which establishes a comprehensive regulatory structure overseeing the safe treatment, storage, and disposal of hazardous waste.¹⁶ HWCs act as a disposal method for hazardous waste but can also provide other benefits to their owners and operators. The primary purpose of HWC incinerators is the destruction or volume reduction of hazardous waste. The primary purpose of HWC cement kilns is the production of cement using hazardous waste as a fuel to reduce the need for non-waste energy inputs. Similarly, HWC lightweight aggregate kilns use hazardous waste to provide energy for producing lightweight aggregate. HWC boilers produce thermal energy (often used in the form of steam), with hazardous waste often replacing the need for some non-waste fuel. An HWC HCl production furnace produces HCl, often using hazardous waste as a chlorine source.

HWCs may either burn only hazardous waste produced onsite or by the owner, which is referred to as a “captive” HWC, or burn hazardous waste produced offsite or by someone other than the owner, which is referred to as a “commercial” HWC. Facilities with captive HWCs typically use their HWC as a waste management strategy. The most common captive HWCs are solid fuel boilers, liquid fuel boilers, HCl production furnaces, and some incinerators. Facilities with commercial HWCs typically use their HWC for revenue generation. The most common commercial HWCs are cement kilns, lightweight aggregate kilns, and incinerators. The main line of business for some commercial HWC incinerators is waste management. There are approximately 160 HWCs located at approximately 90 facilities in the United States. In 2023, approximately 32.2 million tons of hazardous waste were generated in the United States, all of which must be treated or disposed of in ways that protect human health and the environment.¹⁷ Hazardous waste incineration provided that disposal for approximately 1.1 million tons of that hazardous waste, and energy recovery in units like hazardous waste burning

boilers accounted for an additional 1.4 million tons.¹⁸

HWCs are regulated under both the CAA and RCRA. Under the CAA, all unit types are regulated under the HWC NESHAP. Prior to demonstrating compliance with the HWC NESHAP, incinerators were primarily regulated by 40 CFR part 264, subpart O, and cement kilns, lightweight aggregate kilns, boilers, and HCl production furnaces were primarily regulated by 40 CFR part 266, subpart H. For most sources, air emission standards and associated operating requirements are no longer contained in their RCRA permits. Sources continue to hold RCRA permits for activities related to hazardous waste management, including general facility standards, manifest requirements, closure, financial responsibility, and any risk-based emission limit and associated operating conditions deemed necessary to protect human health and the environment.

The HWC NESHAP, which was originally promulgated in 1999, regulated hazardous waste incinerators, cement kilns, and lightweight aggregate kilns.¹⁹ These standards were vacated in 2001²⁰ and replaced with interim standards in 2002.²¹ The EPA promulgated replacement standards for hazardous waste incinerators, cement kilns, and lightweight aggregate kilns and first-time standards for hazardous waste solid fuel boilers, liquid fuel boilers, and HCl production furnaces in 2005.²² Subsequently, the EPA received four petitions for reconsideration of the final rule. In 2006, the EPA granted reconsideration for eight issues raised by the petitions²³ and in 2007 reopened the 2005 rule²⁴ (the “Solicitation of Comment on Legal Analysis”) to consider comments relating to an intervening decision by the D.C. Circuit.²⁵ The EPA took final action on the eight reconsideration issues, responded to comments on the Solicitation of Comment on Legal Analysis, and made technical corrections in 2008.²⁶ In response to a petition for reconsideration of the 2008 final rule, the EPA sought and received

a full voluntary remand of the rule in 2009 to reexamine the HWC NESHAP in totality.²⁷

In July 2024, the EPA issued a notice of proposed rulemaking for the HWC NESHAP regarding emission standards during periods of malfunction, electronic reporting provisions, emergency safety vent provisions, and other minor technical corrections.²⁸ The EPA is withdrawing certain aspects of that proposal in this document for the reasons explained in section IV.E. of this preamble. The EPA is instead proposing different requirements and soliciting comments on certain topics from the 2024 proposal that include emission standards during periods of malfunction and electronic reporting provisions in this notice of proposed rulemaking. The EPA will respond to other comments on aspects of the July 2024 proposal that are not withdrawn in the final action for this proposal.

The key pollutants that the HWC NESHAP regulates include polychlorinated dibenzodioxins and furans (PCDD/PCDF); mercury (Hg); cadmium (Cd) and lead (Pb) as semi-volatile metals (SVM); arsenic (As), beryllium (Be), and chromium (Cr) as low-volatile metals (LVM); antimony (Sb), cobalt (Co), manganese (Mn), nickel (Ni), and selenium (Se) as non-enumerated metal HAP; HCl and chlorine gas; and other hydrocarbon HAP, including polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs). The HWC NESHAP also includes several other emission limits such as a carbon monoxide (CO) or total hydrocarbon (THC) limit associated with demonstrating good combustion practices, a destruction and removal efficiency (DRE) standard also for demonstrating good combustion practices, and a particulate matter (PM) emission limit in some subcategories.

The HWC NESHAP regulates HAP through a combination of numeric emission limits and surrogate standards, where compliance with one emission standard demonstrates compliance with the standard for another HAP. For example, emissions of non-PCDD/PCDF organic HAP, including PCBs and PAHs, are regulated by the combination of the DRE standard and either the CO or THC standard, as chosen by the source. Another example of a surrogate is the PM standard, which primarily regulates emissions of non-enumerated metal HAP. These metals are not regulated by

¹⁶ U.S. Environmental Protection Agency. (Last updated Jul. 10, 2025). Biennial Report Management Methods: <https://rcrapublic.epa.gov/rcra-hwip/trends-and-analysis/details/3>.

¹⁹ 64 FR 52828 (September 30, 1999).

²⁰ *Cement Kiln Recycling Coal. v. EPA*, 255 F.3d 855, 872 (D.C. Cir. 2001).

²¹ 67 FR 6792 (Feb. 13, 2002).

²² 70 FR 59402 (Oct. 12, 2005).

²³ 71 FR 14665 (Mar. 23, 2006); 71 FR 52624 (Sept. 6, 2006).

²⁴ 72 FR 54875 (Sept. 27, 2007).

²⁵ *Sierra Club v. EPA*, 479 F.3d 875 (D.C. Cir. 2007).

²⁶ 73 FR 64068 (Oct. 28, 2008).

²⁷ *Sierra Club v. EPA*, Docket No. 05–1441 (consolidated with Docket Nos. 05–1442, 05–1443, 05–1445, 05–1449) (D.C. Cir.).

²⁸ 89 FR 59867 (Jul. 24, 2024).

¹⁶ 42 U.S.C. 6901–6992k.

¹⁷ U.S. Environmental Protection Agency. (Last updated Dec. 30, 2024). Biennial Report Summary: <https://rcrapublic.epa.gov/rcra-hwip/trends-and-analysis/details/4>.

another metal HAP standard. Sources may also choose to regulate non-enumerated metal HAP directly as an alternative to the PM standard. An alternative health-based emission limit (HBEL) based on a site-specific risk assessment is also available for HCl and chlorine gas.²⁹

The HWC NESHAP regulates HAP emissions from HWCs at major and area sources, as defined by CAA sections 112(a)(1) and (2). The HWC NESHAP also requires both major and area sources to obtain a title V air permit. Major and area sources are subject to the same standards for HWC incinerators, cement kilns, and lightweight aggregate kilns. Area source HWC boilers and HCl production furnaces are only subject to the same emission standards as major sources for Hg, PCDD/PCDF, and non-PCDD/PCDF organic HAP. RCRA standards for Cd and Pb, Cr, HCl and chlorine gas, and PM under 40 CFR part 266, subpart H, apply to area source HWC boilers and HCl production furnaces unless an area source elects to comply with the HWC NESHAP major source standards in lieu of the RCRA standards. Area sources otherwise have the same requirements as major sources, including recordkeeping, reporting, operator training, the startup, shutdown, and malfunction (SSM) plan, and the automatic waste feed cutoff (AWFCO) system.³⁰

Periods of SSM are addressed under both the RCRA rules and the HWC NESHAP. The requirements of both rules apply simultaneously to HWCs. Under the RCRA rules, sources may choose to retain or revise certain RCRA permit conditions that are specific to periods of SSM, including a requirement not to feed most types of hazardous waste during periods of SSM. Alternatively, sources may choose to remove RCRA operating permit conditions specific to periods of SSM if an SSM plan has been developed under the HWC NESHAP and approved by the Administrator.³¹ Most sources have chosen to remove conditions specific to periods of SSM from their RCRA permits because they have approved SSM plans under the HWC NESHAP.

The emission standards and operating requirements of the HWC NESHAP currently do not apply during periods of

SSM.³² However, there are two requirements relating to periods of SSM that apply to all HWCs. Specifically, all HWCs must develop an SSM plan and operate an AWFCO system. All HWCs are subject to the SSM plan provisions of the 40 CFR part 63, subpart A general provisions, including the requirements to develop an SSM plan and update it as necessary. Under the general provisions, if actions taken by the owner or operator cause the source to exceed any applicable emission limitation and are consistent with the procedures specified in the SSM plan, then the owner or operator must keep records and confirm in their reporting that their actions were consistent with the SSM plan. If actions taken by the owner or operator cause the source to exceed any applicable emission limitation and are not consistent with the procedures specified in the SSM plan, then the owner or operator must also record and report those actions.

If an HWC uses their CAA SSM plan to comply with RCRA requirements, then the SSM plan must be submitted to the Administrator for review and approval and the SSM plan must include a description of potential causes of malfunctions and actions the source is taking to minimize the frequency and severity of those malfunctions. The Administrator must also approve any changes to the SSM plan if the changes may significantly increase emissions of HAP.

All HWCs are also required to operate an AWFCO system, which is a system that immediately (or within one minute in some circumstances) and automatically cuts off the hazardous waste feed to the HWC when an operating parameter limit (OPL) established per the HWC NESHAP is exceeded, an emission standard monitored by a continuous emission monitoring system (CEMS) is met or exceeded, the allowable combustion chamber pressure is exceeded, the span value of any continuous monitoring system (CMS) detector except a CEMS is met or exceeded, a CMS monitoring an emission level or an OPL established per the HWC NESHAP malfunctions, or any component of the AWFCO system fails. During an AWFCO, owners or operators must continue to send combustion gases to the air pollution

control system while hazardous waste remains in the combustion chamber of the HWC. Hazardous waste feed to the HWC cannot restart until the OPLs and emission levels are within the specified limits, which typically takes no less than one hour. The AWFCO system must generally be tested at least weekly.

HWCs must comply with the described AWFCO system requirements during malfunctions, although an exceedance of an OPL or emission standard interlocked with the AWFCO system is not a violation of the HWC NESHAP if the corrective measures prescribed in the SSM plan are correctly followed.

Additionally, HWCs must comply with AWFCO requirements during periods of startup and shutdown if they burn hazardous waste during those periods. An exceedance of an OPL or emission standard interlocked with the AWFCO system is not a violation of the HWC NESHAP if the corrective measures prescribed in the SSM plan are correctly followed. If owners or operators of HWCs feed hazardous waste during periods of startup or shutdown, they must include waste feed restrictions and other appropriate operating conditions and limits in the SSM plan and interlock those OPLs with the AWFCO system. Under the RCRA incinerator (40 CFR part 264, subpart O) and boiler and industrial furnaces (BIF; 40 CFR part 266, subpart H) requirements, hazardous waste may be fed into an HWC during startup and shutdown if all OPLs are being met. This is typically the case shortly before startup ends and shortly after shutdown begins. In addition, certain types of hazardous waste may be fed during startup and shutdown under certain stipulations, regardless of whether OPLs for periods of normal operation are being met. One example is a waste that is only considered hazardous because it is ignitable and easily burned; an owner or operator might feed this waste into the combustor during startup and use the energy released by its combustion to raise the HWC's temperature to the allowable range for periods of normal operation. Most HWCs do not combust hazardous waste during startup and shutdown. In cases where an HWC does so, we expect that the HWC NESHAP's SSM plans closely mirror RCRA's restrictions on hazardous waste feed during periods of startup and shutdown.

C. What data collection activities were conducted to support this action?

The EPA conducted multiple data collection activities to support this action, including collecting HWC facility permits and emissions testing

²⁹ For more information on the alternative HBEL for HCl and chlorine gas, see 70 FR 59413–25 (Oct. 12, 2005); see also 69 FR 21298–305–06 (Apr. 20, 2004).

³⁰ See 70 FR 59432 (Oct. 12, 2005) for further discussion on the similarities and differences between major and area source standards.

³¹ See 40 CFR part 270, subpart I, for the integration of RCRA and CAA standards during periods of SSM.

³² In July 2024, the EPA proposed to remove the malfunction exemption from the HWC NESHAP, which, if finalized, would have required standards for periods of normal operation to apply at all times (89 FR 59870). After considering the comments received on that proposal, the EPA is withdrawing the proposed removal of the malfunction exemption and is instead proposing different requirements for periods of malfunction, as described in section IV.E of this preamble.

information available through state and local authorities, a two-phased request for information under CAA section 114, and site visits to HWC facilities.³³

To develop the facility list, we began with a partial facility list provided by the EPA Office of Land and Emergency Management (OLEM), which administers the RCRA rules for HWCs. We also gathered a list of all facilities listed as subject to the HWC NESHAP in the EPA Office of Enforcement and Compliance Assurance's (OECA) Enforcement and Compliance History Online (ECHO) tool (<https://echo.epa.gov>). We reviewed and cross-referenced these lists and confirmed that facilities were subject to the HWC NESHAP by gathering title V air permits from the websites of state and local governments or agencies, where available. The resulting facility list is available in the docket for this proposed rule (Docket ID No. EPA-HQ-OAR-2004-0022).

The EPA also collected emissions test reports for the comprehensive performance test (CPT) and confirmatory performance test (CfPT) required by the HWC NESHAP. These test reports were gathered from the websites of state and local governments or agencies where available, from the EPA regional offices, and from some industry stakeholders who voluntarily provided courtesy copies. The CPT and CfPT reports provide unit- and site-specific emissions information for the HAP regulated by the HWC NESHAP and are the basis for emissions of the currently regulated HAP in the risk modeling for the HWC source category. The collected emissions test reports used to develop emissions for the HWC source category are available in the docket for this proposed rule (Docket ID No. EPA-HQ-OAR-2004-0022).

In August 2023 and January 2024, the EPA issued requests to collect information from HWC facilities owned and operated by nine entities (*i.e.*, corporations) pursuant to CAA section 114. These facilities were chosen to represent the six HWC subcategories and commercial and captive units. The August 2023 request was a questionnaire designed to collect comprehensive information about process equipment, control technologies, emissions, composition of

the hazardous waste feed to the unit, periods of SSM, and other aspects of facility operations. Companies submitted responses (and follow-up responses) in November 2023. A copy of the questionnaire and the information not claimed as CBI by respondents is available in the docket for this proposed rule.³⁴

Following the review of the August 2023 questionnaire information, the EPA issued an emissions testing request to the same nine entities in January 2024 to obtain emissions information about targeted pollutants and to characterize emissions of any HAP not currently regulated by the HWC NESHAP. Companies submitted responsive emissions testing results (and follow-up responses) between September 2024 and November 2024. The EPA did not receive emissions testing results from one company that temporarily ceased operation of their HWCs between January 2024 and September 2024. The January 2024 request generally required emissions testing of PCBs, PAHs, hydrogen fluoride (HF), hydrogen cyanide (HCN), hydrogen bromide (HBr), THC, and supporting measurements like oxygen and moisture, though the requests were tailored to the specific survey responses of each recipient. Notably, all HCl production furnaces indicated in their survey responses that they do not feed any fluorine to their units because it would contaminate their HCl product with HF, and so HCl production furnaces were not required to test for HF. The EPA has used the collected information to identify and quantify emissions of HAP not measured during a CPT or CfPT, fill data gaps, and estimate the public health, environmental, and cost impacts associated with the regulatory options considered in this proposed action. A copy of the emissions testing request and the information not claimed as CBI by respondents is available in the docket for this proposed rule (Docket ID No. EPA-HQ-OAR-2004-0022).

The EPA also conducted two site visits to HWC facilities in 2023. The primary goals of these site visits were to learn about the day-to-day operations of incinerators, solid fuel boilers, and cement kilns. Reports documenting these site visits are available in the docket for this proposed rule.³⁵

D. What other relevant background information and data are available?

The EPA used emissions and supporting data from the National Emissions Inventory (NEI) based on emissions year 2022, supporting data from the database developed for the 2005 HWC NESHAP Final Rule, available RCRA trial or risk burn data, and CPT and CfPT stack test data from as many sources as possible to develop model file inputs for the residual risk assessment of sources subject to the HWC NESHAP.

The NEI is a database that contains information about sources that emit criteria air pollutants, their precursors, and HAP. The NEI contains data necessary for conducting risk modeling, including annual HAP emissions estimates from individual emissions sources at facilities and the related emissions release parameters. The database includes estimates of annual air pollutant emissions from point, nonpoint, and mobile sources in the 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands. The EPA collects this information and releases a full, updated version of the NEI database every three years. The 2022 emissions data is not a full, triennial NEI; instead, the 2020 NEI was taken as a basis and more recent 2022 data was incorporated. In cases where we had emissions and release point parameters for the same HWC from multiple data sources (*e.g.*, the NEI, CPT, and August 2023 questionnaire), we prioritized information in the following order: August 2023 questionnaire, CPT or CfPT data, then NEI data. Additional information on the development of the modeling file can be found in the docket for this proposed rule (Docket ID No. EPA-HQ-OAR-2004-0022).

To identify control technologies in use and determine whether there have been developments in practices, processes, or control technologies to consider under the technology review, the EPA collected information from the August 2023 questionnaire, January 2024 emissions testing request, CPT and CfPT reports, consent decrees involving HWCs regulated by the HWC NESHAP, and the Reasonably Available Control Technology (RACT)/Best Available Control Technology (BACT)/Lowest Achievable Emission Rate (LAER) Clearinghouse (RBLC). The EPA established the RBLC to provide a central database of air pollution technology information (including technologies required in source-specific permits) to promote the sharing of information among permitting agencies

³³ In its 1999 report to Congress on how the agency planned to address residual risks, the EPA stated that "source and emissions data can be derived from broad-scale emissions inventories, specific data collection efforts with particular industries, or information from regional, State, or local air toxics agencies." *Residual Risk Report to Congress*, EPA-453/R-99-001 at 13 (March 1999) (emphasis added).

³⁴ Docket ID No. EPA-HQ-OAR-2004-0022, Document ID No. EPA-HQ-OAR-2004-0022-0651.

³⁵ Docket ID No. EPA-HQ-OAR-2004-0022, Document ID Nos. EPA-HQ-OAR-2004-0022-0649 and EPA-HQ-OAR-2004-0022-0650.

and to aid in identifying future control technology options that might apply to numerous sources within a category or only on a source-by-source basis.³⁶ The EPA also reviewed subsequent CAA regulatory actions for other source categories to determine whether there have been other developments in practices, processes, or control technologies that may also be applicable to the HWC NESHP source category. Additional information about the technology review can be found in the docket for this proposed rule (Docket ID No. EPA-HQ-OAR-2004-0022).

III. Analytical Procedures and Decision-Making

In this section, we describe the analyses performed to support the proposed decisions for the RTR and other issues addressed in this proposal.

A. How do we consider risk in our decision-making?

As discussed in section II.A. of this preamble and in the Benzene NESHP, in evaluating and developing standards under CAA section 112(f)(2), we apply a two-step approach to determine whether or not risks are acceptable and to determine if the standards provide an ample margin of safety to protect public health. As explained in the Benzene NESHP, “the first step judgment on acceptability cannot be reduced to any single factor” and, thus, “[t]he Administrator believes that the acceptability of risk under section 112 is best judged on the basis of a broad set of health risk measures and information.”³⁷ Similarly, with regard to the ample margin of safety determination, “the Agency again considers all of the health risk and other health information considered in the first step” (*id.*). “Beyond that information, additional factors relating to the appropriate level of control will also be considered, including cost and economic impacts of controls, technological feasibility, uncertainties, and any other relevant factors” (*id.*).

The Benzene NESHP approach provides flexibility regarding factors the EPA may consider in making determinations and how the EPA may weigh those factors for each source category.³⁸ The EPA conducts a risk assessment that provides estimates of the MIR posed by emissions of HAP that are carcinogens from each source in the

source category, the hazard index (HI) for chronic exposures to HAP with the potential to cause noncancer health effects, and the hazard quotient (HQ) for acute exposures to HAP with the potential to cause noncancer health effects.³⁹ The assessment also provides estimates of the distribution of cancer risk within the exposed populations, cancer incidence, and an evaluation of the potential for an adverse environmental effect. The scope of the EPA’s risk analysis is consistent with the explanation in the EPA’s response to comments on our policy under the Benzene NESHP:

The policy chosen by the Administrator permits consideration of multiple measures of health risk. Not only can the MIR figure be considered, but also incidence, the presence of non-cancer health effects, and the uncertainties of the risk estimates. In this way, the effect on the most exposed individuals can be reviewed as well as the impact on the general public. These factors can then be weighed in each individual case. This approach complies with the *Vinyl Chloride* mandate that the Administrator ascertain an acceptable level of risk to the public by employing his expertise to assess available data. It also complies with the Congressional intent behind the CAA, which did not exclude the use of any particular measure of public health risk from the EPA’s consideration with respect to CAA section 112 regulations, and thereby implicitly permits consideration of any and all measures of health risk which the Administrator, in his judgment, believes are appropriate to determining what will “protect the public health.”⁴⁰

Thus, the level of the MIR is only one factor to be weighed in determining acceptability of risk. As the EPA explained in the Benzene NESHP: “[A]n MIR of approximately one in 10 thousand should ordinarily be the upper end of the range of acceptability. As risks increase above this benchmark, they become presumptively less acceptable under [CAA] section 112 and would be weighed with the other health risk measures and information in making an overall judgment on acceptability. Or, the Agency may find, in a particular case, that a risk that includes an MIR less than the presumptively acceptable level is unacceptable in the light of other health risk factors.”⁴¹ In other words, risks that include an MIR above 100-in-1 million (1-in-10 thousand) may be determined

to be acceptable, and risks with an MIR below that level may be determined to be unacceptable, depending on the available health information. Similarly, with regard to the ample margin of safety analysis, the EPA stated in the Benzene NESHP that: “EPA believes the relative weight of the many factors that can be considered in selecting an ample margin of safety can only be determined for each specific source category. This occurs mainly because technological and economic factors (along with the health-related factors) vary from source category to source category.”⁴² We also consider the uncertainties associated with the various risk analyses, as discussed later in this preamble, in our determinations of acceptability and ample margin of safety.

The EPA notes that, as a matter of longstanding practice, we do not attempt to quantify the HAP risk that may be associated with emissions from other facilities that do not include the source category under review, mobile source emissions, natural source emissions, persistent environmental pollution, or atmospheric transformation in the vicinity of the sources in the category. The EPA understands the potential importance of considering an individual’s total exposure to HAP in addition to considering exposure to HAP emissions from the source category and facility. We recognize that such consideration may be particularly important when assessing noncancer risk, where pollutant-specific exposure health reference levels (*e.g.*, reference concentrations (RfCs)) are based on the assumption that thresholds exist for adverse health effects. For example, the EPA recognizes that, although exposures attributable to emissions from a source category or facility alone may not indicate the potential for increased risk of adverse noncancer health effects in a population, the exposures resulting from emissions from the facility in combination with emissions from all of the other sources (*e.g.*, other facilities) to which an individual is exposed may be sufficient to result in an increased risk of adverse noncancer health effects. In May 2010, the Science Advisory Board (SAB) advised the EPA “that RTR assessments will be most useful to decision makers and communities if results are presented in the broader context of aggregate and cumulative risks, including background

³⁶ U.S. Environmental Protection Agency. (Last updated Sept. 29, 2025). RACT/BACT/LAER Clearinghouse (RBLCL) Basic Information: <https://www.epa.gov/catc/ractbactlaer-clearinghouse-rblcl-basic-information>.

³⁷ 54 FR 38046, Sept. 14, 1989.

³⁸ See *NRDC*, 529 F.3d at 1082–1084.

³⁹ The MIR is defined as the cancer risk associated with a lifetime of exposure at the highest concentration of HAP where people are likely to live. The HQ is the ratio of the potential HAP exposure concentration to the noncancer dose-response value; the HI is the sum of HQs for HAP that affect the same target organ or organ system.

⁴⁰ 54 FR 38057, Sept. 14, 1989.

⁴¹ *Id.* at Sept. 14, 1989.

⁴² 54 FR 38061, Sept. 14, 1989.

concentrations and contributions from other sources in the area.”⁴³

In response to the SAB recommendations, the EPA incorporates cumulative risk analyses into its RTR risk assessments. The Agency (1) conducts facility-wide assessments, which include source category emission points, as well as other emission points within the facilities; (2) combines exposures from multiple sources in the same category that could affect the same individuals; and (3) for some persistent and bioaccumulative pollutants, analyzes the ingestion route of exposure. In addition, the RTR risk assessments consider aggregate cancer risk from all carcinogens and aggregated noncancer HQs for all noncarcinogens affecting the same target organ or target organ system.

Although we are interested in placing source category and facility-wide HAP risk in the context of total HAP risk from all sources combined in the vicinity of each source, we note there are uncertainties of doing so. Estimates of total HAP risk from emission sources other than those that we have studied in depth during this RTR review would have greater associated uncertainties than the source category or facility-wide estimates. We further note that CAA section 112(f)(2) does not require or authorize the EPA to promulgate standards based on cumulative assessments of a person's total exposure to HAP from all sources.

B. How do we perform the technology review?

The EPA's technology review primarily focuses on the identification and evaluation of developments in practices, processes, and control technologies that have occurred since the MACT standards were promulgated. Where we identify such developments, we analyze their technical feasibility, estimated costs, energy implications, and non-air environmental impacts. We also consider the emission reductions associated with the potential application of each development. This analysis informs our decision whether it is “necessary” to revise the emission standards. In addition, we consider the appropriateness of applying controls to new sources versus retrofitting existing sources. For this exercise, we consider any of the following to be a “development”:⁴⁴

- Any add-on control technology or other equipment that was not identified and considered during development of the original MACT standards;
- Any improvements in add-on control technology or other equipment (that were identified and considered during development of the original MACT standards) that could result in additional emissions reduction;
- Any work practice or operational procedure that was not identified or considered during development of the original MACT standards;
- Any process change or pollution prevention alternative that could be broadly applied to the industry and that was not identified or considered during development of the original MACT standards; and
- Any significant changes in the cost (including cost effectiveness) of applying controls (including controls the EPA considered during the development of the original MACT standards).

In addition to reviewing the practices, processes, and control technologies that were considered at the time we originally developed the NESHAP, we review a variety of data sources in our investigation of potential practices, processes, or controls. Pursuant to the D.C. Circuit's decision in *LEAN*, we also review available data to determine if there are any unregulated emissions of HAP within the source category and evaluate this data for use in developing new emission standards. The *LEAN* decision requires the EPA to address regulatory gaps when reviewing MACT standards, such as missing standards for listed air toxics known to be emitted from a major source category. See sections II.C. and II.D of this preamble for information on the specific data sources that were reviewed as part of the technology review.

C. How do we estimate post-MACT risk posed by the source category?

In this section, the EPA provides a description of the types of analyses that we generally perform during the risk assessment process. In some cases, we do not perform a specific analysis because it is not relevant. For example, in the absence of emissions of HAP known to be persistent and bioaccumulative in the environment (PB-HAP), we would not perform a multipathway exposure assessment. Where we do not perform an analysis, we state that we do not and provide the

interpretation of what is considered “developments” under CAA section 112(d)(6) and deferring to EPA's methodology and balancing decisions for a technology review under the *Skidmore* standard of review).

reason. While we present all of our risk assessment methods, we only present risk assessment results for the analyses actually conducted (see section IV.B. of this preamble).

The EPA conducts a risk assessment that provides estimates of the MIR for cancer posed by the HAP emissions from each source in the source category, the HI for chronic exposures to HAP with the potential to cause noncancer health effects, and the HQ for acute exposures to HAP with the potential to cause noncancer health effects. The assessment also provides estimates of the distribution of cancer risk within the exposed populations, cancer incidence, and an evaluation of the potential for an adverse environmental effect, taking into consideration the factors set out in CAA section 112(f). The following eight subsections describe how we estimated emissions and conducted the risk assessment. The docket for this proposed rule contains the following document which provides more information on the risk assessment inputs and models: *Residual Risk Assessment for the Hazardous Waste Combustor Source Category in Support of the 2025 Risk and Technology Review Proposed Rule*. The methods used to assess risk (as described in the eight primary steps below) are consistent with those described by the EPA in the document reviewed by a panel of the EPA's SAB in 2009;⁴⁵ and described in the SAB review report issued in 2010.⁴⁶ They are also consistent with the key recommendations contained in that report.

1. How did we estimate actual emissions and identify the emissions release characteristics?

The EPA used the actual emissions and emissions release characteristics from the NEI based on emissions year 2022 for each HWC facility to create the initial risk modeling input file. For each NEI record, the EPA reviewed the standard classification code, emission unit description, and process description to classify each record as

⁴⁵ U.S. Environmental Protection Agency. (Last updated Mar. 20, 2012). Risk and Technology Review (RTR) Risk Assessment Methodologies: For Review by the EPA's Science Advisory Board—Case Studies—MACT I Petroleum Refining Sources and Portland Cement Manufacturing (EPA-452/R-09-006): https://cfpub.epa.gov/si/si_public_record_report.cfm?LAB=OAQPS&dirEntryID=238928.

⁴⁶ U.S. Environmental Protection Agency. (Last updated May 7, 2010). Review of EPA's draft entitled, “Risk and Technology Review (RTR) Risk Assessment Methodologies: For Review by the EPA's Science Advisory Board—Case Studies—MACT I Petroleum Refining Sources and Portland Cement Manufacturing”: <https://www.epa.gov/sites/default/files/2021-02/documents/epa-sab-10-007-unsigned.pdf>.

⁴³ Recommendations of the SAB Risk and Technology Review Methods Panel are provided in their report, which is available at: <https://www.epa.gov/sites/default/files/2021-02/documents/epa-sab-10-007-unsigned.pdf>.

⁴⁴ *Nat'l Ass'n for Surface Finishing v. EPA*, 795 F.3d 1, 11 (D.C. Cir. 2015) (upholding EPA's

either belonging to the source category (*i.e.*, the record represents emissions from an HWC) or not belonging to the source category. Source category emissions of HAP are stack emissions only because the source category is specific to the HWC unit. We included both stack and fugitive emissions in non-category records. We removed duplicate emission records for an HWC. For example, some facilities listed emissions from the HWC when the unit was and was not combusting hazardous waste separately. To consolidate these records, we removed the records identified as periods when hazardous waste was not being combusted. We then cross-referenced each source category record against the facility list and added units in the facility list that could not be identified in the NEI records. We identified emission release characteristics from emissions testing information, as available.

Emissions test data or values derived from emissions test data replaced or augmented NEI data for HWC emissions of PCDD/PCDF, HAP metals, HCl, chlorine gas, PCBs, PAHs, HF, and HCN. When we had CPT data or data responsive to the CAA section 114 emissions testing request for a unit, we used that data to estimate emissions. Most of the data were concentration data, and we calculated emissions on a tpy basis using the stack gas flow rate and by assuming that units operate 8,760 hours (hr) per year (*i.e.*, continuous operation). Some of the data were in a thermal concentration format (like pounds (lb) per million british thermal units (MMBTU)), and we used the thermal hazardous waste feedrate (MMBTU/hr) to calculate emissions. When we had units with data from multiple CPTs, test conditions, or runs, we used the mean to estimate annual emissions (tpy). For cement kilns with in-line raw mills, we calculated weighted averages to account for the typical time spent with the raw mill on (85 percent) and off (15 percent).

In accordance with the HWC NESHAP, owners and operators conduct CPTs at worst-case test conditions. Companies use multiple strategies to ensure that CPTs are conducted at worst-case conditions, including operating at worst-case operating parameter limits (*e.g.*, low combustion chamber temperature, high hazardous waste feed rate, high stack gas velocity) and intentionally adding extra HAP, HAP surrogates, or HAP precursors to the feed of the HWC to account for potential variability in the HWC feed. This means that emissions estimates based on CPT data are conservative, worst-case estimates. We expect that

actual annual HAP emissions are lower than the estimates based on CPT data.

The EPA used CfPT data to help account for the conservative, worst-case estimates, where available. Unlike CPTs, CfPTs are conducted at normal operating conditions, and so we expect operating parameters to better reflect average operations of HWCs. CfPTs are only conducted for incinerators, cement kilns, lightweight aggregate kilns, and some liquid fuel boilers. Only PCDD/PCDF is measured when CfPTs are conducted. To scale the estimates produced by the CPT data to better resemble normal operating conditions, we developed ratios between the average stack gas flow rate during CPTs and CfPTs ("CPT adjustment factor") and used them to adjust the CPT emissions estimates, with a maximum value of one.

The HWC NESHAP regulates metal HAP in groups: Hg; Cd and Pb are regulated as SVM; As, Be, and Cr are regulated as LVM (except for liquid fuel boilers, where the LVM standard regulates Cr only); and Sb, Co, Mn, Ni, and Se are typically regulated by PM surrogate. Because the HWC NESHAP regulates metals in groups, metals are often reported by group in CPT results; however, the residual risk review requires the emissions of each metal to be determined separately. Cr also required further speciation because Cr species vary widely in both physiochemical properties and toxicity. To separate these results, the EPA developed speciation factors for Cr, SVM, LVM, and the other metals (regulated using PM as a surrogate) by unit type using the database developed for the 2005 HWC NESHAP final rule.⁴⁷ Generally, we developed the speciation factors by calculating the ratio of the emission of the chemical species in question to the emission of the total group. We averaged speciation factors by unit type, and only the unit type averages were used to account for variability in chemical speciation. We also used standard Hg speciation factors to calculate emissions for Hg species with different physiochemical and toxicity properties. For liquid fuel boilers, the only regulated LVM is Cr, so speciation of Cr from LVM was not required. We did not speciate liquid fuel boiler emissions of As and Be from PM; instead, we collected separate emissions testing data (from trial or risk burns, or to demonstrate compliance with state or

RCRA limits) for As and Be and used the data to estimate emissions.

We did not have complete data to support unit-specific estimates for all units. The EPA made several informed assumptions to help fill the gaps. First, the EPA calculated average CPT adjustment factors for each unit type and applied those factors for units without a unit-specific CPT adjustment factor. Two HWC subcategories, solid fuel boilers and HCl production furnaces, are required to conduct CPTs but not CfPTs. We assumed that the unit type average CPT adjustment factor for these units was the average of the four other unit subcategory average CPT adjustment factors. Second, some companies have units that have been deemed identical units ("sister units") for the purpose of demonstrating compliance with the HWC NESHAP. Typically, the companies perform emissions testing on one HWC of a set of sister units, and they attribute the results to the sister units. When an HWC did not have emissions data, but a sister unit did, we attributed those emissions to all sister unit HWCs without unit-specific data. Third, we calculated average emissions for each unit subcategory. We assumed that the emissions for an HWC without emissions data for a specific HAP were the average emissions of the unit subcategory. We applied this assumption widely for PCBs, PAHs, HF, and HCN because most of the emissions data represented a limited number of HWCs in the January 2024 emissions testing request. No emissions data were submitted in response to the January 2024 emissions testing request for lightweight aggregate kilns; instead, we combined the maximum concentration of each pollutant measured in the January 2024 emissions testing request and the average stack gas flow rate for lightweight aggregate kilns to estimate conservative emissions of these HAP from lightweight aggregate kilns. Fourth, for units with HAP emissions estimated by the HWC subcategory average emission, we substituted the estimated allowable emissions for the HWC subcategory average emission if the HWC subcategory average emission exceeded the estimated allowable emissions (calculated as described in section III.C.2. of this preamble). This affected HWCs with a known flow rate but no known concentration, and it allowed us to better estimate actual emissions from HWCs with smaller-than-average flow rates since the average emissions from the HWC subcategory are based on units with higher flow rates.

⁴⁷ Docket ID No. EPA-HQ-OAR-2004-0022, Document ID No. EPA-HQ-OAR-2004-0022-0433. Available at <https://www.epa.gov/stationary-sources-air-pollution/hazardous-waste-combustors-national-emission-standards-hazardous>.

Additional information on the development of the modeling file for the HWC NESHAP source category, including the development of the actual emissions and emissions release characteristics, can be found in the docket for this proposed rule (Docket ID No. EPA-HQ-OAR-2004-0022).

2. How did we estimate MACT-allowable emissions?

The available emissions data in the RTR emissions dataset include estimates of the mass of HAP emitted during a specified annual time period. These “actual” emission levels are often lower than the emission levels allowed under the requirements of the current MACT standards. The emissions allowed under the MACT standards are referred to as the “MACT-allowable” emissions. We discussed the consideration of both MACT-allowable and actual emissions in the final Coke Oven Batteries RTR (70 FR 19992, 19998–99, Apr. 15, 2005) and in the proposed and final Hazardous Organic NESHAP RTR (71 FR 34421, 34428, June 14, 2006; 71 FR 76603, 76609, Dec. 21, 2006). In those actions, we noted that assessing the risk at the MACT-allowable level is inherently reasonable since that risk reflects the maximum level facilities could emit and still comply with NESHAP. We also explained that it is reasonable to consider actual emissions, where such data are available, in both steps of the risk analysis, in accordance with the Benzene NESHAP approach (54 FR 38044).

The current HWC NESHAP specifies numeric emission limits for PCDD/PCDF, HAP metals (directly, as groups, or through a surrogate), HCl, and chlorine gas for existing and new HWCs. These limits were used as the basis for calculating the MACT-allowable emissions. CPT stack gas flow rates and thermal hazardous waste feed rates were identified for each HWC, where possible. For HWCs without stack gas flow rate or thermal feed rate data, average rates were calculated for each type of HWC and used to fill gaps. These rates were combined with the emission limits and the assumption of 8,760 hours of operation per year (*i.e.*, 24 hours per day, 365 days per year) to produce the upper bound of MACT-allowable emissions. In the case where a standard has two formats (*i.e.*, both a mass and thermal concentration basis), we took the greater of the two as the MACT-allowable emission. We then speciated the MACT-allowable emissions following the same procedures as the actual emissions, except that we speciated As and Be MACT-allowable emissions for liquid

fuel boilers were speciated from PM. For PAHs, PCBs, HCN, and HF, we estimated the unit type allowable emissions from the average actual emissions for each unit type.

For the HWC source category, actual emissions tend to be lower than allowable emissions, in some cases much lower. This shows that HWCs are generally performing better than they are required to by the HWC NESHAP. We generally expect that actual emissions will be lower than allowable emissions because HWCs must demonstrate that their emissions are consistently below the emission limits, which practically means that they operate in such a manner as to be far enough below the emission limit that slight variations in the combustor operation would not cause them to exceed the emission limit. We use the full value of the emission limit to calculate allowable emissions. Another contributing factor in some cases could be that additional non-HWC NESHAP emission limits are established for HWCs under RCRA. Most HWCs have completed site-specific risk assessments using RCRA methodology and under specific provisions of RCRA. Some HWCs may have additional emission restrictions under RCRA based on those results. The methodologies in the RCRA site-specific risk assessments and this CAA residual risk review are not comparable, and one should not be used in lieu of the other. Additional information on the development of the modeling file for the HWC NESHAP source category, including the estimation of MACT-allowable emissions, can be found in the docket for this proposed rule (Docket ID No. EPA-HQ-OAR-2004-0022).

3. How do we conduct dispersion modeling, determine inhalation exposures, and estimate individual and population inhalation risk?

Both long- and short-term inhalation exposure concentrations and health risk from the source category addressed in this proposal were estimated using the Human Exposure Model (HEM).⁴⁸ The HEM performs three primary risk assessment activities: (1) conducting dispersion modeling to estimate the concentrations of HAP in ambient air; (2) estimating long- and short-term inhalation exposures to individuals residing within 50 kilometers (km) of the modeled sources; and (3) estimating individual and population-level inhalation risk using the exposure

estimates and quantitative dose-response information.

a. Dispersion Modeling

The air dispersion model AERMOD (American Meteorological Society/EPA Regulatory Model dispersion modeling system), used by the HEM model, is one of the EPA's preferred models for assessing air pollutant concentrations from industrial facilities.⁴⁹ To perform the dispersion modeling and to develop the preliminary risk estimates, HEM draws on three data libraries. The first is a library of meteorological data, which is used for dispersion calculations. This library includes one year (2019) of hourly surface and upper air observations from over 800 meteorological stations, selected to provide coverage of the United States and Puerto Rico. A second library of United States Census Bureau census block⁵⁰ internal point locations and populations provides the basis of human exposure calculations (U.S. Census, 2020). In addition, for each census block, the census library includes the elevation and controlling hill height, which are also used in dispersion calculations. A third library of pollutant-specific dose-response values is used to estimate health risk. These are discussed below.

b. Risk From Chronic Exposure to HAP

In developing the risk assessment for chronic exposures, we use the estimated annual average ambient air concentrations of each HAP emitted by each source in the source category. The HAP air concentrations at each nearby census block centroid located within 50 km of the facility are a surrogate for the chronic inhalation exposure concentration for all the people who reside in that census block. A distance of 50 km is consistent with both the analysis supporting the 1989 Benzene NESHAP (54 FR 38044) and the limitations of Gaussian dispersion models, including AERMOD.

For each facility, we calculate the MIR as the cancer risk associated with health protective assumptions, such as a continuous lifetime (24 hours per day, seven days per week, 52 weeks per year, 70 years) exposure to the maximum annual average concentration at the centroid of each inhabited census block. This is meant to provide an upper bound estimate of cancer risks as people

⁴⁹ U.S. EPA. Revision to the *Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions* (70 FR 68218, Nov. 9, 2005).

⁵⁰ A census block is the smallest geographic area for which census statistics are tabulated.

⁴⁸ For more information about HEM, go to <https://www.epa.gov/fera/risk-assessment-and-modeling-human-exposure-model-hem>.

are unlikely to be in the same location for 70 years. We calculate individual cancer risk by multiplying the estimated lifetime exposure to the ambient concentration of each HAP (in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)) by its unit risk estimate (URE). The URE is an upper-bound estimate of an individual's incremental risk of contracting cancer over a lifetime of exposure to a concentration of $1 \mu\text{g}/\text{m}^3$ of air. For residual risk assessments, we currently use UREs from the EPA's Integrated Risk Information System (IRIS) when they are available. For carcinogenic pollutants without IRIS values, we look to other reputable sources of cancer dose-response values, often using California EPA (CalEPA) UREs, where available. In cases where new, scientifically credible dose-response values have been developed in a manner consistent with EPA guidelines and have undergone a peer review process similar to that used by the EPA, we may use such dose-response values in place of, or in addition to, other values, if appropriate. The pollutant-specific dose-response values used to estimate health risk are available at <https://www.epa.gov/fera/dose-response-assessment-assessing-health-risks-associated-exposure-hazardous-air-pollutants>.

To estimate individual lifetime cancer risks associated with exposure to HAP emissions from each facility in the source category, we sum the risks for each of the carcinogenic HAP⁵¹ emitted by the modeled facility. We estimate cancer risk at every census block within 50 km of every facility in the source category. The MIR is the highest individual lifetime cancer risk estimated

for any of those census blocks. In addition to calculating the MIR, we estimate the distribution of individual cancer risks for the source category by summing the number of individuals within 50 km of the sources whose estimated risk falls within a specified risk range. We also estimate annual cancer incidence by multiplying the estimated lifetime cancer risk at each census block by the number of people residing in that block, summing results for all of the census blocks, and then dividing this result by a 70-year lifetime.

To assess the risk of noncancer health effects from chronic exposure to HAP, we calculate either an HQ or a target organ-specific hazard index (TOSHI). We calculate an HQ when a single noncancer HAP is emitted. Where more than one noncancer HAP is emitted, we sum the HQ for each of the HAP that affects a common target organ or target organ system to obtain a TOSHI. The HQ is the estimated exposure divided by the chronic noncancer dose-response value, which is a value selected from one of several sources. The preferred chronic noncancer dose-response value is the EPA RfC, defined as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime."⁵² In cases where an RfC from the EPA's IRIS is not available or where the EPA determines that using a value other than the RfC is appropriate, the chronic noncancer dose-response value can be a value from the following prioritized sources, which define their dose-response values similarly to the EPA: (1) the Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Level (<https://www.atsdr.cdc.gov/minimal-risk-levels/about/index.html>); (2) the CalEPA Chronic Reference Exposure Level (REL) (<https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary>); or (3) as noted above, a scientifically credible dose-response value that has been developed in a manner consistent with EPA guidelines and has undergone a peer review process similar to that used by the EPA. The pollutant-specific dose-response values used to estimate health risks are available at <https://www.epa.gov/fera/dose-response-assessment-assessing-health-risks->

associated-exposure-hazardous-air-pollutants.

c. Risk From Acute Exposure to HAP That May Cause Health Effects Other Than Cancer

For each HAP for which appropriate acute inhalation dose-response values are available, the EPA also assesses the potential health risks due to acute exposure. For these assessments, the EPA makes health protective assumptions about emission rates, meteorology, and exposure location. As part of our efforts to continually improve our methodologies to evaluate the risks that HAP emitted from categories of industrial sources pose to human health and the environment,⁵³ we revised our treatment of meteorological data to use reasonable worst-case air dispersion conditions in our acute risk screening assessments instead of worst-case air dispersion conditions. This revised treatment of meteorological data and the supporting rationale are described in more detail in *Residual Risk Assessment for the Hazardous Waste Combustor Source Category in Support of the 2025 Risk and Technology Review Proposed Rule* and in appendix 5 of the report: *Technical Support Document for Acute Risk Screening Assessment*, which are available in the docket for this proposed rule. This revised approach has been used in this proposed rule and in all other RTR rulemakings proposed on or after June 3, 2019.⁵⁴

To assess the potential acute risk to the maximally exposed individual, we use the peak hourly emission rate for each emission point,⁵⁵ reasonable worst-case air dispersion conditions (i.e., 99th percentile), and the point of highest off-site exposure. Specifically, we assume that peak emissions from the source category and reasonable worst-

⁵¹ The EPA's 2005 *Guidelines for Carcinogen Risk Assessment* identifies five recommended standard hazard descriptors: "Carcinogenic to Humans," "Likely to Be Carcinogenic to Humans," "Suggestive Evidence of Carcinogenic Potential," "Inadequate Information to Assess Carcinogenic Potential," and "Not Likely to Be Carcinogenic to Humans." The first three are treated as carcinogenic and coincide with the terms "known carcinogen, probable carcinogen, and possible carcinogen," respectively, which are the terms advocated in the EPA's *Guidelines for Carcinogen Risk Assessment*, published in 1986 (51 FR 33992, Sept. 24, 1986). In August 2000, the EPA published a document entitled *Supplemental Guidance for Conducting Health Risk Assessment of Chemical Mixtures* (EPA/630/R-00/002) as a supplement to the 1986 document. Copies of both documents can be obtained from <https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=20533&CFID=70315376&CFTOKEN=71597944>. Summing the risk of these individual compounds to obtain the cumulative cancer risk is an approach that was recommended by the EPA's SAB in their 2002 peer review of the EPA's National Air Toxics Assessment (NATA) titled *NATA—Evaluating the National-scale Air Toxics Assessment 1996 Data*—an SAB Advisory, available at <https://archive.epa.gov/airtoxics/nata/web/html/sabrev.html>.

⁵² U.S. Environmental Protection Agency. (Last updated May 2, 2025). IRIS Glossary: <https://www.epa.gov/iris/iris-glossary>.

⁵³ See, e.g., U.S. EPA. *Screening Methodologies to Support Risk and Technology Reviews (RTR): A Case Study Analysis* (Report, Sept. 2018). https://cfpub.epa.gov/si/si_public_record/report.cfm?Lab=OAQPS&dirEntryID=307074.

⁵⁴ See for example, 85 FR 40740, (July 7, 2020) (Organic Liquids Distribution RTR); 85 FR 40386, (July 6, 2020) (Ethylene Production RTR); 85 FR 15608, (March 18, 2020) (Solvent Extraction for Vegetable Oil Production RTR).

⁵⁵ In the absence of hourly emission data, we develop estimates of maximum hourly emission rates by multiplying the average actual annual emission rates by a factor (either a category-specific factor or a default factor of 10) to account for variability. We used the default factor of 10 for this risk assessment because we did not have hourly emissions data. This is documented in *Residual Risk Assessment for the Hazardous Waste Combustor Source Category in Support of the 2025 Risk and Technology Review Proposed Rule* and in appendix 5 of the report: *Technical Support Document for Acute Risk Screening Assessment*. Both are available in the docket for this rulemaking.

case air dispersion conditions co-occur and that a person is present at the point of maximum exposure.

To characterize the potential health risks associated with estimated acute inhalation exposures to a HAP, we generally use multiple acute dose-response values, including acute RELs, acute exposure guideline levels (AEGLs), and emergency response planning guidelines (ERPG) for 1-hour exposure durations, if available, to calculate acute HQs. The acute HQ is calculated by dividing the estimated acute exposure concentration by the acute dose-response value. For each HAP for which acute dose-response values are available, the EPA calculates acute HQs.

An acute REL is defined as “the concentration level at or below which no adverse health effects are anticipated for a specified exposure duration.”⁵⁶ Acute RELs are based on the most sensitive, relevant, adverse health effect reported in the peer-reviewed medical and toxicological literature. They are designed to protect the most sensitive individuals in the population through the inclusion of margins of safety. Because margins of safety are incorporated to address data gaps and uncertainties, exceeding the REL does not automatically indicate an adverse health impact. AEGLs represent threshold exposure limits for the general public and are applicable to emergency exposures ranging from 10 minutes to eight hours.⁵⁷ They are guideline levels for “once-in-a-lifetime, short-term exposures to airborne concentrations of acutely toxic, high-priority chemicals.”⁵⁸ The AEGL-1 is specifically defined as “the airborne concentration (expressed as ppm (parts per million) or mg/m³ (milligrams per cubic meter)) of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable

discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.” The document also notes that “Airborne concentrations below AEGL-1 represent exposure levels that can produce mild and progressively increasing but transient and nondisabling odor, taste, and sensory irritation or certain asymptomatic, nonsensory effects.”⁵⁹ AEGL-2 are defined as “the airborne concentration (expressed as parts per million or milligrams per cubic meter) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.”⁶⁰

ERPGs are developed by the American Industrial Hygiene Association (AIHA) for emergency planning and are intended to be health-based guideline concentrations for single exposures to chemicals. The ERPG-1 is the maximum airborne concentration established by AIHA below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing other than mild transient adverse health effects or without perceiving a clearly defined, objectionable odor. Similarly, the ERPG-2 is the maximum airborne concentration established by AIHA below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.

An acute REL for 1-hour exposure durations is typically lower than its corresponding AEGL-1 and ERPG-1. Even though their definitions are slightly different, AEGL-1s are often the same as the corresponding ERPG-1s, and AEGL-2s are often equal to ERPG-2s. The maximum HQs from our acute inhalation screening risk assessment typically result when we use the acute REL for a HAP. In cases where the maximum acute HQ exceeds 1, we also report the HQ based on the next highest acute dose-response value (usually the AEGL-1 and/or the ERPG-1). In our acute inhalation screening risk assessment, acute impacts are deemed negligible for HAP for which acute HQs are less than or equal to 1, and no further analysis is performed for these HAP. In cases where an acute HQ from the screening step is greater than 1, we assess the site-specific data to ensure

that the acute HQ is at an off-site location. For this source category, the data refinements employed consisted of reviewing satellite imagery of the locations of the maximum acute HQ values to determine if the maximum was off facility property. For any maximum value that was determined to be on facility property, the next highest value that was off facility property was used. These refinements are discussed more fully in the *Residual Risk Assessment for the Hazardous Waste Combustor Source Category in Support of the 2025 Risk and Technology Review Proposed Rule*, which is available in the docket for this proposed rule.

4. How do we conduct the multipathway exposure and risk screening assessment?

The EPA conducts a tiered screening assessment examining the potential for significant human health risks due to exposures via routes other than inhalation (*i.e.*, ingestion). We first determine whether any sources in the source category emit any HAP known to be persistent and bioaccumulative in the environment, as identified in the EPA's Air Toxics Risk Assessment Library.⁶¹

For the HWC source category, we identified PB-HAP emissions of As compounds, Cd compounds, PCDD/PCDF, Pb, polycyclic organic matter (POM), and Hg, so we proceeded to the next step of the evaluation. Except for Pb, the human health risk screening assessment for PB-HAP consists of three progressive tiers. In a Tier 1 screening assessment, we determine whether the magnitude of the facility-specific emissions of PB-HAP warrants further evaluation to characterize human health risk through ingestion exposure. To facilitate this step, we evaluate emissions against previously developed screening threshold emission rates for several PB-HAP that are based on a hypothetical upper-end screening exposure scenario developed for use in conjunction with the EPA's Total Risk Integrated Methodology.Fate, Transport, and Ecological Exposure (TRIM.FaTE) model. The PB-HAP with screening threshold emission rates are As compounds, Cd compounds, PCDD/PCDF, Hg compounds, and POM. Based on the EPA estimates of toxicity and bioaccumulation potential, these pollutants represent a conservative list for inclusion in multipathway risk assessments for RTR rules.⁶² In this assessment, we compare the facility-

⁵⁶ CalEPA issues acute RELs as part of its *Air Toxics Hot Spots Program*, and the 1-hour and 8-hour values are documented in *Air Toxics Hot Spots Program Risk Assessment Guidelines, Part I, The Determination of Acute Reference Exposure Levels for Airborne Toxicants*, which is available at <https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary>.

⁵⁷ National Academy of Sciences, 2001. *Standing Operating Procedures for Developing Acute Exposure Levels for Hazardous Chemicals*, at 2. Available at https://www.epa.gov/sites/production/files/2015-09/documents/sop_final_standing_operating_procedures_2001.pdf. Note that the National Advisory Committee for Acute Exposure Guideline Levels for Hazardous Substances ended in October 2011, but the AEGL program continues to operate at the EPA and works with the National Academies to publish final AEGLs (<https://www.epa.gov/aegl>).

⁵⁸ *Id.* at 21.

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ See volume 1, appendix D, at <https://www.epa.gov/fera/risk-assessment-and-modeling-air-toxics-risk-assessment-reference-library>.

⁶² *Id.*

specific emission rates of these PB-HAP to the screening threshold emission rates for each PB-HAP to assess the potential for significant human health risks via the ingestion pathway. We call this application of the TRIM.FaTE model the Tier 1 screening assessment. The ratio of a facility's actual emission rate to the Tier 1 screening threshold emission rate is a "screening value."

We derive the Tier 1 screening threshold emission rates for these PB-HAP (other than Pb compounds) to correspond to a maximum excess lifetime cancer risk of 1-in-1 million (*i.e.*, for As compounds, PCDD/PCDF, and POM) or, for HAP that cause noncancer health effects (*i.e.*, Cd compounds and Hg compounds), a maximum HQ of one. If the emission rate of any one PB-HAP or combination of carcinogenic PB-HAP in the Tier 1 screening assessment exceeds the Tier 1 screening threshold emission rate for any facility (*i.e.*, the screening value is greater than 1), we conduct a second screening assessment, which we call the Tier 2 screening assessment. The Tier 2 screening assessment separates the Tier 1 combined fisher and farmer exposure scenario into fisher, farmer, and gardener scenarios that retain upper-bound ingestion rates.

In the Tier 2 screening assessment, the location of each facility that exceeds a Tier 1 screening threshold emission rate is used to refine the assumptions associated with the Tier 1 fisher and farmer exposure scenarios at that facility. A key assumption in the Tier 1 screening assessment is that a lake and/or farm is located near the facility. As part of the Tier 2 screening assessment, we use a U.S. Geological Survey (USGS) database to identify actual waterbodies within 50 km of each facility and assume the fisher only consumes fish from lakes within that 50 km zone. We also examine the differences between local meteorology near the facility and the meteorology used in the Tier 1 screening assessment. We then adjust the previously developed Tier 1 screening threshold emission rates for each PB-HAP for each facility based on an understanding of how exposure concentrations estimated for the screening scenario change with the use of local meteorology and the USGS lakes database.

In the Tier 2 farmer scenario, we maintain an assumption that the farm is located within 0.5 km of the facility and that the farmer consumes meat, eggs, dairy, vegetables, and fruit produced near the facility. We may further refine the Tier 2 screening analysis by assessing a gardener scenario to characterize a range of exposures, with

the gardener scenario being more plausible in RTR evaluations. Under the gardener scenario, we assume the gardener consumes home-produced eggs, vegetables, and fruit products at the same ingestion rate as the farmer. The Tier 2 screen continues to rely on the high-end food intake assumptions that were applied in Tier 1 for local fish (adult female angler at 99th percentile fish consumption)⁶³ and locally grown or raised foods (90th percentile consumption of locally grown or raised foods for the farmer and gardener scenarios).⁶⁴ If PB-HAP emission rates do not result in a Tier 2 screening value greater than 1, we consider those PB-HAP emissions to pose risks below a level of concern. If the PB-HAP emission rates for a facility exceed the Tier 2 screening threshold emission rates, we may conduct a Tier 3 screening assessment.

There are several analyses that can be included in a Tier 3 screening assessment, depending upon the extent of refinement warranted, including validating that the lakes are fishable, locating residential/garden locations for urban and/or rural settings, considering plume-rise to estimate emissions lost above the mixing layer, and considering hourly effects of meteorology and plume-rise on chemical fate and transport (a time-series analysis). If necessary, the EPA may further refine the screening assessment through a site-specific assessment.

In evaluating the potential multipathway risk from emissions of Pb compounds, rather than developing a screening threshold emission rate, it is our longstanding practice to compare maximum estimated chronic inhalation exposure concentrations to the level of the current National Ambient Air Quality Standard (NAAQS) for Pb.⁶⁵

⁶³ Burger, J. (2002). Daily consumption of wild fish and game: Exposures of high end recreationists. *International Journal of Environmental Health Research*, 12, 343–354; <https://doi.org/10.1080/0960312021000056393>.

⁶⁴ U.S. Environmental Protection Agency. (Last updated Mar. 21, 2022). Exposure Factors Handbook 2011 Edition (Final Report): <https://iris.epa.gov/document/&deid=236252>.

⁶⁵ In doing so, the EPA notes that the legal standard for a primary NAAQS—that a standard is requisite to protect public health and provide an adequate margin of safety (CAA section 109(b))—differs from the CAA section 112(f) standard (requiring, among other things, that the standard provide an "ample margin of safety to protect public health"). However, the primary lead NAAQS is a reasonable measure of determining risk acceptability (*i.e.*, the first step of the Benzene NESHAP analysis) since it is designed to protect the most susceptible group in the human population—children, including children living near major lead emitting sources. 73 FR 67002, (Oct. 18, 2006); 73 FR 67000; 73 FR 67005. In addition, applying the level of the primary lead NAAQS at the risk

Values below the level of the primary (health-based) Pb NAAQS are considered to have a low potential for multipathway risk.

For further information on the multipathway assessment approach, see the *Residual Risk Assessment for the Hazardous Waste Combustor Source Category in Support of the Risk and Technology Review 2025 Proposed Rule*, which is available in the docket for this proposed rule.

5. How do we assess risks considering emissions control options?

In addition to assessing baseline inhalation risks and screening for potential multipathway risks, we also estimate risks considering the potential emission reductions that would be achieved by the control options under consideration. In these cases, the expected emission reductions are applied to the specific HAP and emission points in the RTR emissions dataset to develop corresponding estimates of risk and incremental risk reductions.

6. How do we conduct the environmental risk screening assessment?

a. Adverse Environmental Effect, Environmental HAP, and Ecological Benchmarks

The EPA conducts a screening assessment to examine the potential for an adverse environmental effect as required under CAA section 112(f)(2)(A). This section authorizes the Agency to adopt more stringent standards than MACT standards, if necessary, "to prevent, taking into consideration costs, energy, safety, and other relevant factors, an adverse environmental effect." CAA section 112(a)(7) defines "adverse environmental effect" as "any significant and widespread adverse effect, which may reasonably be anticipated, to wildlife, aquatic life, or other natural resources, including adverse impacts on populations of endangered or threatened species or significant degradation of environmental quality over broad areas."

In conducting the screening assessment during the risk review, under CAA section 112(f)(2)(A), it is the EPA's long-standing practice to focus on eight HAP, which are referred to as "environmental HAP": six PB-HAP and two acid gases. The PB-HAP included in the screening assessment are As

acceptability step is conservative, since that primary lead NAAQS reflects an adequate margin of safety.

compounds, Cd compounds, PCDD/PCDF, POM, Hg (both inorganic and methylmercury), and Pb compounds. The acid gases included in the screening assessment are HCl and HF.

HAP that persist and bioaccumulate are of particular environmental concern because they accumulate in the soil, sediment, and water. The acid gases, HCl and HF, are included due to their well-documented potential to cause direct damage to terrestrial plants. In the environmental risk screening assessment, we evaluate the following four exposure media: terrestrial soils, surface water bodies (includes water-column and benthic sediments), fish consumed by wildlife, and air. Within these four exposure media, we evaluate nine ecological assessment endpoints, which are defined by the ecological entity and its attributes. For PB-HAP other than Pb, both community-level and population-level endpoints are included. For acid gases, the ecological assessment evaluated is terrestrial plant communities.

An ecological benchmark represents a concentration of HAP that has been linked to a particular environmental effect level. For each environmental HAP, we identified the available ecological benchmarks for each assessment endpoint. We identified, where possible, ecological benchmarks at the following effect levels: probable effect levels, lowest-observed-adverse-effect level (LOAEL), and no-observed-adverse-effect level (NOAEL). In cases where multiple effect levels were available for a particular PB-HAP and assessment endpoint, we use all of the available effect levels to help us determine whether ecological risks exist and, if so, whether the risks could be considered significant and widespread.

For further information on how the environmental risk screening assessment was conducted, including a discussion of the risk metrics used, how the environmental HAP were identified, and how the ecological benchmarks were selected, see appendix 9 of the *Residual Risk Assessment for the Hazardous Waste Combustor Source Category in Support of the Risk and Technology Review 2025 Proposed Rule*, which is available in the docket for this proposed rule.

b. Environmental Risk Screening Methodology

For the environmental risk screening assessment, the EPA first determined whether any facilities in the HWC source category emitted any of the environmental HAP. For the HWC source category, we identified emissions of As compounds, Cd compounds,

PCDD/PCDF, Pb, POM, Hg, HCl, and HF. Because one or more of the environmental HAP evaluated—As compounds, Cd compounds, PCDD/PCDF, Pb, POM, Hg, HCl, and HF—are emitted by at least one facility in the source category, we proceeded to the second step of the evaluation.

c. PB-HAP Methodology

The environmental screening assessment includes six PB-HAP—As compounds, Cd compounds, PCDD/PCDF, POM, Hg (both inorganic and methylmercury), and Pb compounds. With the exception of Pb, the environmental risk screening assessment for PB-HAP consists of three tiers. The first tier of the environmental risk screening assessment uses the same health-protective conceptual model that is used for the Tier 1 human health screening assessment. TRIM.FaTE model simulations were used to calculate Tier 1 screening threshold emission rates. The screening threshold emission rates represent the emission rate in tpy that results in media concentrations at the facility that equal the relevant ecological benchmark. To assess emissions from each facility in the category, the reported emission rate for each PB-HAP was compared to the Tier 1 screening threshold emission rate for that PB-HAP for each assessment endpoint and effect level. If emissions from a facility do not exceed the Tier 1 screening threshold emission rate, the facility “passes” the screening assessment and therefore is not evaluated further under the screening approach. If emissions from a facility exceed the Tier 1 screening threshold emission rate, we evaluate the facility further in Tier 2.

In Tier 2 of the environmental screening assessment, the screening threshold emission rates are adjusted to account for local meteorology and the actual location of lakes in the vicinity of facilities that did not pass the Tier 1 screening assessment. For soils, we evaluate the average soil concentration for all soil parcels within a 7.5-km radius for each facility and for each PB-HAP. For the water, sediment, and fish tissue concentrations, the highest value for each facility for each pollutant is used. If emission concentrations from a facility do not exceed the Tier 2 screening threshold emission rate, the facility “passes” the screening assessment and typically is not evaluated further. If emissions from a facility exceed the Tier 2 screening threshold emission rate, we evaluate the facility further in Tier 3.

As in the multipathway human health risk assessment, in Tier 3 of the

environmental screening assessment, we examine the suitability of the lakes around the facilities to support life and remove those that are not suitable (*e.g.*, lakes that have been filled in or are industrial ponds), adjust emissions for plume-rise, and conduct hour-by-hour time-series assessments. If these Tier 3 adjustments to the screening threshold emission rates still indicate the potential for an adverse environmental effect (*i.e.*, the facility emission rate exceeds the screening threshold emission rate), we may elect to conduct a more refined assessment using more site-specific information. If, after additional refinement, the facility emission rate still exceeds the screening threshold emission rate, the facility may have the potential to cause an adverse environmental effect.

To evaluate the potential for an adverse environmental effect from Pb, we compared the average modeled air concentrations (from HEM) of Pb around each facility in the source category to the level of the secondary Pb NAAQS. The secondary Pb NAAQS is a reasonable means of evaluating environmental risk because it is set to provide substantial protection against adverse welfare effects, which can include “effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being.”⁶⁶

d. Acid Gas Environmental Risk Methodology

The environmental screening assessment for acid gases evaluates the potential phytotoxicity and reduced productivity of plants due to chronic exposure to HF and HCl. The environmental risk screening methodology for acid gases is a single-tier screening assessment that compares modeled ambient air concentrations (from AERMOD) to the ecological benchmarks for each acid gas. To identify a potential adverse environmental effect (as defined in CAA section 112(a)(7)) from emissions of HF and HCl, we evaluate the following metrics: the size of the modeled area around each facility that exceeds the ecological benchmark for each acid gas, in acres and square kilometers; the percentage of the modeled area around each facility that exceeds the ecological benchmark for each acid gas; and the area-weighted average screening value

⁶⁶ CAA section 302(h) describes effects on welfare. 42 U.S.C. 7602(h).

around each facility (calculated by dividing the area-weighted average concentration over the 50-km modeling domain by the ecological benchmark for each acid gas). For further information on the environmental screening assessment approach, see appendix 9 of the *Residual Risk Assessment for the Hazardous Waste Combustor Source Category in Support of the Risk and Technology Review 2025 Proposed Rule*, which is available in the docket for this proposed rule.

7. How do we conduct facility-wide assessments?

To put the source category risks in context, we typically examine the risks from the entire facility, where the facility includes all HAP-emitting operations within a contiguous area and under common control. In other words, we examine not only the HAP emissions from the source category emission points of interest, but also emissions of HAP from all other emission sources at the facility for which we have data. For the HWC source category, we conducted the facility-wide assessment using a dataset compiled from the NEI based on emissions year 2022. The source category records of that NEI dataset were removed, evaluated, and updated as described in section II.C. of this preamble. Once we completed the quality assurance review, the dataset was placed back with the remaining records from the NEI for that facility. The facility-wide file was then used to analyze risks due to the inhalation of HAP that are emitted facility-wide for the populations residing within 50 km of each facility, consistent with the methods used for the source category analysis described above. For these facility-wide risk analyses, the modeled source category risks were compared to the facility-wide risks to determine the portion of the facility-wide risks that could be attributed to the source category addressed in this proposal. We also specifically examined the facility that was associated with the highest estimate of risk and determined the percentage of that risk attributable to the source category of interest. The *Residual Risk Assessment for the Hazardous Waste Combustor Source Category in Support of the Risk and Technology Review 2025 Proposed Rule*, available through the docket for this proposed rule, provides the methodology and results of the facility-wide analyses, including all facility-wide risks and the percentage of source category contribution to facility-wide risks.

8. How do we consider uncertainties in risk assessment?

Uncertainty and the potential for bias are inherent in all risk assessments, including those performed for this proposal. Although uncertainty exists, we believe that our approach, which used health protective tools and assumptions, ensures that our decisions are health and environmentally protective. A brief discussion of the uncertainties in the RTR emissions dataset, dispersion modeling, inhalation exposure estimates, and dose-response relationships follows. Also included are those uncertainties specific to our acute screening assessments, multipathway screening assessments, and environmental risk screening assessments. A more thorough discussion of these uncertainties is included in the *Residual Risk Assessment for the Hazardous Waste Combustor Source Category in Support of the Risk and Technology Review 2025 Proposed Rule*, which is available in the docket for this proposed rule. If a multipathway site-specific assessment was performed for this source category, a full discussion of the uncertainties associated with that assessment can be found in appendix 11 of that document, *Site-Specific Human Health Multipathway Residual Risk Assessment Report*.

a. Uncertainties in the RTR Emissions Dataset

Although the development of the RTR emissions dataset involved quality assurance/quality control processes, the accuracy of emissions values will vary depending on the source of the data, the degree to which data are incomplete or missing, the degree to which assumptions made to complete the datasets are accurate, errors in emission estimates, and other factors. The emission estimates considered in this analysis generally are emissions during worst-case scenario performance tests corrected based on a stack gas flow rate or hazardous waste thermal concentration feed rate more typical of normal operations. Results were averaged across multiple years, where available, and emissions averages across HWC unit subcategories were used when specific emissions data was not available. The estimates of peak hourly emission rates for the acute effects screening assessment were based on an emission adjustment factor applied to the average annual hourly emission rates, which are intended to account for emission fluctuations due to normal facility operations.

b. Uncertainties in Dispersion Modeling

We recognize that there is uncertainty in ambient concentration estimates associated with any model, including AERMOD. In using a model to estimate ambient pollutant concentrations, the user chooses certain options to apply. For RTR assessments, we select some model options that have the potential to overestimate ambient air concentrations (e.g., not including plume depletion or pollutant transformation). We select other model options that have the potential to underestimate ambient impacts (e.g., not including building downwash). Other options that we select have the potential to either underestimate or overestimate ambient levels (e.g., meteorology and receptor locations). On average, considering the directional nature of the uncertainties commonly present in ambient concentrations estimated by dispersion models, the approach we apply in the RTR assessments should yield unbiased estimates of ambient HAP concentrations. We also note that the selection of meteorology dataset locations could have an impact on the risk estimates. As we continue to update and expand our library of meteorological station data used in our risk assessments, we expect to reduce this variability.

c. Uncertainties in Inhalation Exposure Assessment

Although we make every effort to identify all of the relevant facilities and emission points, as well as to develop accurate estimates of the annual emission rates for all relevant HAP, the uncertainties in our emission inventory are likely the highest-contributing factors of the uncertainties in the exposure assessment. Some uncertainties in our exposure assessment include human mobility, using the centroid of each census block, assuming lifetime exposure, and assuming only outdoor exposures. For most of these factors, there is neither an underestimate nor overestimate when looking at the MIR or the incidence, but the shape of the distribution of risks may be affected. With respect to outdoor exposures, actual exposures may not be as high if people spend time indoors, especially for very reactive pollutants or larger particles. For all factors, we reduce uncertainty when possible. For example, with respect to census block centroids, we analyze large blocks using aerial imagery and adjust locations of the block centroids to better represent the population in the blocks. We also add additional receptor locations where

the population of a block is not well-represented by a single location.

d. Uncertainties in Dose-Response Relationships

There are uncertainties inherent in the development of the dose-response values used in our risk assessments for cancer effects from chronic exposures and noncancer effects from both chronic and acute exposures. Some uncertainties are generally expressed quantitatively, and others are generally expressed qualitatively. We note, as a preface to this discussion, a point on dose-response uncertainty that is stated in the EPA's *2005 Guidelines for Carcinogen Risk Assessment*; namely that "the primary goal of EPA actions is protection of human health; accordingly, as an Agency policy, risk assessment procedures, including default options that are used in the absence of scientific data to the contrary, should be health protective" (the EPA's *2005 Guidelines for Carcinogen Risk Assessment*, at 1–7). This is the approach followed here as summarized in the next paragraphs.

Cancer UREs used in our risk assessments are those that have been developed to generally provide an upper-bound estimate of risk.⁶⁷ That is, they represent a "plausible upper limit to the true value of a quantity" (although this is usually not a true statistical confidence limit). In some circumstances, the true risk could be as low as zero; however, in other circumstances the risk could be greater.⁶⁸ Chronic noncancer RfC and reference dose (RfD) values represent chronic exposure levels that are intended to be health-protective levels. To derive dose-response values that are intended to be "without appreciable risk," the methodology relies upon an uncertainty factor (UF) approach,⁶⁹ which considers uncertainty, variability, and gaps in the available data. The UFs are applied to derive dose-response

values that are intended to protect against appreciable risk of deleterious effects.

Many of the UFs used to account for variability and uncertainty in the development of acute dose-response values are quite similar to those developed for chronic durations. Additional adjustments are often applied to account for uncertainty in extrapolation from observations at one exposure duration (e.g., four hours) to derive an acute dose-response value at another exposure duration (e.g., one hour). Not all acute dose-response values are developed for the same purpose, and care must be taken when interpreting the results of an acute assessment of human health effects relative to the dose-response value or values being exceeded. Where relevant to the estimated exposures, the lack of acute dose-response values at different levels of severity should be factored into the risk characterization as potential uncertainties.

Uncertainty also exists in the selection of ecological benchmarks for the environmental risk screening assessment. We established a hierarchy of preferred benchmark sources to allow selection of benchmarks for each environmental HAP at each ecological assessment endpoint. We searched for benchmarks for three effect levels (*i.e.*, no-effects level, threshold-effect level, and probable-effect level), but not all combinations of ecological assessment/environmental HAP had benchmarks for all three effect levels. Where multiple effect levels were available for a particular HAP and assessment endpoint, we used all of the available effect levels to help us determine whether risk exists and whether the risk could be considered significant and widespread.

Although we make every effort to identify appropriate human health effect dose-response values for all pollutants emitted by the sources in this risk assessment, some HAP emitted by this source category lack dose-response assessments. Accordingly, these pollutants cannot be included in the quantitative risk assessment, which could result in quantitative estimates understating HAP risk. To help to alleviate this potential underestimate, where we conclude similarity with a HAP for which a dose-response value is available, we use that value as a surrogate for the assessment of the HAP for which no value is available. To the extent use of surrogates indicates appreciable risk, we may identify a need to increase priority for an IRIS assessment for that substance. We additionally note that, generally

speaking, HAP of greatest concern due to environmental exposures and hazard are those for which dose-response assessments have been performed, reducing the likelihood of understating risk. Further, HAP not included in the quantitative assessment are assessed qualitatively and considered in the risk characterization that informs the risk management decisions, including consideration of HAP reductions achieved by various control options.

For a group of compounds that are unspiciated (e.g., glycol ethers), we conservatively use the most protective dose-response value of an individual compound in that group to estimate risk. Similarly, for an individual compound in a group (e.g., ethylene glycol diethyl ether) that does not have a specified dose-response value, we also apply the most protective dose-response value from the other compounds in the group to estimate risk.

e. Uncertainties in Acute Inhalation Screening Assessments

In addition to the uncertainties highlighted in section III.C.8. of this preamble, there are several factors specific to the acute exposure assessment that the EPA conducts as part of the risk review under CAA section 112(f). The accuracy of an acute inhalation exposure assessment depends on the simultaneous occurrence of independent factors that may vary greatly, such as hourly emission rates, meteorology, and the presence of a person. In the acute screening assessment that we conduct under the RTR program, we assume that peak emissions from the source category and reasonable worst-case air dispersion conditions (*i.e.*, 99th percentile) co-occur. We then include the additional assumption that a person is located at this point at the same time. Together, these assumptions represent a reasonable worst-case actual exposure scenario. In most cases, it is unlikely that a person would be located at the point of maximum exposure during the time when peak emissions and reasonable worst-case air dispersion conditions occur simultaneously.

f. Uncertainties in the Multipathway and Environmental Risk Screening Assessments

For each source category, we generally rely on site-specific levels of PB-HAP or environmental HAP emissions to determine whether a refined assessment of the impacts from multipathway exposures is necessary or whether it is necessary to perform an environmental screening assessment. This determination is based on the

⁶⁷ U.S. Environmental Protection Agency. (Last updated Jun. 22, 2022). Integrated Risk Information System (IRIS) Glossary: https://sor.epa.gov/sor_internet/registry/termreg/searchandretrieve/glossariesandkeywordlists/search.do?details=&vocabName=IRIS%20Glossary&filterTerm=unit%20risk&checkedAcronym=false&checkedTerm=false&hasDefinitions=false&filterTerm=unit%20risk&filterMatchCriteria=Contains.

⁶⁸ An exception to this is the URE for benzene, which is considered to cover a range of values, each end of which is considered to be equally plausible, and which is based on maximum likelihood estimates.

⁶⁹ See *A Review of the Reference Dose and Reference Concentration Processes*, U.S. EPA, December 2002, and *Methods for Derivation of Inhalation Reference Concentrations and Application of Inhalation Dosimetry*, U.S. EPA, 1994.

results of a three-tiered screening assessment that relies on the outputs from models—TRIM.FaTE and AERMOD—that estimate environmental pollutant concentrations and human exposures for five PB-HAP (PCDD/PCDF, POM, Hg, Cd compounds, and As compounds) and two acid gases (HF and HCl). For Pb, we use AERMOD to determine ambient air concentrations, which are then compared to the secondary Pb NAAQS. Two important types of uncertainty associated with the use of these models in RTR risk assessments and inherent to any assessment that relies on environmental modeling are model uncertainty and input uncertainty.⁷⁰

Model uncertainty concerns whether the model adequately represents the actual processes (*e.g.*, movement and accumulation) that might occur in the environment. For example, if the model adequately describes the movement of a pollutant through the soil. This type of uncertainty is difficult to quantify. However, based on feedback received from previous EPA SAB reviews and other reviews, we are confident that the models used in the screening assessments are appropriate and state-of-the-art for the multipathway and environmental screening risk assessments conducted in support of RTRs.

Input uncertainty is concerned with how accurately the models have been configured and parameterized for the assessment at hand. For Tier 1 of the multipathway and environmental screening assessments, we configured the models to avoid underestimating exposure and risk. This was accomplished by selecting upper-end values from nationally representative datasets for the more influential parameters in the environmental model, including selection and spatial configuration of the area of interest, lake location and size, meteorology, surface water, soil characteristics, and structure of the aquatic food web. We also assume an ingestion exposure scenario and values for human exposure factors that represent reasonable maximum exposures.

In Tier 2 of the multipathway and environmental screening assessments, we refine the model inputs to account for meteorological patterns in the vicinity of the facility versus using upper-end national values, and we

identify the actual location of lakes near the facility rather than the default lake location that we apply in Tier 1. By refining the screening approach in Tier 2 to account for local geographical and meteorological data, we decrease the likelihood that concentrations in environmental media are overestimated, thereby increasing the usefulness of the screening assessment. In Tier 3 of the screening assessments, we refine the model inputs again to account for hour-by-hour plume-rise and the height of the mixing layer. We can also use those hour-by-hour meteorological data in a TRIM.FaTE run using the screening configuration corresponding to the lake location. These refinements produce a more accurate estimate of chemical concentrations in the media of interest, thereby reducing the uncertainty with those estimates. The assumptions and the associated uncertainties regarding the selected ingestion exposure scenario are the same for all three tiers.

For the environmental screening assessment for acid gases, we employ a single-tiered approach. We use the modeled air concentrations and compare those with ecological benchmarks.

For all tiers of the multipathway and environmental screening assessments, our approach to addressing model input uncertainty is generally cautious. We choose model inputs from the upper-end of the range of possible values for the influential parameters used in the models, and we assume that the exposed individual exhibits ingestion behavior that would lead to a high total exposure. This approach reduces the likelihood of not identifying high risks for adverse impacts.

Despite the uncertainties, when individual pollutants or facilities do not exceed screening threshold emission rates (*i.e.*, “passes”), we are confident that the potential for adverse multipathway impacts on human health is very low. On the other hand, when individual pollutants or facilities do exceed screening threshold emission rates, it does not mean that impacts are significant, only that we cannot rule out that possibility and that a refined assessment for the site might be necessary to obtain a more accurate risk characterization for the source category.

The EPA evaluates the following HAP in the multipathway and/or environmental risk screening assessments, where applicable: As compounds, Cd compounds, PCDD/PCDF, Pb, Hg (both inorganic and methylmercury), POM, HCl, and HF. These HAP represent pollutants that can cause adverse impacts either through direct exposure to HAP in the air or

through exposure to HAP that are deposited from the air onto soils and surface waters and then through the environment into the food web. These HAP represent those for which we can conduct a meaningful multipathway or environmental screening risk assessment. For other HAP not included in our screening assessments, the model has not been parameterized such that it can be used for that purpose. In some cases, depending on the HAP, we may not have appropriate multipathway models that allow us to predict the concentration of that pollutant. The EPA acknowledges that other HAP beyond these that we are evaluating may have the potential to cause adverse effects and, therefore, the EPA may evaluate other relevant HAP in the future, as modeling science and resources allow.

IV. Analytical Results and Proposed Decisions

A. What actions are we proposing pursuant to CAA sections 112(d)(2) and 112(d)(3)?

In this proposal, we are proposing actions to address unregulated HAP pursuant to the D.C. Circuit’s decision in *LEAN*. The D.C. Circuit has held that the EPA is required to address any previously unregulated HAP emissions as part of its periodic review of MACT standards under CAA section 112(d)(6). Based on a review of available information pursuant to the *LEAN* decision, we are proposing the following pursuant to CAA sections 112(d)(2), (d)(3), and (h)(1):⁷¹

- Numeric emission limits for HF and HCN for major source HWC solid fuel boilers.
- Work practice standard for HF for major source HWC incinerators.
- Work practice standard for HF and numeric emission limit for HCN for major source HWC cement kilns.
- Work practice standard for HF and numeric emission limits for HCN for major source liquid fuel boilers.

The results and proposed decisions based on the analyses performed pursuant to CAA sections 112(d)(2) and (3) are presented below, with separate discussion for each subcategory and HAP.

Consistent with the EPA’s longstanding position, we do not believe that we are required to regulate emissions of HF or HCN from area sources in the HWC NESHAP because the EPA did not identify either HF or HCN as urban HAP pursuant to CAA sections 112(k)(3)(B) and 112(c)(3).⁷²

⁷¹ See *LEAN*, 955 F.3d at 1091–99.

⁷² 64 FR 38706, 38715, (July 19, 1999); see, *e.g.*, Proposed Gas-Fired Melting Furnaces Located at

⁷⁰ In the context of this discussion, the term “uncertainty” as it pertains to exposure and risk encompasses both *variability* in the range of expected inputs and screening results due to existing spatial, temporal, and other factors, as well as *uncertainty* in being able to accurately estimate the true result.

and because CAA section 112(c)(6) does not identify either HF or HCN as a pollutant of specific concern. Neither HF nor HCN is an urban HAP or a pollutant of specific concern, therefore, we are not proposing any emission limits for HF or HCN for area sources. All emission standards discussed here are only for HWCs at facilities that are major sources of HAP.

As previously noted, the D.C. Circuit has held that the EPA must address any previously unregulated HAP known to be emitted from major sources as part of its periodic review of MACT standards under CAA section 112(d)(6). *LEAN*, 955 F.3d at 1091–99. The order issued by the D.C. District Court addressing our obligations to review and revise the HWC NESHAP also requires the EPA to establish standards for any previously unregulated HAP in this rulemaking. Order, *Blue Ridge Env'tl. Def. League v. Regan*, 22–cv–3134 (APM) (D.D.C. Dec. 12, 2024). During the technology review, the EPA identified HF and HCN as unregulated HAP through permit review and emissions testing. We also collected information on PCBs and PAHs in the emission testing request. Although we mistakenly identified PCBs as an unregulated HAP to the D.C. District Court, we more recently conducted a careful analysis of the HWC NESHAP's rule record, which revealed that the EPA already promulgated MACT standards for PCBs and PAHs through the combination of the DRE and CO or THC standards as a surrogate for non-PCDD/PCDF organic HAP.⁷³ Because PCBs are already regulated through surrogacy, no additional emission standards are required. Therefore, we are not proposing additional standards regulating PCB emissions.

To address the missing HF and HCN standards, we are proposing emission limits for HF and HCN under CAA sections 112(d)(2), (d)(3), and (h)(2) as described in this section. While the proposed emission limits for these HAP were calculated under CAA sections 112(d)(3) and (h)(2), we are soliciting comment on setting the HF and HCN standards pursuant to CAA section 112(d)(6) rather than setting the HF and HCN standards exclusively pursuant to CAA section 112(d)(2), (d)(3), and (h)(2) (C–1). Although the D.C. Circuit held in *LEAN* that the EPA is required to address previously unregulated HAP from major sources during a CAA section 112(d)(6) technology review, it

is not entirely clear how that process functions under the statutory text. The difference in the approach would be that we would not be constrained to any minimum stringency level and would, therefore, not conduct a beyond-the-floor analysis. We would not anticipate any cost or impact differences associated with setting the HF and HCN limits pursuant to CAA section 112(d)(6) as compared to CAA sections 112(d)(2) and (3). The estimated costs would be for testing, recordkeeping, and reporting. It bears noting that the standards under review were first promulgated in 2005 and our review found an overall reduction of emissions from this source category that could likely be attributed to concerted efforts of sources since promulgation. We are also soliciting comments, data, and other information regarding the analyses for our proposed MACT floor standards, the beyond-the-floor options, and our determinations (C–2).

1. Solid Fuel Boilers

a. Hydrogen Fluoride

The EPA is proposing MACT standards for HF emissions from solid fuel boilers. As further explained below, the EPA is also soliciting comment on establishing an HBEL under CAA section 112(d)(4) for HF emissions from solid fuel boilers.

Under the D.C. Circuit's decision in *LEAN*, the EPA must set emission limits for major sources with known unregulated HAP emissions as part of its periodic review of MACT standards under CAA section 112(d)(6). These standards can take at least three forms: technology-based standards that reflect the maximum reductions of HAP achievable (after considering cost, energy requirements, and non-air health and environmental impacts) and are commonly referred to as MACT standards; an HBEL for HAP with an established health threshold; or a work practice standard when another standard is not feasible to prescribe or enforce. Because the EPA did not have previous HF emissions data, the EPA collected HF emissions data from one HWC solid fuel boiler in the January 2024 emissions testing request, and this boiler had detected emissions of HF in all emissions test runs. Based on that emissions test data, the EPA considers that a numerical emission standard is feasible to prescribe and enforce for emissions of HF from solid fuel boilers.

We are proposing MACT emission limits for HF emissions from solid fuel boilers. CAA section 112(d)(3)(B) provides that MACT shall not be less stringent than “the average emission

limitation achieved by the best performing 5 sources (for which the Administrator has or could reasonably obtain emissions information) in the category or subcategory for categories or subcategories with fewer than 30 sources.” Because we have HF emissions data for only one of the seven solid fuel boilers, the proposed MACT floor is based on the HF data for this unit. In determining the level of the MACT floor, we used the Upper Prediction Limit (UPL) method to account for variability in solid fuel boiler performance and calculated the MACT floor at 6.2 parts per million by volume (ppmv) HF, dry basis and corrected to seven percent oxygen.⁷⁴ Based on available data, the EPA estimates that all solid fuel boilers would be able to meet the MACT floor limit with no additional controls.

For new sources, CAA section 112(d)(3) provides that the MACT shall not be less stringent than “the emission control that is achieved in practice by the best controlled similar source, as determined by the Administrator.” Because we only have HF emissions data from one solid fuel boiler, the proposed MACT floor limit for new sources is the same as the MACT floor limit for existing sources: 6.2 ppmv HF, dry basis and corrected to seven percent oxygen.

When establishing an emission standard pursuant to CAA section 112, the EPA also determines whether to control emissions “beyond-the-floor” (BTF) after considering the costs, non-air quality health and environmental impacts, and energy requirements of such more stringent control.⁷⁵ Further, CAA section 112 does not prescribe a methodology for the Agency's costs analysis. Therefore, where cost is a consideration for standard setting under CAA section 112(d)(2), we have historically used cost-effectiveness (cost/ton-reduced) in supporting analyses.⁷⁶ The EPA solicits comment

⁷⁴ MACT Floor and Beyond-the-Floor Analysis for Hazardous Waste Combustors, which is available in the docket for this proposed rulemaking (Docket ID No. EPA–HQ–OAR–2004–0022); The UPL “reflect[s] a reasonable estimate of the emissions achieved in practice by the best-performing sources.” *U.S. Sugar Corp. v. EPA*, 830 F.3d 579, 639 (D.C. Cir. 2016) (alteration in original).

⁷⁵ *Nat'l Lime Ass'n v. EPA*, 233 F.3d 625, 634 (D.C. Cir. 2000) (“Once the Agency sets statutory floors, it then determines, considering cost and the other factors listed in section 7412(d)(2), whether stricter standards are ‘achievable.’ The Agency calls such stricter requirements ‘beyond-the-floor’ standards.”).

⁷⁶ See *NRDC v. EPA*, 749 F.3d 1055, 1060 (D.C. Cir. 2014) (upholding the EPA's consideration of cost-effectiveness as a component of the CAA section 112(d)(2) cost analysis); see also *Ass'n of*

Wool Fiberglass Manufacturing Area Sources NESHAP, 78 FR 22370, 22375–76, (Apr. 15, 2013); 80 FR 45280, 45319–20, (July 29, 2015) (finalized as proposed).

⁷³ 70 FR 59433 (Oct. 12, 2005); 80 FR 31473 (June 3, 2015).

on whether strategies other than cost per ton of pollutant reduced for considering cost when evaluating beyond-the-floor standards would be more appropriate (C–3).

The EPA evaluated whether a BTF emission limit would be appropriate for HF emissions from solid fuel boilers. One HWC liquid fuel boiler has a caustic packed bed scrubber (caustic scrubber) with sodium hydroxide (NaOH) added to the scrubbing liquid which can control HF emissions. While no HWC solid fuel boilers have a caustic scrubber, based on substantial similarities in design and operations of both types of boilers, we expect that a caustic scrubber would be a technically feasible option for HWC solid fuel boilers. Therefore, we evaluated whether the incremental emissions reduction achievable with a caustic scrubber would be cost-effective. A caustic scrubber would also offer some co-control of HCl and HCN emissions. We estimate that a caustic scrubber would achieve approximately 95 percent reduction of HF from the solid fuel boiler. A corresponding 95 percent reduction in the HF MACT floor would result in a standard that is below three times the representative detection level (3xRDL) of the method.⁷⁷ The EPA uses 3xRDL as its minimum standard to account for variability in the test method measurements and ensure that compliance with a standard can be reliably measured. Therefore, the BTF emission limit would be 0.60 ppmv HF, dry basis and corrected to seven percent oxygen, which reflects the 3xRDL for HF emissions from solid fuel boilers.

The EPA estimates that all solid fuel boilers would need to install caustic scrubbers to meet the BTF level. This would result in an industry-wide 16.35 tpy reduction of HF (i.e., 95 percent reduction of emissions), at approximately a total capital investment of \$14.3 million (2024\$) and total annualized costs of \$4.46 million (2024\$) for a cost-effectiveness of \$273,000 (2024\$) per ton of HF reduced. The installation of a caustic scrubber at a single new source would achieve a 2.3

tpy reduction of HF, at approximately a total capital investment of \$2.04 million (2024\$) and total annualized costs of \$637,000 (2024\$) for a cost effectiveness of \$272,000 (2024\$) per ton of HF reduced. If other acid gases are present, then the amount of caustic required would increase from the amount we estimated, and there would be corresponding annual cost increases. The EPA has previously considered \$68,000 per ton of HF reduced (adjusted to 2024\$) to not be cost-effective⁷⁸ and, in keeping with that prior consideration, proposes not to consider either \$273,000 or \$272,000 per ton of HF reduced to be cost-effective. A caustic scrubber would also produce additional wastewater that would need to be treated onsite or removed from the site for treatment or disposal. Additional energy is required both to operate the scrubber and to treat or otherwise dispose of wastewater. After considering both the MACT floor and BTF options for existing and new sources, the EPA proposes to conclude that the installation of a caustic scrubber as a BTF option is not warranted considering the cost, non-air quality health and environmental impacts, and energy requirements for either existing or new solid fuel boilers. Therefore, the EPA is proposing the MACT floor of 6.2 ppmv HF, dry basis and corrected to seven percent oxygen, for both existing and new solid fuel boilers.

The EPA is proposing that compliance with the HF emission limits for solid fuel boilers would be required within three years after the publication of the final rule and that demonstration through an initial compliance test would occur no later than six months after the compliance date. This would be followed by subsequent demonstration of compliance once every five years during the CPT using EPA Methods 26A or 320. For affected facilities that commence construction or reconstruction after November 10, 2025, owners or operators must comply with all requirements of the subpart, including the HF emission limits, no later than the effective date of the final rule or upon startup, whichever is later, and must demonstrate compliance no later than six months after the compliance date.

The EPA is also soliciting comment on whether an HBEL for HF emissions from solid fuel boilers should be established (C–4). For HAP with an established health threshold, CAA section 112(d)(4) allows the EPA to consider such health thresholds when

establishing emission standards under CAA section 112(d). CAA section 112(d)(4) states, “[w]ith respect to pollutants for which a health threshold has been established, the Administrator may consider such threshold level, with an ample margin of safety, when establishing emission standards under this subsection.”⁷⁹ In other words, for HAP with a health threshold, such as HCl, the EPA may promulgate standards under a different process from that otherwise specified in CAA sections 112(d)(2) and (3). This kind of standard is commonly referred to as an HBEL. It also bears noting that the EPA previously established an alternative HBEL for HCl in the HWC NESHAP that was based on a site-specific risk assessment or, more conservatively, values based on general release parameters.⁸⁰ More recently, the EPA solicited comment on establishing an HBEL for HCl in the supplemental proposal for the Lime Manufacturing Plants NESHAP.⁸¹ For solid fuel boilers, the EPA is soliciting comment on whether an HBEL for HF should be established (C–4) and, if so, whether that should be a single HBEL, like the one for HCl in the Lime Manufacturing Plants NESHAP, or an alternative HBEL based on the existing framework in the HWC NESHAP for HCl (C–5).

b. Hydrogen Cyanide

The EPA is proposing MACT standards for HCN emissions from solid fuel boilers. As further explained below, the EPA is also soliciting comment on establishing an HBEL under CAA section 112(d)(4) for HCN emissions from solid fuel boilers (C–4).

The EPA collected HCN emissions data from one HWC solid fuel boiler in the January 2024 emissions testing request, and this boiler had detected emissions of HCN in all emissions test runs. The EPA is proposing MACT emission limits for HCN emissions from solid fuel boilers. CAA section 112(d)(3)(B) provides that MACT shall not be less stringent than “the average emission limitation achieved by the best performing 5 sources (for which the

Battery Recyclers, 716 F.3d at 673–74 (the EPA may rely on cost-effectiveness in CAA section 112(d)(6) decision-making); *Nat’l Ass’n of Clean Water Agencies v. EPA*, 734 F.3d 1115, 1156–57 (D.C. Cir. 2013) (the EPA may rely on cost-effectiveness in setting BTF standards under CAA section 129(a)(2)); *Husqvarna AB v. EPA*, 254 F.3d 195, 200 (D.C. Cir. 2001) (“because section 213 does not mandate a specific method of cost analysis, we find reasonable the EPA’s choice to consider costs on the per ton of emissions removed basis”).

⁷⁷ See the memorandum *Representative Detection Limit (RDL) for Hydrogen Fluoride for Hazardous Waste Combustion Sources*, which is available in the docket for this proposed rulemaking (Docket ID No. EPA–HQ–OAR–2004–0022).

⁷⁸ Brick and Structural Clay Products Manufacturing NESHAP, 67 FR 47894 (July 22, 2002).

⁷⁹ 42 U.S.C. 7412(d)(4). See also *U.S. Sugar*, 830 F.3d at 624 (“This provision thus allows, but does not require, the EPA to adopt a standard more lenient than the MACT floor, subject to two critical restrictions: the Agency must determine (1) that there is an established health threshold, and (2) that the established threshold would provide ‘an ample margin of safety.’”).

⁸⁰ See the 2005 HWC NESHAP final rule (70 FR 59432, Oct. 12, 2005) and its technical support documents for more discussion on the current alternative health-based emission limit for HCl, which is available in the docket for this proposed rulemaking (Docket ID No. EPA–HQ–OAR–2004–0022).

⁸¹ 89 FR 9088 (Feb. 9, 2024).

Administrator has or could reasonably obtain emissions information) in the category or subcategory for categories or subcategories with fewer than 30 sources.” Because we have HCN emissions data for only one of the seven HWC solid fuel boilers, the proposed MACT floor is based on the HCN emissions data from this one unit. In determining the level of the MACT floor, the UPL method was used to account for variability in solid fuel boiler performance, and the MACT floor was calculated at 5.0 ppmv HCN, dry basis and corrected to seven percent oxygen.⁸² Based on available data, the EPA estimates that all solid fuel boilers would be able to meet the MACT floor limit with no additional controls. For new sources, CAA section 112(d)(3) provides that the MACT shall not be less stringent than “the emission control that is achieved in practice by the best controlled similar source, as determined by the Administrator.” Because we only have HCN emissions data from one solid fuel boiler, the proposed MACT floor limit for new sources is the same as the MACT floor limit for existing sources: 5.0 ppmv HCN, dry basis and corrected to seven percent oxygen.

When establishing an emission standard pursuant to CAA section 112, the EPA must also determine whether to control emissions BTF after considering the costs, non-air quality health and environmental impacts, and energy requirements of such more stringent control. The EPA evaluated whether BTF emission limits would be appropriate for HCN emissions from solid fuel boilers. No HWC solid fuel boiler has a control device that the EPA expects to control HCN emissions. Furthermore, no HWC has a control device specifically designated as controlling HCN emissions. Good combustion practices like high combustion temperature, thorough mixing, sufficient residence time, excess oxygen, and control of flue gas temperature can prevent emissions of HCN from HWCs by encouraging the oxidation of HCN in the combustion zone and preventing its formation after the flue gas exits the combustion chamber. Many HWCs have incorporated secondary combustion chambers or afterburners that may serve to promote good combustion and control HCN emissions, especially if they are followed by a quench. One HWC, a liquid fuel boiler, combusts HCN and uses it as the primary organic

hazardous constituent (POHC) in its DRE demonstration. This unit demonstrated at least 99.99 percent DRE and had low HCN emissions. The unit does not have any air pollution control devices (APCDs) that control HCN emissions and instead relies on good combustion practices and operational parameters appropriate for limiting HCN emissions.

Several HWCs have control devices for other HAP that we expect to co-control HCN emissions, including caustic scrubbers with NaOH added to the scrubbing liquid. One HWC liquid fuel boiler has a caustic scrubber and based on substantial similarities in design and operations of both types of boilers we expect that a caustic scrubber would be a technically feasible option for HWC solid fuel boilers, so we evaluated whether the incremental emissions reduction achievable with a caustic scrubber would be cost-effective. We estimate that a caustic scrubber would achieve approximately 95 percent reduction of HCN from one solid fuel boiler. A corresponding 95 percent reduction in the MACT floor would result in a standard below the 3xRDL value for HCN for solid fuel boilers (1.1 ppmv).⁸³ Therefore, the BTF emission limit would be 1.1 ppmv HCN, dry basis and corrected to seven percent oxygen, which reflects the 3xRDL for HCN emissions from solid fuel boilers.

The EPA estimates that all solid fuel boilers would need to install caustic scrubbers to meet the BTF limit. This would result in an industry-wide 27.4 tpy reduction of HCN (*i.e.*, 95 percent reduction of emissions), at a total capital investment of \$14.3 million (2024\$) and total annualized costs of \$4.46 (2024\$) for a cost-effectiveness of \$163,000 (2024\$) per ton of HCN reduced. The installation of a caustic scrubber at a single new source would achieve a 3.9 tpy reduction of HF, at approximately a total capital investment of \$2.04 million (2024\$) and total annualized costs of \$637,000 (2024\$) for a cost effectiveness of \$162,000 (2024\$) per ton of HCN reduced. A caustic scrubber would also offer some co-control of HCl and HF. If other acid gases are present, then the amount of caustic required would increase from the amount estimated, and there will be corresponding annual cost increases. The EPA has previously considered \$15,900 per ton of HCN reduced (adjusted to 2024\$) to not be

cost-effective⁸⁴ and, in keeping with that prior consideration, proposed not to consider either \$163,000 or \$162,000 per ton of HCN reduced to be cost-effective. A caustic scrubber would also produce additional wastewater that would need to be treated onsite or removed from the site for treatment or disposal. Additional energy is required both to operate the scrubber and to treat or otherwise dispose of wastewater. After considering both the MACT floor and BTF options for existing and new sources, the EPA proposes to conclude that the installation of a caustic scrubber as a BTF option is not warranted considering the cost, non-air quality health and environmental impacts, and energy requirements for either existing or new solid fuel boilers. Therefore, the EPA is proposing the MACT floor of 5.0 ppmv HCN, dry basis and corrected to seven percent oxygen for both existing and new solid fuel boilers.

The EPA is proposing that compliance with the HCN emission limits for solid fuel boilers would be required within three years after the publication of the final rule and that demonstration through an initial compliance test would occur no later than six months after the compliance date. This would be followed by subsequent demonstration of compliance once every five years during the CPT using EPA Method 320 or, if there are entrained water droplets in the flue gas, an alternative test method submitted and approved by the Administrator according to 40 CFR 63.7(f). For affected facilities that commence construction or reconstruction after November 10, 2025, owners or operators must comply with all requirements of the subpart, including the HCN emission limits, no later than the effective date of the final rule or upon startup, whichever is later, and must demonstrate compliance no later than six months after the compliance date.

The EPA solicits comment on establishing an HBEL under CAA section 112(d)(4) for HCN (C-4). The EPA also solicits comment on whether a single HBEL under CAA section 112(d)(4) for HCN should be established, like that discussed in the supplemental proposal for HCl in the Lime Manufacturing Plants NESHAP (89 FR 9088; Feb. 9, 2024), or whether an alternative HBEL for HCN based on the framework already in the HWC NESHAP for HCl (40 CFR 63.1215) would be more appropriate (C-5).

⁸² MACT Floor and Beyond-the-Floor Analysis for Hazardous Waste Combustors, which is available in the docket for this proposed rulemaking (Docket ID No. EPA-HQ-OAR-2004-0022).

⁸³ See the memorandum *Representative Detection Level for Hydrogen Cyanide for Cement Kilns and Hazardous Waste Combustors*, which is available in the docket for this proposed rulemaking (Docket ID No. EPA-HQ-OAR-2004-0022).

⁸⁴ Petroleum Refinery Sector Risk and Technology Review and New Source Performance Standards, 79 FR 36880 (June 30, 2014).

2. Incinerators

a. Hydrogen Fluoride

The EPA is proposing a work practice standard with multiple proposed compliance options for HF emissions from HWC incinerators. The EPA collected HF emissions data from seven HWC incinerators in the January 2024 emissions testing request. We did not require an eighth incinerator to test for HF emissions because it had reported in the August 2023 questionnaire that it did not burn fluorinated waste. CAA section 112(h)(1) authorizes the Administrator to promulgate “a design, equipment, work practice, or operational standard, or combination thereof” if, in his judgment, “it is not feasible to prescribe or enforce a standard of performance.” CAA section 112(h)(2) provides the circumstances under which prescribing or enforcing a standard of performance is “not feasible,” such as when the pollutant cannot be emitted through a conveyance designed to emit or capture the pollutant, or when there is no practicable measurement methodology for the particular class of sources. Further, “application of measurement methodology” is more than just taking a measurement. The measurement must also have some reasonable relation to what the source is emitting (*i.e.*, the measurement must yield a meaningful value). The EPA generally considers a work practice standard to be justified if a significant majority (*e.g.*, more than 55 percent of test runs) of emissions data available indicate that emissions are so low that they cannot be reliably measured (*i.e.*, emissions are below detection limit).⁸⁵ In the case of HWC incinerators, we found that 94 percent of the HF data was below the detection limit, and so we find it appropriate to propose a work practice standard.

The EPA is proposing a work practice standard for HF emissions from HWC incinerators with multiple compliance options. We are proposing that a source would only comply with one of the three options. The options of the proposed work practice standard are as follows:

- *Option 1:* If a source actively controls HCl emissions and the source has at least two AWFCO-interlocked operating parameter limits other than chlorine feed rate to control HCl, then comply with the HCl and chlorine gas operating parameter limits and indicate in the CPT report and notice of compliance that compliance is demonstrated by complying with the HCl and chlorine gas operating parameter limits.

- *Option 2:* If a facility does not feed any material with detectable levels of fluorine to the source, then certify in the CPT report that no fluorine is fed and indicate in the CPT report and notice of compliance that compliance is demonstrated through the certification.

- *Option 3:* If a facility feeds fluorine to a source and the source has no active HCl control with at least two AWFCO-interlocked operating parameter limits other than chlorine feed rate to control HCl emissions, then the facility must monitor and record the total fluorine fed to the unit as a 12-hour rolling average. If at any point the feed rate suggests that HF emissions may exceed the solid fuel boiler existing source emission limit for HF (as calculated according to the HWC NESHAP’s maximum theoretical emissions concentration (MTEC) procedure), then complete a one-time HF emissions test during the next CPT at the maximum recorded fluorine feed rate and include the test results in the CPT report. The demonstration that HF MTEC does not exceed the solid fuel boiler existing source emission limit for HF would be included in the CPT plan.

Compliance with this work practice standard will minimize emissions of HF from HWC incinerators. For the Option 1 work practice, all utilized controls of HCl emissions except chlorine feed rate control also control HF, as both are acid gases with similar chemistry in APCDs; these APCDs are equally or more effective at controlling HF than HCl. Because HCl, and by extension HF, is already controlled, no further control requirements are necessary. For the Option 2 work practice, if no fluorine is fed to an HWC, then HF will not be emitted from the HWC. While most commercial HWCs accept some hazardous waste containing fluorine, the results of the August 2023 questionnaire indicate that some captive HWCs do not feed fluorine, and there is no reason to expect HF emissions. The EPA anticipates that most HWC incinerators will fall into the Option 1 or Option 2 work practices. By our estimate, approximately 70 percent of HWC incinerators have an APCD that controls HCl, and approximately 33

percent of captive incinerators do not feed fluorine.

Any HWC incinerators that cannot meet the Option 1 or Option 2 work practices would be required to comply with Option 3 by monitoring the fluorine fed to the unit and completing an HF emissions test if significant amounts of fluorine are ever fed. The feed monitoring requirement is similar to the monitoring requirements of other HAP precursors (like metals or chlorine). The Option 3 work practice is designed to operate as a backstop and to provide the EPA with emissions data to use in a future CAA section 112(d)(6) technology review if HF emissions are more significant than our current data indicate.

The EPA is soliciting comment on whether this proposed work practice standard is appropriate for the control of HF emissions and whether additional work practice options should be added (C–6).

The EPA is proposing that compliance with the HF work practice standard for incinerators would be required within three years after the publication of the final rule and that demonstration through a certification, test plan, or initial compliance test would occur no later than six months after the compliance date. This would be followed by subsequent demonstration of compliance once every five years during the CPT. Emission testing for HF must use EPA Methods 26A or 320. For affected facilities that commence construction or reconstruction after November 10, 2025, owners or operators would be required to comply with all requirements of the subpart, including the HF work practice standard, no later than the effective date of the final rule or upon startup, whichever is later, and must demonstrate compliance no later than six months after the compliance date.

b. Hydrogen Cyanide

The EPA is not proposing MACT standards for HCN emissions from HWC incinerators. The EPA collected HCN emissions data from eight HWC incinerators in the January 2024 emissions testing request. HCN was not measured in any test run. Because the EPA emissions data indicates that HCN is not measurably emitted from HWC incinerators, the EPA is not proposing any emission standard for HCN from HWC incinerators.

3. Cement Kilns

a. Hydrogen Fluoride

For HF emissions from cement kilns, the EPA is proposing work practice

⁸⁵ See the memorandum titled *Determination of “non detect” from EPA Method 29 (multi-metals) and EPA Method 23 (dioxin/furan) test data when evaluating the setting of MACT floors versus establishing work practice standards* (Johnson, 2014), which is available in the docket for this proposed rulemaking (Docket ID No. EPA–HQ–OAR–2004–0022). (The EPA may “adopt[] a method to account for measurement imprecision that has a rational basis in the correlation between increased emission values and increased testing precision.” *Nat’l Ass’n of Clean Water Agencies*, 734 F.3d at 1155).

standards with the same multiple compliance options proposed for HF emissions from HWC incinerators. The EPA collected HF emissions data from four HWC cement kilns in the January 2024 emissions testing request. We found that 71 percent of the HF data was below the detection limit, and so the Administrator finds it appropriate to propose a work practice standard for emissions of HF from major source cement kilns under CAA section 112(h)(1).

The EPA is proposing the same multi-option work practice standard for cement kilns as described in section IV.A. of this preamble for incinerators. Approximately 15 percent of HWC cement kilns have integrated APCDs with AWFCO-interlocked operating parameter limits that control HCl emissions, and these kilns would fall into the Option 1 work practice. To our knowledge, all cement kilns burn at least some fluorine-containing material, and so we do not expect that any would fall into the Option 2 work practice. Any cement kilns that cannot meet the Option 1 or Option 2 work practices would follow the Option 3 monitoring work practice.

While only 15 percent of cement kilns have APCDs that control HCl emissions, the EPA views the cement production process as offering some degree of inherent control of HCl (and thus HF). When hot effluent gas flows out of a cement kiln, it is not immediately directed to the air pollution control train like it may be for other types of HWC. Instead, the effluent gas is used to preheat raw materials before they enter the kiln, which serves as a form of energy recovery. Raw materials that are fed to a cement kiln contain large amounts of alkaline materials including calcium carbonate, which is used in dry scrubbing APCDs for control of acid gases because it reacts readily with HCl and HF. The effluent gas continues to contact alkaline cement kiln dust throughout the process until the dust collection APCD, which is often the final control device for an HWC cement kiln. For “inherent” control of HCl from cement kilns to qualify as an Option 1 work practice, there must be operating parameter limits related to the inherent control interlocked with the AWFCO system. The EPA is soliciting comment on which operating parameter limits (e.g., maximum stack gas flow rate) may be appropriate parameterization for cement kiln’s inherent control of HCl and thus HF (C–7).

The EPA is proposing that compliance with the HF work practice standard for HWC cement kilns would be required within three years after the publication

of the final rule and that demonstration through a certification, test plan, or initial compliance test would occur no later than six months after the compliance date. This would be followed by subsequent demonstration of compliance once every five years during the CPT. Emission testing for HF must use EPA Methods 26A or 320. For affected facilities that commence construction or reconstruction after November 10, 2025, owners or operators would be required to comply with all requirements of the subpart, including the HF work practice standard, no later than the effective date of the final rule or upon startup, whichever is later, and must demonstrate compliance no later than six months after the compliance date.

b. Hydrogen Cyanide

The EPA is proposing MACT standards for HCN emissions from HWC cement kilns. As further explained below, the EPA is also soliciting comment on whether the HCN standards for cement kilns should be subcategorized by kiln type and, if so, how (C–8).

The EPA collected HCN emissions data from four HWC cement kilns in the CAA section 114 emissions testing request, and HCN was detected in all emissions test runs. The EPA is proposing MACT emission limits for HCN emissions from cement kilns. CAA section 112(d)(3)(B) provides that MACT shall not be less stringent than “the average emission limitation achieved by the best performing 5 sources (for which the Administrator has or could reasonably obtain emissions information) in the category or subcategory for categories or subcategories with fewer than 30 sources.” Because we have HCN emissions data from only four HWC cement kilns, the proposed MACT floor is based on the HCN emissions data from those four units. Many HWC cement kilns have in-line raw mills that operate approximately 85 percent of the time when the kiln is in operation. Whether the raw mill is in operation can affect the HAP emissions profile of the cement kiln. In the January 2024 emissions testing request, the EPA requested that data be collected both while the raw mill was on and off if the kiln had an in-line raw mill. When the raw mill is running, a portion of the kiln exhaust is recycled back to the raw mill to heat raw materials fed to the kiln, resulting in a different emission profile at the stack. When the raw mill is not running, typically for maintenance, the kiln’s exhaust is routed directly to the APCDs and stack. The raw mill off data

were used to develop a correction factor for HCN emissions. Specifically, the average HCN emission concentration when the raw mill was off was calculated for each HWC cement kiln with a raw mill. Then, the raw mill off average was used with the raw mill on data for each test run to calculate a raw mill-corrected HCN emission concentration as a weighted mean assuming that the raw mill is on 85 percent of the time and off 15 percent of the time. This allows us to correct for any differences in emission profile depending on the operational status of the raw mill while maintaining the variability displayed in the raw mill on test runs. In determining the level of the MACT floor, the UPL method was used to account for variability in cement kiln performance, and the MACT floor was calculated at 56 ppmv HCN, dry basis and corrected to seven percent oxygen.⁸⁶ Based on available data, the EPA estimates that all existing cement kilns would be able to meet the MACT floor limit with no additional controls.

For new sources, CAA section 112(d)(3) provides that the MACT shall not be less stringent than “the emission control that is achieved in practice by the best controlled similar source, as determined by the Administrator.” The cement kiln with the best controlled emissions is a wet process kiln. The EPA calculated a proposed new source limit from the unit with the best controlled emissions using the UPL method, and this limit was calculated at 1.8 ppmv HCN, dry basis and corrected to seven percent oxygen.⁸⁷

When establishing an emission standard pursuant to CAA section 112, the EPA must also determine whether to control emissions BTF after considering the costs, non-air quality health and environmental impacts, and energy requirements of such more stringent control. The EPA evaluated whether BTF emission limits would be appropriate for HCN emissions from cement kilns. No HWC cement kilns have APCDs that the EPA expects to control HCN emissions. The HWC cement kiln industry submitted information to the EPA explaining why APCDs that may control HCN emissions from other sources are inappropriate for cement kilns.⁸⁸ While a caustic scrubber

⁸⁶ MACT Floor and Beyond-the-Floor Analysis for Hazardous Waste Combustors, which is available in the docket for this proposed rulemaking (Docket ID No. EPA-HQ-OAR-2004-0022).

⁸⁷ *Id.*

⁸⁸ See the email from the Cement Kiln Recycling Coalition in the docket for this proposed rulemaking (Docket ID No. EPA-HQ-OAR-2004-0022).

may be a potential control option for other subcategories of HWC, it is not a demonstrated control strategy for HWC cement kilns. Caustic scrubbers remove HCN by reacting it with NaOH to produce sodium cyanide (NaCN) and water. In some applications, sodium hypochlorite (NaClO) is also added to the scrubbing solution to form sodium bicarbonate (NaHCO₃), sodium chloride (NaCl), and nitrogen (N₂), which are often more favored reaction products. As implied by their name, caustic scrubbers operate at a basic pH. However, wet scrubbers employed by the cement kiln industry for acid gas control by necessity operate at an acidic pH to avoid precipitation and fouling of scrubber components and pumps. The product of these wet scrubbers is synthetic gypsum, which can be used in the cement production process. Caustic scrubbers could not replace wet scrubbers for multiple reasons, including that elevated levels of sodium would interfere with the cement production process. Instead, caustic scrubbers would have to be added after the final component of the cement kiln's current air pollution control system, likely followed by a demister to prevent interference with stack CEMS. The EPA has no evidence that this APCD configuration has been demonstrated on any cement kiln.

The EPA considers regenerative thermal oxidizers (RTO) to be a technically feasible option for control of HCN emissions, but RTO have an additional energy requirement due to use of natural gas. While no HWC cement kilns have RTO installed, two Portland cement kilns do. The EPA has considered, and continues to consider, combustion as a viable control technology for HCN. HWCs are, by nature, combustors. However, the data show that HCN is emitted from cement kilns. This is because gas that exits cement kilns can stay in the post-combustion system at elevated temperatures for relatively long times. These conditions create an environment for the potential formation of certain HAP (e.g., PCDD/PCDF) after the gas leaves the combustion zone of the kiln but before it exits to the atmosphere. Therefore, the EPA evaluated whether the incremental emissions reduction achievable with RTO would be cost-effective. We estimated that RTO would achieve approximately 95 percent reduction of HCN. This may be an overestimation of effectiveness given the relatively high HCN emissions from one Portland cement kiln with RTO

installed.⁸⁹ Assuming a 95 percent reduction from the UPL MACT floor due to RTO, the BTF emission limit for existing sources would be 2.8 ppmv HCN, dry basis and corrected to seven percent oxygen. A corresponding 95 percent reduction in the new source MACT floor would result in a standard below the 3xRDL value for HCN for cement kilns (1.1 ppmv).⁹⁰ Therefore the evaluated beyond-the-floor levels are 2.8 ppmv HCN for existing sources and 1.1 ppmv HCN for new sources, both on a dry basis and corrected to seven percent oxygen.

The EPA estimates that 13 of 14 existing HWC cement kilns and all new cement kilns would need to install RTO to meet the beyond-the-floor limits. For existing sources, this would result in a 311 tpy reduction of HCN, at approximately a total capital investment of \$122 million (2024\$) and total annualized costs of \$36.3 million (2024\$) for a cost-effectiveness of \$130,000 (2024\$) per ton of HCN reduced. For a new source, this would result in a 22.3 tpy reduction of HCN at approximately a total capital investment of \$9.40 million (2024\$) and total annualized costs of \$2.80 million (2024\$) for a cost effectiveness of \$125,000 (2024\$) per ton of HCN reduced. The EPA has previously considered \$15,900 per ton of HCN reduced (adjusted to 2024\$) to not be cost-effective⁹¹ and, in keeping with that prior consideration, proposes not to consider either \$130,000 or \$125,000 per ton of HCN reduced to be cost-effective. We also note that the costs used in this analysis underestimate the true cost of installing RTO because there are additional facility-specific costs that we could not estimate. For example, the cost estimates do not include the cost of securing a natural gas supply and installing a new natural gas connection to the RTO. Based on this analysis, and even with underestimated costs, the EPA proposes to conclude that the installation and operation of RTO for the BTF control of HCN emissions are not cost-effective for either existing or new HWC cement kilns.

Additional non-air quality health and environmental impacts and energy

⁸⁹ See "Section 114 Facility Responses" for the Portland Cement NESHAP (<https://www.epa.gov/stationary-sources-air-pollution/portland-cement-manufacturing-industry-information-collection>). Accessed May 19, 2025.

⁹⁰ See the memorandum *Representative Detection Level for Hydrogen Cyanide for Cement Kilns and Hazardous Waste Combustors*, which is available in the docket for this proposed rulemaking (Docket ID No. EPA-HQ-OAR-2004-0022).

⁹¹ Petroleum Refinery Sector Risk and Technology Review and New Source Performance Standards, 79 FR 36880 (June 30, 2014).

requirements of RTO must also be considered. Installation of RTO would increase emissions of criteria air pollutants, such as NO_x and CO because RTO requires the combustion of additional natural gas for fuel. It would consume an estimated 15,000–16,000 standard cubic feet of natural gas per hour. Based on the foregoing discussions, the EPA is proposing the MACT floor of 56 ppmv HCN, dry basis and corrected to seven percent oxygen, for existing cement kilns and the MACT floor of 1.8 ppmv HCN, dry basis and corrected to seven percent oxygen, for new cement kilns.

The EPA is proposing that compliance with the HCN emission limits for cement kilns would be required within three years after the publication of the final rule and that demonstration through an initial compliance test would occur no later than six months after the compliance date. This would be followed by subsequent demonstration of compliance once every five years during the CPT using EPA Method 320 or, if there are entrained water droplets in the flue gas, an alternative test method submitted and approved by the Administrator according to 40 CFR 63.7(f). For affected facilities that commence construction or reconstruction after November 10, 2025, owners or operators would be required to comply with all requirements of the subpart, including the HCN emission limits, no later than the effective date of the final rule or upon startup, whichever is later, and must demonstrate compliance no later than six months after the compliance date.

The EPA solicits comment on whether the HCN emission limit cement kilns should be subcategorized by kiln type and, if so, how (C–8). The EPA has HCN emission data for two types of HWC cement kilns: a wet process kiln and three preheater/precalciner kilns. There are other types of HWC cement kilns for which EPA does not have HCN emission data, including modified wet process with a preheater/precalciner and dry process without a preheater/precalciner. Without additional data, if we were to subcategorize in response to this proposal, the EPA could set HCN emission limits for wet process kilns separately from preheater/precalciner and other dry process kilns. Using the UPL method to account for variability when determining the level of the MACT floors, the existing and new source MACT floors for wet process HWC cement kilns would be 1.8 ppmv HCN, dry basis and corrected to seven

percent oxygen.⁹² Using the UPL method to account for variability when determining the level of the MACT floors, the existing source MACT floor for preheater/precalciner and dry process HWC cement kilns would be 27 ppmv HCN, dry basis and corrected to seven percent oxygen, and the new source MACT floor for preheater/precalciner and dry process HWC cement kilns would be 5.5 ppmv HCN, dry basis and corrected to seven percent oxygen.⁹³

4. Liquid Fuel Boilers

a. Hydrogen Fluoride

For HF emissions from liquid fuel boilers, the EPA is proposing work practice standards with the same multiple compliance options proposed for HF emissions from HWC incinerators. The EPA collected HF emissions data from four HWC liquid fuel boilers in the January 2024 emissions testing request. We did not require three liquid fuel boilers to test for HF because they reported in the August 2023 questionnaire that they did not burn fluorinated waste. We found that 75 percent of the HF data was below the detection limit, and so the Administrator finds it appropriate to propose a work practice standard for emissions of HF from major source liquid fuel boilers under CAA section 112(h)(1).

The EPA is proposing the same multi-option work practice standard for liquid fuel boilers as was described in section IV.A. of this preamble for incinerators. Approximately five percent of liquid fuel boilers have integrated APCDs with AWFCO-interlocked operating parameter limits that control HCl emissions, and these would fall into the Option 1 work practice. The results of the August 2023 questionnaire suggest that approximately 45 percent of liquid fuel boilers do not feed fluorine-containing materials and so would fall into the Option 2 work practice. Any major source liquid fuel boiler that cannot meet the Option 1 or Option 2 work practices would follow the Option 3 monitoring work practice. Based on the fluorine feed rates in the January 2024 emissions testing request, we do not anticipate that any liquid fuel boilers would be required to complete a one-time HF emissions test; however, the one-time test, if triggered, would provide the EPA with emissions data to use in a future CAA section 112(d)(6)

technology review if HF is found to be consistently emitted in measurable quantities.

The EPA is proposing that compliance with the HF work practice standard for liquid fuel boilers would be required within three years after the publication of the final rule and that demonstration through a certification, test plan, or initial compliance test would occur no later than six months after the compliance date. This would be followed by subsequent demonstration of compliance once every five years during the CPT. Emission testing for HF must use EPA Methods 26A or 320. For affected facilities that commence construction or reconstruction after November 10, 2025, owners or operators would be required to comply with all requirements of the subpart, including the HF work practice standard, no later than the effective date of the final rule or upon startup, whichever is later, and must demonstrate compliance no later than six months after the compliance date.

b. Hydrogen Cyanide

The EPA is proposing to subcategorize liquid fuel boilers by size, under CAA section 112(d)(1), for the purposes of the proposed HCN emission standard.

The EPA collected HCN emissions data from six major source HWC liquid fuel boilers in the January 2024 emissions testing request, and HCN was detected in 76 percent of emissions test runs. The smallest boiler, which is also equipped with a wet scrubber that uses NaOH in the scrubbing liquid, did not have any detectable HCN emissions. According to CAA section 112(d)(1), the Administrator may “distinguish among classes, types, and sizes of sources within a category or subcategory” in establishing emission standards.⁹⁴ In general, the design and operation of a liquid fuel boiler varies according to size and type. For example, many major source HWC liquid fuel boilers with capacity of 50 MMBTU/hr and less are firetube boilers or process heaters, while almost all larger HWC liquid fuel boilers are watertube boilers. Very large boilers, of sizes comparable to electric utility steam generating units (*i.e.*, greater than 250 MMBTU/hr) may also be designed differently to handle larger thermal loads. For example, they may have more burners, may have different methods of introducing pumpable hazardous waste to the combustion chamber (*e.g.*, liquid injection instead of liquid fired), or may

have different methods of atomization than smaller boilers. This size cutoff aligns with the size used as part of the definition of electric utility steam generating units.⁹⁵ For these reasons, the EPA is proposing to subcategorize liquid fuel boilers by size for the purposes of the proposed HCN emission standard. The proposed size categories are as follows: capacity less than or equal to 50 MMBTU/hr, capacity greater than 50 MMBTU/hr but less than or equal to 250 MMBTU/hr, and capacity greater than 250 MMBTU/hr.

For units with a capacity that is less than or equal to 50 MMBTU/hr, the EPA has no data indicating that HCN is emitted because the boiler in this size category had no measurable emissions of HCN. Therefore, we are not proposing HCN emission limits for liquid fuel boilers with capacity less than or equal to 50 MMBTU/hr.

When separate subcategories are established under CAA 112(d)(1), a MACT floor is determined separately for each subcategory.⁹⁶ The MACT floor calculation was carried out separately for existing and new liquid fuel boilers in the other two size categories. To the EPA’s knowledge, there are fewer than 30 major source liquid fuel boilers with capacity greater than 50 MMBTU/hr but less than or equal to 250 MMBTU/hr. The EPA had HCN emissions data from two of them. Our MACT floor analysis is based on the two sources for which we have data. In determining the level of the MACT floor, we used the UPL method to account for variability in performance, and we calculated the MACT floor at 2.7 ppmv HCN, dry basis and corrected to seven percent oxygen.⁹⁷ Based on available data, the EPA estimates that all existing liquid fuel boilers with capacity greater than 50 MMBTU/hr but less than or equal to 250 MMBTU/hr would be able to meet the MACT floor limit with no additional controls. The EPA also calculated a proposed new source limit from the best performing unit using the UPL method at 1.2 ppmv HCN, dry basis and corrected to seven percent oxygen.

To the EPA’s knowledge, there are also fewer than 30 major source liquid fuel boilers with capacity greater than 250 MMBTU/hr. The EPA had HCN

⁹² MACT Floor and Beyond-the-Floor Analysis for Hazardous Waste Combustors, which is available in the docket for this proposed rulemaking (Docket ID No. EPA-HQ-OAR-2004-0022).

⁹³ *Id.*

⁹⁴ 42 U.S.C. 7412(d)(1). *See also* U.S. *Sugar* 830 F.3d at 593–94 (“[T]he EPA has discretion to differentiate among classes, types, and sizes of sources within a category or subcategory.” (internal citations omitted)).

⁹⁵ *See* 40 CFR part 60, subpart Da, Standards of Performance for Electric Utility Steam Generating Units.

⁹⁶ U.S. *Sugar*, 830 F.3d at 657 (“[T]he grant of this authority implicitly acknowledges that the EPA may need to set different emission standards within a category of major sources based on what is achievable for a subset of those sources.”).

⁹⁷ MACT Floor and Beyond-the-Floor Analysis for Hazardous Waste Combustors, which is available in the docket for this proposed rulemaking (Docket ID No. EPA-HQ-OAR-2004-0022).

emissions data from three of them. Our MACT floor analysis is based on the three sources for which we have data. In determining the level of the MACT floor, we used the UPL method to account for variability in performance, and we calculated the MACT floor at 3.4 ppmv HCN, dry basis and corrected to seven percent oxygen.⁹⁸ Based on available data, the EPA estimates that all existing liquid fuel boilers with capacity greater than 250 MMBTU/hr would be able to meet the MACT floor limit with no additional controls. The EPA also calculated a proposed new source limit from the best performing unit using the UPL method at 0.57 ppmv HCN, dry basis and corrected to seven percent oxygen. However, the limit calculated by the UPL method is below the 3xRDL value for HCN for liquid fuel boilers (1.1 ppmv), and so the proposed new source limit based on the 3xRDL value is 1.1 ppmv HCN, dry basis and corrected to seven percent oxygen.⁹⁹

The EPA evaluated whether BTF emission limits would be appropriate for HCN emissions from all the liquid fuel boiler subcategories except the new source limit for liquid fuel boilers with capacity greater than 250 MMBTU/hr, which is based on the 3xRDL and is already at the EPA's minimum level of the standard. One HWC liquid fuel boiler has a caustic scrubber that we expect to control HCN emissions, so we evaluated whether the incremental emissions reduction achievable with a caustic scrubber would be cost-effective for existing and new liquid fuel boilers with capacity greater than 50 MMBTU/hr. We estimate that a caustic scrubber would achieve approximately 95 percent reduction of HCN from a liquid fuel boiler. A corresponding 95 percent decrease in each UPL MACT floor value would be below the 3xRDL level for HCN emissions from a liquid fuel boiler (1.1 ppmv). Therefore, the BTF emission limits, reflecting the 3xRDL value, would be:

- For existing sources with capacity greater than 50 MMBTU/hr but less than or equal to 250 MMBTU/hr, 1.1 ppmv HCN, dry basis and corrected to seven percent oxygen.
- For new sources with capacity greater than 50 MMBTU/hr but less than or equal to 250 MMBTU/hr, 1.1 ppmv HCN, dry basis and corrected to seven percent oxygen.
- For existing sources with capacity greater than 250 MMBTU/hr, 1.1 ppmv

HCN, dry basis and corrected to seven percent oxygen.

For liquid fuel boilers with a capacity greater than 50 MMBTU/hr but less than or equal to 250 MMBTU/hr, the EPA estimates that 20 of 21 existing sources and all new sources would need to install a caustic scrubber to meet the BTF limit. For existing sources, this would result in an industry-wide 13.0 tpy reduction of HCN, at approximately a total capital investment of \$30.9 million (2024\$) and total annualized costs of \$7.57 (2024\$) for a cost-effectiveness of \$588,000 (2024\$) per ton of HCN reduced. For a new source, this would result in a 0.63 tpy reduction of HCN at approximately a total capital investment of \$1.55 million (2024\$) and total annualized costs of \$378,000 (2024\$) for a cost effectiveness of \$601,000 (2024\$) per ton of HCN reduced.

For liquid fuel boilers with capacity greater than 250 MMBTU/hr, the EPA estimates that 17 of 19 existing sources would need to install a caustic scrubber to meet the BTF limit. For existing sources, this would result in an industry-wide 9.34 tpy reduction of HCN, at approximately a total capital investment of \$45.9 million (2024\$) and total annualized costs of \$10.2 million (2024\$) for a cost-effectiveness of \$1.14 million (2024\$) per ton of HCN reduced. Because the MACT floor new source limit is based on the 3xRDL for HCN emissions from liquid fuel boilers, no emissions reductions or cost effectiveness were calculated for these units.

A caustic scrubber would also offer some co-control of HCl and HCN. If other acid gases are present, then the amount of caustic required would increase from the amount we estimated, and there would be corresponding annual cost increases. The EPA has previously considered \$15,900 per ton of HCN reduced (converted to 2024\$) to not be cost-effective¹⁰⁰ and, in keeping with that prior determination, proposes not to consider \$588,000, \$601,000, or \$1.14 million per ton of HCN reduced to be cost-effective. A caustic scrubber would also produce additional wastewater that would need to be treated onsite or removed from the site for treatment or disposal. Additional energy is required both to operate the scrubber and to treat or otherwise dispose of wastewater. After considering both the MACT floor and BTF options for existing and new sources, the EPA is proposing to conclude that the

installation of a caustic scrubber as a BTF option is not warranted considering the cost, non-air quality health and environmental impacts, and energy requirements for either existing or new liquid fuel boilers. Therefore, the EPA is proposing the following HCN emission limits for liquid fuel boilers:

- For existing sources with capacity greater than 50 MMBTU/hr but less than or equal to 250 MMBTU/hr, 2.7 ppmv HCN, dry basis and corrected to seven percent oxygen.
- For new sources with capacity greater than 50 MMBTU/hr but less than or equal to 250 MMBTU/hr, 1.2 ppmv HCN, dry basis and corrected to seven percent oxygen.
- For existing sources with capacity greater than 250 MMBTU/hr, 3.4 ppmv HCN, dry basis and corrected to seven percent oxygen.
- For new sources with capacity greater than 250 MMBTU/hr, 1.1 ppmv HCN, dry basis and corrected to seven percent oxygen.

The EPA is proposing that compliance with the HCN emission limits for all liquid fuel boilers would be required within three years after the publication of the final rule and that demonstration through an initial compliance test would occur no later than six months after the compliance date. This would be followed by demonstration of compliance once every five years during the CPT using EPA Method 320 or, if there are entrained water droplets in the flue gas, an alternative test method submitted and approved by the Administrator according to 40 CFR 63.7(f). For affected facilities that commence construction or reconstruction after November 10, 2025, owners or operators would be required to comply with all requirements of the subpart, including the HCN emission limits, no later than the effective date of the final rule or upon startup, whichever is later, and must demonstrate compliance no later than six months after the compliance date.

5. HCl Production Furnaces

a. Hydrogen Fluoride

The EPA is not proposing MACT standards for HF emissions from HCl production furnaces. The EPA surveyed the owners or operators of two HCl production furnaces in the August 2023 questionnaire. Both indicated that they do not burn fluorine-containing materials in their HCl production furnaces. Follow-up conversations between the EPA and these owners indicated that no fluorine-containing materials would be fed into HCl production furnaces because such

⁹⁸ *Id.*

⁹⁹ See the memorandum *Representative Detection Level for Hydrogen Cyanide for Cement Kilns and Hazardous Waste Combustors*, which is available in the docket for this proposed rule (Docket ID No. EPA-HQ-OAR-2004-0022).

¹⁰⁰ Petroleum Refinery Sector Risk and Technology Review and New Source Performance Standards, 79 FR 36880 (June 30, 2014).

materials contaminate their HCl product. The EPA has no reason to expect that HF is emitted from HWC HCl production furnaces, and, therefore, we are not proposing any emission standard for HF from HWC HCl production furnaces.

b. Hydrogen Cyanide

The EPA is not proposing MACT standards for HCN emissions from HCl production furnaces. The EPA collected HCN emissions data from two HWC HCl production furnaces in the January 2024 emissions testing request. HCN was not measured in any test run. Because the EPA emissions data indicates that HCN is not measurably emitted from HWC HCl production furnaces, the EPA is not proposing any emission standard for HCN from HWC HCl production furnaces.

6. Lightweight Aggregate Kilns

The EPA is not proposing any MACT standards for emissions from lightweight aggregate kilns. Although a January 2024 emissions testing request was issued to a company that owns and operates lightweight aggregate kilns, both kilns went out of service during the response period and, to the EPA's knowledge, have neither begun operating again nor initiated RCRA closure.¹⁰¹ These are the only lightweight aggregate kilns in the source category. Because the EPA has no emissions data on which to base decisions about whether or how to regulate HF or HCN emissions from lightweight aggregate kilns, we are not proposing emission standards for HF or HCN emissions from lightweight

aggregate kilns at this time. If the existing or new HWC lightweight aggregate kilns begin operating, we expect that we would collect emissions testing data from them and address potential emissions in a subsequent action.

B. What are the results of the risk assessment and analyses?

As described in section III.C., the EPA conducts a risk assessment to estimate the human health and environmental risks posed by HAP emissions from the source category. The following five subsections provide a summary of the results of that risk assessment. Detailed information about the assessment is provided in the document titled *Residual Risk Assessment for the Hazardous Waste Combustors Source Category in Support of the 2025 Risk and Technology Review Proposed Rule*, which is available in the docket for this proposed rule.

1. Chronic Inhalation Risk Assessment Results

The results of the chronic inhalation cancer risk assessment indicate that, based on estimates of current actual emissions, the MIR posed by emissions from the source category is 9-in-1 million, driven by Ni, Cr(VI) compounds, and As compounds emissions from liquid fueled boilers. The total estimated cancer incidence based on actual emissions is 0.07. Within 50 km of HWC facilities, the population exposed to cancer risk greater than or equal to 1-in-1 million is approximately 540,000 people. The maximum modeled chronic noncancer

TOSHI for the source category based on actual emissions is estimated to be 0.3 (for respiratory effects) due to emissions of Ni, HCl, and Co compounds from liquid fuel boilers. No people are estimated to be exposed to a TOSHI greater than one. Table 2 of this preamble provides a summary of the HWC source category inhalation risk assessment results.

Based on allowable emissions from the source category, the MIR is estimated to be 100-in-1 million, driven by As compounds, Cr(VI) compounds, Be compounds, and Ni compounds emitted from liquid fueled boilers. The total estimated cancer incidence based on allowable emissions is 0.9. Within 50 km of HWC facilities, no one is exposed to cancer risks greater than 100-in-1 million due to allowable emissions and the population exposed to cancer risk greater than or equal to 1-in-1 million due to allowable emissions is approximately 12.1 million people. The maximum modeled chronic noncancer TOSHI for the source category based on allowable emissions is estimated to be 1 (for respiratory effects) at two facilities. The TOSHI is driven by HCl emissions from lightweight aggregate kiln sources at one facility (which is not currently operating) and driven by Be compounds, Ni compounds, Co compounds, and Cr(VI) compounds emitted from liquid fuel boiler sources at the other facility. No people are estimated to be exposed to a TOSHI greater than one. Again, table 2 of this preamble provides a summary of the HWC source category inhalation risk assessment results.

TABLE 2—HWC SOURCE CATEGORY INHALATION RISK ASSESSMENT RESULTS BASED ON ACTUAL AND ALLOWABLE EMISSIONS

Risk assessment	Number of facilities ²	Maximum individual cancer risk (-in-1 million) ¹	Estimated population at increased risk of cancer ≥1-in-1 million	Estimated annual cancer incidence (cases per year)	Maximum chronic noncancer TOSHI (respiratory)	Refined maximum screening acute noncancer HQ (REL, as compounds)	Multipathway screening assessment
HWC Source Category—Actual Emissions	92	9	540,000	0.07	0.3	2	
HWC Source Category—Allowable Emissions	92	100	12,100,000	0.9	1		
Facility-wide ²	92	200	6,400,000	0.4	3		

¹ Maximum individual excess lifetime cancer risk due to HAP emissions.

² See "Facility-Wide Risk Results" in section IV.B.5. of this preamble for more details on this risk assessment.

2. Screening-Level Acute Risk Assessment Results

As presented in table 2 of this preamble, the estimated reasonable worst-case off-site (*i.e.*, refined) acute exposures to emissions from the HWC

source category result in a maximum modeled acute noncancer HQ of 2 based on the REL for As compounds. Detailed information about the assessment, including evaluation of the screening-level acute risk assessment results and refinement of the value, is provided in

the main body and appendix 10 of the document titled *Residual Risk Assessment for the Hazardous Waste Combustor Source Category in Support of the 2025 Risk and Technology Review Proposed Rule*, which is available in the docket for this proposed rule.

¹⁰¹ See 40 CFR 63.1200(b), 265.351, 266.102(e)(11).

3. Multipathway Risk Screening Results

For the HWC source category, 92 facilities emitted at least one PB-HAP, including As compounds, Cd compounds, PCDD/PCDF, Hg compounds, and POM. Emissions of these PB-HAP from each facility were compared to the respective pollutant-specific Tier 1 screening emission thresholds. The Tier 1 screening analysis indicated that 92 facilities exceeded the Tier 1 emission threshold for As compounds, 19 facilities for Cd compounds, 84 facilities for PCDD/PCDF, and 75 facilities for Hg compounds. No facilities exceeded the Tier 1 emission threshold for POM.

For facilities that exceeded the Tier 1 multipathway screening threshold emission rate for one or more PB-HAP, we used additional facility site-specific information to perform a Tier 2 multipathway risk screening assessment. The Tier 2 assessment resulted in a maximum Tier 2 noncancer screening value of 80 for methylmercury and 2 for Cd compounds based on the fisher scenario, a cancer screening value of 300 for PCDD/PCDF and 90 for As compounds based on the fisher scenario, and a cancer screening value of 600 for As compounds based on the gardener scenario. For these pollutants and scenarios, additional screening was performed as detailed here. The Tier 2 assessment indicated that the maximum cancer screening value for the gardener scenario for As compounds was four and the maximum noncancer screening value for the gardener scenario for Hg and Cd compounds were <1; therefore, no further screening was performed for these pollutants and scenarios.

For Hg compounds, Cd compounds, As compounds, and PCDD/PCDF, a Tier 3 screening assessment was conducted for the fisher scenario and for As compounds for the gardener scenario. In the Tier 3 screening, lakes near the facilities were reviewed on aerial photographs to ensure they were accessible for fishing. Any lakes not accessible were removed from the assessment. After conducting the Tier 3 assessment, the screening values for Hg compounds and Cd compounds remained at 80 and 2, respectively. For PCDD/PCDF, the Tier 3 screening value was reduced to 200 and for As compounds the Tier 3 screening value was reduced to 80 in the fisher scenario and 300 in the gardener scenario.

An exceedance of a screening threshold emission rate in any of the tiers cannot be equated with a risk value or an HQ (or HI). Rather, it represents a high-end estimate of what the risk or

hazard may be. For example, a screening value of two for a noncarcinogen can be interpreted to mean that the Agency is confident that the HQ would be lower than two. Similarly, a Tier 2 cancer screening value of seven means that we are confident that the cancer risk is lower than 7-in-1 million. Our confidence comes from the many conservative, or health-protective, assumptions encompassed in the screening tiers: the Agency chooses inputs from the upper-end of the range of possible values for the influential parameters used in the screening tiers, and the Agency assumes that the exposed individual exhibits atypical ingestion behavior that would lead to a high total exposure.

The EPA determined that it is not necessary to go beyond the Tier 3 analysis or conduct a site-specific assessment for Cd compounds, Hg compounds, PCDD/PCDF, or As compounds. The EPA compared the Tier 2 screening results to site-specific risk estimates for five previously assessed source categories which had characteristics that make them most useful for interpreting the HWC screening results. For these source categories, the EPA assessed fisher risks for Cd compounds, Hg compounds, PCDD/PCDF, and/or As compounds as well as gardener risks for As compounds by conducting site-specific assessments. The EPA used AERMOD for modeling air dispersion and Tier 2 screens that used multi-facility aggregation of chemical loading to lakes where appropriate. These assessments indicated that the site-specific hazard/risk values for Hg compounds, Cd compounds, and As compounds were at least 50 times lower than the respective Tier 2 screening values and the cancer site-specific risk value for PCDD/PCDF was at least 10 times lower (refer to EPA Docket IDs EPA-HQ-OAR-2017-0015 and EPA-HQ-OAR-2019-0373 for a copy of these reports).¹⁰²

¹⁰² EPA Docket records (EPA-HQ-OAR-2017-0015): *Appendix 11 of the Residual Risk Assessment for the Taconite Manufacturing Source Category in Support of the Risk and Technology Review 2019 Proposed Rule*; *Appendix 11 of the Residual Risk Assessment for the Integrated Iron and Steel Source Category in Support of the Risk and Technology Review 2019 Proposed Rule*; *Appendix 11 of the Residual Risk Assessment for the Portland Cement Manufacturing Source Category in Support of the 2018 Risk and Technology Review Final Rule*; *Appendix 11 of the Residual Risk Assessment for the Coal and Oil-Fired EGU Source Category in Support of the 2018 Risk and Technology Review Proposed Rule*; and EPA Docket records (EPA-HQ-OAR-2019-0373): *Appendix 11 of the Residual Risk Assessment for Iron and Steel Foundries Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*.

Based on our review of these analyses, if the EPA was to perform a site-specific assessment for the HWC source category, we would expect similar magnitudes of decreases from the Tier 2 screening values. For Cd compounds, the maximum noncancer HQ for the fisher scenario would be less than one. For PCDD/PCDF, the maximum cancer risk under the fisher scenario would likely decrease to at or below 30-in-1 million. For As compounds, the maximum cancer risk under the fisher and gardener scenarios would likely decrease to at or below 10-in-1 million. Finally, for Hg, the screening value after applying the site-specific adjustment factor would be reduced to two. However, given that the average site-specific screening value for Hg in the fisher scenario was over 300 times lower than the Tier 2 value and, in general, given the conservative nature of the screen, we are confident that the HQ for ingestion exposure from Hg is at or below one. Further details on the Tier 3 screening assessment can be found in appendices 10 and 11 of *Residual Risk Assessment for the Hazardous Waste Combustor Source Category in Support of the 2025 Risk and Technology Review Proposed Rule*.

In evaluating the potential for multipathway risk from emissions of Pb compounds, we compared modeled annual Pb concentrations to the primary Pb NAAQS (0.15 µg/m³). The highest annual Pb concentration of 0.004 µg/m³ (or 0.012 µg/m³ when multiplied by four to assume a health-protective three-month average) is well below the Pb NAAQS, indicating low potential for multipathway risk of concern due to Pb emissions.

Detailed information about the assessment is provided in the document titled *Residual Risk Assessment for the Hazardous Waste Combustor Source Category in Support of the 2025 Risk and Technology Review Proposed Rule*, which is available in the docket for this proposed rule.

4. Environmental Risk Screening Results

As described in section III.A. of this preamble, we conducted a screening assessment for adverse environmental effects for the HWC source category. The environmental screening assessment included the following PB-HAP: As compounds, Cd compounds, PCDD/PCDF, Pb compounds, methylmercury, divalent Hg, and POM. In addition, we conducted an environmental screening assessment for the acid gases HCl and HF.

In the Tier 1 screening analysis for PB-HAP (other than Pb compounds, which were evaluated differently), As

compounds and POM emissions had no exceedances for any ecological benchmark. Cd compounds, PCDD/PCDF, divalent Hg, and methylmercury had Tier 1 screening values above various benchmarks. The maximum Tier 1 screening value was 200 for methylmercury emissions for the surface soil NOAEL avian ground insectivores' benchmark (woodcock). Because there were Tier 1 exceedances, a Tier 2 environmental screening assessment was performed for Cd compounds, PCDD/PCDF, divalent Hg, and methylmercury emissions.

In the Tier 2 screen, Cd compounds and PCDD/PCDF emissions did not exceed any ecological benchmark. The following Tier 2 screening values were exceeded for methylmercury emissions: a screening value of six for the fish-eating birds NOAEL benchmark (specifically for the merganser), a screening value of two for the maximum allowable toxicant level for the merganser, and a maximum screening value of three (a total of eight facilities had screening values from two to three) for avian ground insectivores (woodcock).

The following Tier 2 screening values were exceeded for divalent Hg emissions: a maximum screening value of five for a sediment threshold level (emissions from 10 facilities contributed to this screening value) and a maximum screening value of two for an invertebrate threshold level (a total of five facilities had a screening value of two).

Since there were Tier 2 exceedances, we conducted a Tier 3 environmental risk screen. In the Tier 3 environmental risk screen, we looked at aerial photos of the lakes potentially being impacted by Hg emissions. Unnamed "lake" number 139670 is the lake at which the maximum methylmercury screening value of six was modeled for the fish-eating birds NOAEL benchmark (specifically for the merganser). It is also the lake where the maximum divalent Hg screening value of five was modeled for the sediment threshold level. The aerial photos reveal that this "lake" is an open bay off the Gulf of America. As such, it is not a "closed" waterbody, and therefore we do not expect accumulation of Hg concentrations. Therefore, the screening results for "lake" 139670 were removed from the analysis.

Once the screening results for "lake" 139670 were removed, the highest Tier 2 screening values for methylmercury were a screening value of three for a water-column NOAEL benchmark for fish-eating birds (merganser) and a screening value of three for a surface

soils NOAEL benchmark for avian ground insectivores (woodcock). The water-column NOAEL benchmark for fish-eating mammals (mink) and the soils NOAEL benchmark for mammalian insectivores (shrew) were not exceeded for methylmercury in Tier 2. In addition, the water-column LOAEL level benchmarks for fish eating birds (merganser) and fish-eating mammals (mink) were not exceeded in Tier 2 for methylmercury.

Once the screening results for "lake" 139670 were removed, the highest Tier 2 screening value for divalent Hg is a screening value of three for a sediment threshold level benchmark. This screening value is the result of emissions from three facilities near one lake (lake 431155), with one facility being the primary contributor (facility 450755720711). The water-column community threshold level benchmark and the surface soil threshold level benchmark for plant communities were not exceeded for divalent Hg in Tier 2.

In summary, Hg emissions from this category resulted in ecological screening values above one (maximum screening value of three) for only some of the most sensitive ecological benchmarks for Hg, while other sensitive benchmarks for Hg were not exceeded. Therefore, we conclude that the ecological impacts of Hg emissions from this category are not widespread and significant.

We did not estimate any exceedances of the secondary Pb NAAQS. The highest annual Pb concentration of 0.004 $\mu\text{g}/\text{m}^3$ is well below the Pb NAAQS (0.15 $\mu\text{g}/\text{m}^3$ in total suspended particles as a three-month average), indicating low potential for environmental risk of concern due to Pb emissions.¹⁰³

We also conducted an environmental risk screening assessment specifically for acid gases (*i.e.*, HCl and HF) for the HWC source category. For HCl and HF, the average modeled concentration around each facility (*i.e.*, the average concentration of all off-site data points in the modeling domain) did not exceed any ecological benchmark. In addition, each individual modeled concentration of HCl and HF (*i.e.*, each off-site data point in the modeling domain) was below the ecological benchmarks for all facilities.

Based on the results of the environmental risk screening analysis, we do not expect an adverse environmental effect resulting from HAP emissions from this source category and we are proposing that it is not necessary to set any additional standards, beyond those described

above, to prevent, taking into consideration costs, energy, safety, and other relevant factors, an adverse environmental effect. Detailed information about the assessment is provided in the document titled *Residual Risk Assessment for the Hazardous Waste Combustors Source Category in Support of the 2025 Risk and Technology Review Proposed Rule*, which is available in the docket for this proposed rule.

5. Facility-Wide Risk Results

We conducted an assessment of facility-wide risk as described in section III.C. of this preamble to characterize the source category risk in the context of whole facility risk. We estimated facility-wide risks using the NEI-based data described in section III.C. of this preamble. The maximum lifetime individual cancer risk posed by the 92 facilities modeled based on facility-wide emissions is 200-in-1 million, driven by emissions of ethylene oxide from a different source category (commonly referred to as the Hazardous Organic NESHAP), and the risk review for that source category has already been completed.¹⁰⁴ The total estimated cancer incidence based on facility-wide emission levels is 0.4 excess cancer cases per year. Within 50 km of HWC facilities, the population exposed to cancer risk greater than 100-in-1 million due to facility-wide emissions is approximately 250 people, and the population exposed to cancer risk greater than or equal to 1-in-1 million is approximately 6.4 million people. The maximum chronic noncancer TOSHI posed by facility-wide emissions is estimated to be three (for respiratory effects) at two different facilities, driven by non-category emissions of chlorine at both. Approximately 170 people are estimated to be exposed to a TOSHI greater than one due to facility-wide emissions.

C. What are our proposed decisions regarding risk acceptability, ample margin of safety, and adverse environmental effect?

1. Risk Acceptability

As noted in section III.A. of this preamble, the EPA weighs a wide range of health risk measures and factors in our risk acceptability determination, including the cancer MIR, the number of persons in various cancer and noncancer risk ranges, cancer incidence, the maximum noncancer TOSHI, the

¹⁰⁴ For more information about the Hazardous Organic NESHAP, see <https://www.epa.gov/stationary-sources-air-pollution/synthetic-organic-chemical-manufacturing-industry-national>.

¹⁰³ 81 FR 71906 (Oct. 18, 2016).

maximum acute noncancer HQ, and risk estimation uncertainties (54 FR 38044, September 14, 1989).

The results of the risk assessment indicate that, based on actual emissions, the MIR is 9-in-1 million, driven by emissions of Ni compounds, Cr(VI) compounds, and As compounds. The estimated incidence of cancer due to inhalation exposures is 0.07 excess cancer case per year. No people are estimated to have inhalation cancer risks greater than 100-in-1 million, and the population estimated to be exposed to cancer risks greater than or equal to 1-in-1 million is approximately 540,000. The estimated maximum chronic noncancer TOSHI from inhalation exposure for this source category is 0.07 for respiratory effects. The acute risk screening assessment of reasonable worst-case inhalation impacts indicates a maximum acute HQ of two for the REL for As compounds. In addition, the risk assessment indicates no significant potential for multipathway health effects.

For allowable emissions, the MIR is 100-in-1 million, driven by emissions of Ni compounds, Cr(VI) compounds, and As compounds. The estimated incidence of cancer due to inhalation exposures is 0.8 excess cancer case per year. No people are estimated to have inhalation cancer risks greater than 100-in-1 million, and the population estimated to be exposed to cancer risks greater than or equal to 1-in-1 million is approximately 12.1 million. The estimated maximum chronic noncancer TOSHI from inhalation exposure for this source category is one for respiratory effects. We note that HWC source category actual emissions are much lower than allowable emissions. The allowable emissions are based on the value of the standard and the maximum allowable stack gas flow rate, and they assume that an HWC operates at this maximum capacity for 8,760 hours per year. This is an upper-bound assumption because HWCs cannot operate at their maximum capacity every hour of the year, so the maximum allowable emissions would not be possible. In addition, RCRA omnibus authority provides a site-specific backstop for emission rates. Many facilities have additional HAP emission limits established under RCRA. For those reasons, we do not expect actual emissions to approach MACT-allowable emissions.

To summarize our upper-bound, health-protective analysis, the residual risk assessment found that the MIR posed by emissions from the source category is 9-in-1 million, and the total estimated cancer incidence is 0.07. The

population exposed to cancer risk greater than or equal to 1-in-1 million is approximately 540,000 people. The maximum chronic noncancer TOSHI is estimated to be 0.3 (for respiratory effects). Considering all of the health risk information and factors discussed above, including the uncertainties discussed in section III. of this preamble, the EPA proposes that the risks for this source category under the current NESHAP provisions are acceptable.

2. Ample Margin of Safety Analysis

The second step in the residual risk decision framework is a determination of whether more stringent emission standards are required to provide an ample margin of safety to protect public health. In making this determination, we considered the health risk and other health information considered in our acceptability determination, along with additional factors not considered in the risk acceptability step, including costs and economic impacts of controls, technological feasibility, uncertainties, and other relevant factors, consistent with the approach of the Benzene NESHAP.

In conducting the ample margin of safety analysis for the HWC NESHAP, we also considered control technologies for PCDD/PCDF emissions that were identified in section IV.D. of this preamble, specifically a Shell Dioxin Destruction System (SDDS) and a Gore Mercury Control System (GMCS). As detailed in section IV.D. of this preamble, estimated emission reductions of PCDD/PCDF were 0.211 grams of PCDD/PCDF toxic equivalency quotient (TEQ) per year per unit. Emission reductions of PCDD/PCDF would have no impact on the cancer MIR or the maximum noncancer TOSHI. It would have a minimal impact on the cancer incidence, of which greater than 99 percent of is attributable to emissions of Ni compounds, Cr(VI) compounds, As compounds, Cd compounds, and Be compounds, as well as the number of people exposed to cancer risks greater than or equal to one. The SDDS emission reductions could potentially lower the cancer risks estimated in the Multipathway Risk Screening discussed in section IV.B.3. of this preamble. However, in conducting the technology review described in sections III.C. and IV.D. of this preamble, we found that the potential emission reductions were relatively small (0.211 grams of PCDD/PCDF TEQ per year per unit) and we are proposing that the potential control options that we evaluated are not cost-effective (cost-effectiveness of \$1.42

million per gram of PCDD/PCDF TEQ reduction).

For the GMCS, emission reductions were estimated to be 13 pounds of Hg per unit per year. The emission reductions would have no impact on the cancer MIR, maximum TOSHI, cancer incidence, or number of people exposed to cancer risk levels of greater than or equal to 1-in-1 million. Similar to the SDDS emission reductions, the GMCS emission reductions could potentially lower the cancer risks estimated in the Multipathway Risk Screening discussed in section IV.B.3. of this preamble. However, also like the SDDS, we are proposing to conclude that the GMCS is not cost-effective, with an estimated annualized cost-effectiveness of \$62,000 per pound of Hg reduction (see section IV.D. of this preamble).

Considering the high overall costs of the control options that we evaluated and relatively small emissions reductions, we are proposing to determine that the control technologies are not necessary to provide an ample margin of safety to protect public health. Therefore, based on our weighing of all the relevant factors as presented in the risks analyses for this source category and all of the other information discussed earlier in this section, we propose to conclude that the current standards provide an ample margin of safety to protect public health. We are also requesting comment on whether there are additional control measures for emission sources subject to the HWC standards that are necessary to provide an ample margin of safety to protect public health (C-9).

3. Adverse Environmental Effect

Based on our screening assessment of environmental risk presented in section III.A.4. of this preamble, we did not identify any areas of concern with respect to environmental risk. Therefore, we have determined that HAP emissions from the source categories do not result in an adverse environmental effect. Taking into consideration costs, energy, safety, and other relevant factors, we are proposing that it is not necessary to set a more stringent standard to prevent an adverse environmental effect.

D. What are the results and proposed decisions based on our technology review?

As described in section III.B. of this preamble, the EPA's technology review under CAA section 112(d)(6) focused on the identification and evaluation of potential developments in practices, processes, and control technologies that have occurred since the promulgation of

the HWC NESHAP in 2005. We reviewed various sources of information to identify any such developments and found that two new control technologies have been employed in the HWC NESHAP source category on one incinerator since 2005: the SDDS for control of PCDD/PCDF and the GMCS for control of Hg. Detailed information about the technology review can be found in the memorandum titled *Clean Air Act Section 112(d)(6) Technology Review for the Hazardous Waste Combustor Source Category*, which is available in the docket for this proposed rule (Docket ID No. EPA-HQ-OAR-2004-0022). The EPA is also specifically requesting comment on whether we should consider additional developments not addressed here or in the technical memorandum for emission sources subject to the HWC NESHAP (C-10).

1. Shell Dioxin Destruction System

The SDDS uses a catalyst to promote the decomposition of PCDD/PCDF and its precursors in the gas phase, similar to selective catalytic reduction (SCR). The system is a lateral flow reactor design and can be used in solid and liquid waste incinerators. A study on the SDDS indicates that it removes approximately 98 percent of PCDD/PCDF compounds at a temperature of 150 °C with low gas space velocity through catalytic destruction.¹⁰⁵ Destruction at higher gas space velocities was temperature dependent. A control efficiency of 95 percent was used to estimate emission reductions attributable to the SDDS, and this was based on the results of a CfPT prior to the installation of the SDDS and a CPT after its installation on the HWC incinerator.

The EPA is not aware of any publicly available cost information for SDDS installation and operation for HWC units in the U.S. Because the SDDS is similar in principle and design to SCR, we estimated the costs of the SDDS using information from the EPA Control Cost Manual's section on SCR. The EPA estimates a total capital investment cost of \$1,776,000 and a total annualized cost of \$299,000 per year (2024\$) for each unit that installs the SDDS. Using the 95 percent control efficiency demonstrated by the HWC that installed the SDDS and its PCDD/PCDF emissions, we estimate emission reductions of 0.211 grams of PCDD/PCDF TEQ per year for each unit that

installs the SDDS. This results in an annualized cost-effectiveness of \$1,419,000 per gram of PCDD/PCDF TEQ reduction. Lower control efficiency and lower pre-SDDS PCDD/PCDF emissions (as we expect for HWCs other than the unit that installed the SDDS) would substantially decrease the emission reductions of the SDDS, making it less cost-effective. The EPA has previously considered \$300,000 per gram of PCDD/PCDF TEQ reduced (adjusted to 2024\$) to not be cost-effective¹⁰⁶ and, in keeping with that prior determination, proposes not to consider \$1,419,000 per gram of PCDD/PCDF TEQ reduced to be cost-effective. Due to the high cost and low potential emission reductions of PCDD/PCDF, the EPA proposes not to consider the SDDS a cost-effective technology to further reduce emissions of PCDD/PCDF from sources subject to the HWC NESHAP.

2. Gore Mercury Control System

The GMCS uses a series of modules containing catalysts and sorbents to capture elemental and oxidized Hg and co-control sulfur dioxide emissions. The GMCS has been considered in other EPA rulemakings, including the Phosphoric Acid Manufacturing NESHAP. Specifically, the control efficiency, module capacity, initial costs, and costs of modules from the Phosphoric Acid Manufacturing NESHAP GMCS analysis were used as the basis for the HWC NESHAP estimate.¹⁰⁷

The EPA used the average Hg emission rates and stack gas flow rates for HWC incinerators that we developed in the residual risk review to also develop a cost estimate for installing, operating, and maintaining a GMCS at an "average" HWC. The EPA estimates a total capital investment cost of \$4,143,000 and a total annualized cost of \$804,000 per year (2024\$) for each unit that installs a GMCS. Assuming 90 percent control efficiency, we estimate emission reductions of 13 pounds of Hg per unit per year. This results in an annualized cost-effectiveness of \$62,000 per pound of Hg reduction. The EPA has previously considered \$55,400 per pound of Hg reduced (adjusted to 2024\$) to not be cost-effective¹⁰⁸ and, in keeping with that prior determination,

proposes not to consider \$62,000 per pound of Hg reduced to be cost-effective. Due to the high cost and low potential emission reductions of Hg, the EPA proposes not to consider the GMCS a cost-effective technology to further reduce emissions of Hg from sources subject to the HWC NESHAP.

In summary, we have not identified any additional relevant cost-effective developments in technologies, practices, or processes since promulgation of the HWC NESHAP in 2005 to further reduce HAP emissions. We also considered whether fenceline monitoring would be appropriate for the HWC NESHAP source category; however, the emissions from the source category are not fugitive emissions and come from stacks with an average height of approximately 125 feet and stack parameters that would cause the emissions to be much higher than where the fenceline monitors would be located. Therefore, we are not proposing any changes to the MACT standards in this action as a result of our technology review under CAA section 112(d)(6).

E. What other actions are we proposing?

In addition to the proposed actions described earlier in this document, we are proposing revisions to the NESHAP in response to intervening developments. Specifically, we are proposing revisions to the SSM provisions of the MACT rule in order to ensure that those provisions are consistent with *Sierra Club v. EPA*, 551 F.3d 1019 (D.C. Cir. 2008), in which the D.C. Circuit vacated two provisions that the court interpreted as exempting sources from the requirement to comply with otherwise applicable CAA section 112(d) emission standards during periods of SSM.

The EPA is also proposing the following additional changes to the HWC NESHAP:

- Requiring electronic reporting of performance test results, notification of compliance reports, and certain other submissions;
- Allowing states to choose to exempt area sources from the requirement to obtain a title V permit;
- Removing the requirement that CO is kept between the average and maximum reported values during the CfPT;
- Explicitly allowing incorporation by reference of operating parameter limits determined during the CPT into title V permits;
- Clarifying that a relative accuracy test audit (RATA) must be performed within 60 days of every CPT;
- Removing the never-implemented requirement that sources install and operate PM CEMS;

¹⁰⁶ See the 2003 proposed and final rules for the National Emission Standards for Hazardous Air Pollutants for Primary Magnesium Refining, 68 FR 2970 (Jan. 22, 2003) and 68 FR 58615 (Oct. 10, 2003).

¹⁰⁷ 85 FR 19412 (Apr. 7, 2020).

¹⁰⁸ See the 2011 final rule for the National Emission Standards for Hazardous Air Pollutants: Gold Mine Ore Processing and Production Area Source Category, 76 FR 9450 (Feb. 17, 2011).

¹⁰⁵ Liljelind, P., et al. (2001). Removal of dioxins and related aromatic hydrocarbons from flue gas streams by adsorption and catalytic destruction. *Chemosphere*, 42, 615–623. [https://doi.org/10.1016/S0045-6535\(00\)00235-6](https://doi.org/10.1016/S0045-6535(00)00235-6).

- Removing references that were incorrectly incorporated by reference and have since expired;
- Clarifying the demonstration of compliance timeframe for new standards and removing an outdated demonstration of compliance timeline for the 2005 HWC NESHAP; and
- Other minor editorial corrections.

Our analyses and proposed changes related to these issues are discussed as follows.

1. Emission Standards During Periods of SSM

In *Sierra Club v. EPA*, the D.C. Circuit vacated the SSM exemption contained in 40 CFR 63.6(f)(1) and 40 CFR 63.6(h)(1), holding that under CAA section 302(k), emission standards or limitations must be continuous in nature and that the SSM exemption violates the CAA's requirement that some section 112 standards apply continuously. In July 2024, the EPA proposed the removal of the malfunction exemption from the HWC NESHAP, which, if finalized, would have required the standards for periods of normal operation to apply at all times.¹⁰⁹ We also indicated that we would address standards for periods of startup and shutdown in a future planned rulemaking action.¹¹⁰ After considering comments received on the proposed removal of the malfunction exemption, the EPA is withdrawing that proposal and instead proposing a different standard for periods of malfunction, as described in this section. The EPA is also proposing standards for periods of startup and shutdown.

We are proposing to remove the SSM provision in the HWC NESHAP that appears at 40 CFR 63.1206(b). Consistent with *Sierra Club v. EPA*, we are proposing standards in this rule that apply at all times, specifically work practice standards that apply for periods of SSM. Although under the current HWC NESHAP emission standards and operating requirements do not apply during periods of SSM, there are other requirements that apply during these periods. Two specific requirements are notable: an approved SSM plan (40 CFR 63.1206(c)(2)) and the AWFCO requirement (40 CFR 63.1206(c)(3)).

Most sources demonstrate compliance with the RCRA requirement to minimize emissions from SSM events by complying with an approved SSM plan during those periods. Under the general provisions of 40 CFR part 63, the SSM plan must describe in detail procedures

for operating and maintaining the source during periods of SSM and a program of corrective action for malfunction scenarios that would cause the source to exceed an applicable emission limit. If sources use the SSM plan to comply with RCRA requirements, the SSM plan must include a description of potential causes of malfunctions that may result in significant HAP releases and of actions the source is taking to minimize the frequency and severity of these malfunctions. In addition, when used to demonstrate RCRA compliance, SSM plans must be submitted to the Administrator (or an identified delegate) for approval, and any changes that may significantly increase emissions must also be submitted for approval.

All HWCs are required to have an AWFCO system. Hazardous waste feed to the HWC cannot restart until the event that triggered the AWFCO is resolved, which typically takes no less than one hour. HWCs must comply with the AWFCO system requirements during periods of SSM if they are burning hazardous waste during those periods.

While the D.C. Circuit established that, reading CAA sections 112 and 302(k) together, Congress has required that there must be continuous CAA section 112 standards, the court recognized that in some instances, it may not be feasible to prescribe or enforce an emission standard.¹¹¹ For example, the EPA may set different standards for periods of SSM, where feasible.¹¹² Additionally, the EPA may set work practice standards for periods of SSM under CAA section 112(h) where it is not feasible to accurately measure emissions.¹¹³ Here, specifically, we are proposing work practice standards for periods of SSM because it is often not feasible to accurately measure emissions of HWCs during periods of SSM. Periods of SSM are transitory and often unstable for HWCs. The isokinetic sampling required in the primary means of compliance demonstration during stack testing cannot be met during unstable periods of operation. In addition, many OPLs required under the HWC NESHAP cannot be met during startup and shutdown, including minimum combustion temperature, and some APCDs cannot operate during the full duration of startup and shutdown. One example is that stack gas cannot be

directed to a baghouse until the temperature surpasses the dew point.

For these reasons, the EPA is proposing work practice standards for periods of SSM. These work practice standards would be enforceable requirements that minimize emissions of HAP, primarily by preventing emissions. The work practice standards would include the following: (1) a clean fuel requirement for periods of startup and shutdown; (2) a requirement to follow an approved SSM plan during periods of SSM; and (3) the AWFCO system requirement.

The clean fuel requirement for periods of startup and shutdown would limit which supplemental fuels could be burned during those periods to minimize emissions of HAP. For the HWC NESHAP, we are proposing that clean fuels would include one or a combination of natural gas, synthetic natural gas, propane, other Gas 1 fuels, distillate oil, syngas, ultra-low sulfur diesel, kerosene, hydrogen, refinery gas, liquefied petroleum gas, and any other fuel authorized in the SSM plan. We are including the option to use any other authorized fuel to allow for cases where another fuel is required due to either combustor design or availability of a facility-produced fuel that is not listed and that has expected combustion emissions similar to those of the listed fuels. An example may include a hazardous waste that is hazardous only because it is flammable and is currently allowed to be burned during startup in accordance with 40 CFR 63.1206(c)(2)(v)(B).

The EPA is proposing that all sources must follow an approved SSM plan during periods of SSM. This is a change from the July 2024 proposal as it relates to malfunctions. This proposal has two differences from the current provisions of the rule. First, all sources, not just sources using the SSM plan for RCRA compliance, would be required to have an approved SSM plan. The EPA expects that most, if not all, sources are already using this option for compliance, so this provision, if finalized, would have minimal impact on most sources. Second, the EPA is proposing to add an explicit requirement that sources must operate according to their SSM plan during periods of SSM. Based on discussions with regulated parties, the EPA expects that sources are already doing this. This proposal is therefore intended to codify this requirement and, if finalized, would make compliance with the SSM plan an enforceable provision during periods of SSM.

For malfunctions, the EPA is proposing no changes to the current

¹¹¹ *Sierra Club*, 551 F.3d at 1027.

¹¹² See for example, 85 FR 40386, 40390, July 6, 2020 (Ethylene Production NESHAP); 80 FR 45280, 45285–87, 45292, July 29, 2015 (Mineral Wool and Wool Fiberglass NESHAP).

¹¹³ *Id.*

¹⁰⁹ 89 FR 59870.

¹¹⁰ *Id.*

AWFCO requirements as part of the proposed work practice.¹¹⁴ The AWFCO requirements minimize emissions during malfunctions that could cause exceedances by requiring swift hazardous waste feed shut off.¹¹⁵ Because hazardous waste is a primary source of HAP emissions for most HWCs, shutting off hazardous waste feed immediately minimizes emissions while the owner or operator can diagnose and resolve the issue that triggered the AWFCO.

Additionally, on September 5, 2025, the D.C. Circuit held in *SSM Litigation Group v. EPA*, Case No. 23–1267, that although the EPA lacks authority under the CAA to “create a regulatory ‘defense’ that limits the remedial authority granted by Congress to the federal courts,” a “complete affirmative defense, like the one at issue [in that case], is permissible because it relates to the antecedent question of liability and therefore does not impinge on the judiciary’s authority to award ‘appropriate civil penalties.’”¹¹⁶ While this proposal does not involve affirmative defenses, the EPA requests comment on whether and how we should establish regulations within this and other New Source Performance Standards or NESHAPs in response to the D.C. Circuit’s *SSM Litigation Group* decision (C–11). Due to the timing of the D.C. Circuit decision and the Agency’s court-ordered deadline, the EPA will address the impacts of the *SSM Litigation Group* decision in an appropriate future action.

2. Electronic Reporting

The EPA proposed some provisions for electronic reporting for the HWC NESHAP in July 2024. After considering the comments received on that proposal, the EPA is reproposing the same provisions for electronic reporting in addition to proposing requirements for the use of templates for certain reports. The templates are available in the docket for this proposed rule. The EPA will respond to comments on the July 2024 proposal in the final action for this proposal. There is no need to resubmit any comments that duplicate comments on the July 2024 proposal. Specifically, the EPA is reproposing the requirement that owners and operators of HWC facilities submit electronic copies of

required performance test reports, performance evaluation reports, eligibility demonstrations, periodic SSM reports, notifications of intent to comply, notifications of compliance (NOC), compliance progress reports, and excess emissions and CMS performance reports and summary reports through the EPA’s Central Data Exchange (CDX) using the Compliance and Emissions Data Reporting Interface (CEDRI). A description of the electronic data submission process is provided in the memorandum *Electronic Reporting Requirements for New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) Rules*, available in the docket for this proposed rule.¹¹⁷ The proposed rule would require that performance test results be submitted in the format generated through the use of the EPA’s Electronic Reporting Tool (ERT) or an electronic file consistent with the XML schema on the ERT website.¹¹⁸ Similarly, performance evaluation results of CEMS that include a RATA would be submitted in the format generated through the use of the ERT or an electronic file consistent with the XML schema on the ERT website. The proposed rule would require that the notification of intent to comply, eligibility demonstrations, periodic SSM reports, and compliance progress reports be submitted as PDF uploads in CEDRI.

For the NOC and the excess emissions and CMS performance reports and summary reports, the proposed rule would require that owners and operators use the appropriate spreadsheet template to submit information to CEDRI. A draft version of the proposed templates for these reports is included in the docket for this proposed rule.¹¹⁹ The EPA specifically requests comment on the content, layout, and overall design of the templates (C–12).

The electronic submittal of the reports addressed in this proposed rule would increase the usefulness of the data contained in those reports, is in keeping with current trends in data availability and transparency, would further assist in the protection of public health and the environment, would improve compliance by facilitating the ability of regulated facilities to demonstrate

compliance with requirements and by facilitating the ability of delegated state, local, Tribal, and territorial air agencies and the EPA to assess and determine compliance, and would ultimately reduce burden on regulated facilities, delegated air agencies, and the EPA. Electronic reporting also eliminates paper-based, manual processes, thereby saving time and resources, simplifying data entry, eliminating redundancies, minimizing data reporting errors, and providing data quickly and accurately to the affected facilities, air agencies, the EPA, and the public. For more information on the benefits of electronic reporting, see the memorandum *Electronic Reporting Requirements for New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) Rules*, referenced earlier in this section.

3. Title V Permits for Area Sources

Under the CAA, sources subject to standards or regulations under sections 111 or 112 generally must obtain a title V operating permit. However, the Administrator has the discretion under CAA section 502(a) to exempt area sources from the requirements of title V if the Administrator finds that “compliance with such requirements is impracticable, infeasible, or unnecessarily burdensome on such categories. . . .” Currently, the HWC NESHAP requires that all sources subject to the rule, both major sources and area sources, obtain and maintain a title V air permit. Title V permits did not replace RCRA permits for HWCs. HWCs are required to obtain and maintain both RCRA and title V permits.

In the 2004 HWC NESHAP proposal, the EPA stated that title V permitting for area sources was not impracticable, infeasible, or unnecessarily burdensome because HWCs were already complying with RCRA permitting requirements, which make no distinction between major and area sources.¹²⁰ The EPA did not fully explain why complying with RCRA permitting requirements meant that title V permitting was not impracticable, infeasible, or unnecessarily burdensome. For the reasons provided below, the EPA now proposes to find that the requirement to obtain a title V permit is “unnecessarily burdensome” for HWC area sources and, accordingly, proposes to allow states to exempt HWC area sources from title V permitting requirements.¹²¹ The EPA

¹¹⁴ 80 FR 75178, 75211–14 (Dec. 1, 2015); see also 85 FR 49434, 49441–46 (Aug. 13, 2020).

¹¹⁵ “At the very least, the language [of CAA section 112(d)(3)] permits the EPA to ignore malfunctions in its standard-setting and account for them instead through its regulatory discretion.” *U.S. Sugar*, 830 F.3d at 608.

¹¹⁶ Slip Op. at 10–11 (quoting CAA 304(a), 42 U.S.C. 7604(a)).

¹¹⁷ See Document ID No. EPA–HQ–OAR–2004–0022–0646 in Docket ID No. EPA–HQ–OAR–2004–0022.

¹¹⁸ <https://www.epa.gov/electronic-reporting-air-emissions/electronic-reporting-tool-ert>.

¹¹⁹ See *Proposed Electronic Reporting Templates for 40 CFR part 63, subpart EEE*, available at Docket ID. No. EPA–HQ–OAR–2004–0022.

¹²⁰ 69 FR 21198, 21325 (Apr. 20, 2004).

¹²¹ Unless provided otherwise by statute, an agency may revise or rescind prior actions so long as they are not inconsistent with the law. Continued

seeks comment on this proposal, including any specific reliance interests relevant to the existing requirements for HWC area sources to obtain title V permits (C-13).

The EPA has previously exempted many area sources from title V requirements based on a conclusion that the requirements are “unnecessarily burdensome” under CAA section 502(a). Historically, the EPA has considered four factors in determining whether the “unnecessarily burdensome” criterion is satisfied: (1) whether title V would add any significant compliance requirements to those already required by the NESHAP; (2) whether the area sources subject to a NESHAP possess characteristics that would contribute to title V permitting imposing a significant burden on them and whether this burden could be aggravated by difficulty in obtaining assistance from permitting agencies; (3) whether the costs of title V permitting for the area sources would be justified, taking into consideration any potential gains in compliance; and (4) whether adequate oversight, outreach, and compliance assistance programs by the EPA or a delegated authority could achieve high compliance without relying on title V permitting.¹²² The EPA has considered on a case-by-case basis the extent to which one or more of these four factors is present for a given source category and then considered whether, taken together, those factors that are present demonstrate that compliance with title V requirements would be unnecessarily burdensome.¹²³

With respect to the first factor (*i.e.*, whether title V would add any significant compliance requirements to those already required by the NESHAP), the EPA compared the compliance requirements of the HWC NESHAP and the applicable general provisions with the monitoring, recordkeeping, and reporting requirements of 40 CFR 70.6 and 71.6 that may be important for assuring compliance with the NESHAP. The purpose of this was to determine whether title V is “unnecessary” to improve compliance for these NESHAP

requirements at these area sources.¹²⁴ A finding that title V would not result in significant improvements to compliance requirements, compared to the compliance requirements contained in the NESHAP, would support a conclusion that title V permitting is “unnecessary” for area sources in that category. Based on this comparison, we find that the compliance requirements in the HWC NESHAP and part 63 general provisions are substantially equivalent to the monitoring, recordkeeping, and reporting requirements of 40 CFR 70.6 and 71.6, supporting a conclusion that title V permitting is unnecessary for HWC NESHAP area sources because no additional benefits would be achieved.

The second factor is whether the area sources subject to a NESHAP possess characteristics that would contribute to title V permitting imposing a significant burden on them, and whether this burden could be aggravated by difficulty in obtaining assistance from permitting agencies. The third factor, which is closely related to the second factor, is whether the costs of title V permitting for area sources subject to a NESHAP would be justified, taking into consideration any potential gains in compliance likely to occur for such sources. The EPA did not discuss either factor as part of the 2004 HWC NESHAP proposal.¹²⁵ We estimate that the cost of renewing a title V permit is between \$15,000 and \$30,000, with costs varying by state and by complexity of the permit, often with additional associated emission fees (the presumptive minimum fee rate was \$63.69/ton for both HAP and non-HAP emissions for September 1, 2024, through August 31, 2025).¹²⁶ We estimate that the cost of a non-title V state operating permit is approximately half that of a title V permit. Some area sources are small businesses, and the title V permitting cost can represent substantial cost to a small business, making the requirement that area sources have title V permits potentially burdensome on some sources. We propose to find that HWC area sources have characteristics that would contribute to title V permitting imposing a significant burden, and that the costs of title V permitting for these area sources is not justified given the minimal gains in compliance likely to occur for such sources.

The fourth factor is whether adequate oversight by state and local permitting authorities could achieve high compliance with the particular NESHAP requirements without relying on title V permitting.¹²⁷ A conclusion that high compliance can be achieved without relying on title V permitting would support a conclusion that title V permitting is “unnecessary” for those sources. The EPA believes that even if area sources are not required to have title V permits, the area sources would be issued non-title V state operating permits governing their air emissions which would incorporate the requirements of the HWC NESHAP. States would be able to enforce the contents of these permits in the same manner in which they can enforce the contents of a title V permit. Furthermore, the EPA has general authority for enforcement of NESHAP under CAA section 113 and has the authority to determine if violations have occurred through inspection, auditing, monitoring, recordkeeping, reporting, and entry onto premises under CAA section 114 and to pursue enforcement action; the EPA uses title V as a compliance tool but does not solely rely on it to enforce requirements of NESHAP. Most HWC NESHAP area sources have good compliance history, showing that a title V permit may not be necessary to incentivize compliance for some area sources.

For these reasons, the EPA is proposing to allow states to choose to exempt HWC area sources from the requirement to obtain a title V permit based on the Administrator’s determination under CAA section 502(a) that compliance with title V requirements is “unnecessarily burdensome.” If this proposal is finalized, state, local, and Tribal permitting authorities will have the option under 40 CFR 63.1(c)(2)(i) to exclude HWC area sources from the requirement to obtain a title V permit on a source-by-source basis unless the area source is otherwise required by law to obtain a title V permit (*e.g.*, is an area source of HAP but a major source of criteria pollutants). State, Tribal, and local title V permitting authorities are highly involved in the day-to-day issuance of title V permits and determinations of compliance with the HWC NESHAP. States are well positioned to determine whether the requirement to have a title V permit is burdensome on a small business with a strong record of compliance, or if a title

as it acknowledges the change in position, provides a reasonable explanation for the new position, and considers legitimate reliance interests in the prior position. See *FDA v. Wages & White Lion Investments, LLC*, 145 S. Ct. 898 (2025); *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502 (2009); *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29 (1983); *Clean Air Council v. Pruitt*, 862 F.3d 1, 8 (D.C. Cir. 2017) (“Agencies obviously have broad discretion to reconsider a regulation at any time.”).

¹²² For further discussion, see the EPA’s proposal (70 FR 15250, Mar. 25, 2005) and final rule (70 FR 75320, Dec. 19, 2005) exempting multiple area sources from title V permitting requirements.

¹²³ *Id.*

¹²⁴ The EPA did not conduct such a comparison as part of the 2004 HWC NESHAP proposal. 69 FR at 21325 (Apr. 20, 2004).

¹²⁵ 69 FR at 21325 (Apr. 20, 2004).

¹²⁶ See <https://www.epa.gov/title-v-operating-permits/permit-fees> for information about part 70 permit fees and presumptive fee rates.

¹²⁷ The EPA did not discuss this factor as part of the 2004 HWC NESHAP proposal. 69 FR at 21325 (Apr. 20, 2004).

V permit is a necessary compliance tool for a specific area source. Providing a state with title V permitting authority the option of issuing a title V permit or other non-title V permit decreases unnecessary burden on small entities while ensuring that states have the flexibility to maintain compliance tools.

There are, however, implications of this proposal that are unique to the HWC NESHAP. Because the HWC NESHAP was originally promulgated under joint CAA and RCRA authority, the EPA issued a final rule in 1999 giving sources in authorized states the option to migrate air emissions and related operating requirements established under RCRA regulations from RCRA permits to title V permits in order to consolidate all air requirements for one unit in the same permitting location.¹²⁸ All other RCRA related requirements (*e.g.*, corrective action, general facility standards, material handling, and risk-based emission limits and operating requirements) remain in the RCRA permit.¹²⁹ This option was provided pursuant to RCRA section 1006(b), which requires the EPA to demonstrate that the RCRA and CAA provisions are equivalent and that RCRA air emissions requirements could be removed because they were duplicative with HWC NESHAP requirements.¹³⁰

The EPA undertook this demonstration most robustly in the 1999 final rule, in which we relied heavily on the federal enforceability of title V permits and concluded that the title V permitting process would provide equivalent opportunities for public participation.¹³¹ The EPA explained that the HWC NESHAP emission limits were generally as protective as the RCRA limits, and in cases where RCRA emission limits were more stringent than the HWC NESHAP limits and were established as site-specific risk-based limits, the RCRA limits would be maintained in the RCRA permit. The title V permit would take the place of the RCRA permit as a federally enforceable operating permit for air emission limits, except in limited cases. The most significant difference between the RCRA and HWC NESHAP requirements was in the public participation requirements. RCRA has requirements for a preapplication public meeting and notice (40 CFR 124.31), public notice at application submittal,

public notice of the draft permit, opportunity for public comments on the draft permit, and opportunity for public hearings. The requirement for a preapplication public meeting was incorporated into the HWC NESHAP (40 CFR 63.1212(b)). The other public participation requirements were not incorporated into the HWC NESHAP directly because they were included in the title V permit process and all HWCs were required to have a title V permit. The EPA determined that the title V application process was equivalent for the remainder of the RCRA public participation requirements.¹³²

If a state chooses to exempt an area source HWC from the title V permit requirements, the HWC NESHAP would no longer be equivalent to the RCRA requirements. As a result, any area source HWC without a title V permit would need to have air emissions requirements, likely the HWC NESHAP requirements, included in their RCRA permit while also maintaining a non-title V state operating permit with the same HWC NESHAP requirements. This would create the opportunity for enforcement of the HWC NESHAP requirements under RCRA by the EPA enforcing the HWC NESHAP directly and by the state enforcing the state operating permit.

Under this proposal, if a state exempts an area source from the requirement to have a title V permit, the RCRA permit would need to be modified to include air emissions requirements before the title V permit for the area source is cancelled or allowed to expire. We seek comment on this proposal, including on any reliance interests relevant to the existing requirements for HWC area sources to obtain title V permits.

In addition to proposing that states with title V permitting authority may exempt area source HWCs from title V permitting requirements, the EPA is soliciting comment on whether we should completely exempt area sources from title V permitting requirements (C-13); as with the more flexible proposal described above, such comments may include any reliance interests associated with existing requirements for HWC area sources to obtain title V permits. If we completely exempt area sources from the requirement, then states may not choose to issue a title V permit to such area sources solely because they are subject to the HWC NESHAP; they would only be allowed to issue a non-title V state air permit unless the area source is otherwise required by law to obtain a title V permit. This option

would also require area sources to modify their RCRA permit to include air emissions requirements, which would have similar potential enforcement implications to those previously described.

4. CO Requirement During CfPTs

Currently, 40 CFR 63.1207(g)(2)(i) requires that CO or THC CEMS emission levels must be within the range of the average value to the maximum value allowed during the CfPT, unless the requirement is waived in the CfPT plan approval. The EPA routinely waives this requirement because CO and THC emissions are not tunable parameters. As the HWC NESHAP has established, emissions of CO and THC are representative of good combustion practices below levels of 100 ppmv and 10 ppmv, respectively. HWC operators are not able to set and maintain a specific concentration of CO or THC below those levels, which are the maximum allowable by rule. In addition, the only way that HWC operators can try to ensure that CO or THC emissions are higher than the average value is to not operate according to best combustion practices. However, the EPA generally encourages the use of best practices for combustors. Because this requirement is counter to the use of best combustion practices and is routinely waived, the EPA is proposing its removal.

5. Incorporation of Operating Parameter Limits by Reference

Currently, the HWC NESHAP requires that operating parameter limits set during the CPT be specified in the notification of compliance and incorporated into the HWC's title V permit (40 CFR 63.1206(c)(1)(v)). The HWC NESHAP does not specify whether the requirements must be directly incorporated or if they can be incorporated by reference. This lack of specificity has led to some disparities in requirements across different HWCs. In general, modifications to title V or other air permits expend the time of both HWC owners and operators and the permitting agency, and have fees associated with them. Because requiring a permit modification is costly in time and money, the EPA is proposing to make notifications of compliance, including the operating parameter limits, publicly available through the EPA's WebFIRE interface. Additionally, because operating parameter limits will be available to the public through other means, the EPA is proposing to clarify that operating parameter requirements may be incorporated in the title V

¹²⁸ See 64 FR 52828, 52833–34 (Sept. 30, 1999); see also 70 FR 59516–26 (Oct. 12, 2005).

¹²⁹ *Id.*

¹³⁰ See *Chem. Waste Mgmt. v. EPA*, 976 F.2d 2, 23, 25 (D.C. Cir. 1992).

¹³¹ See 64 FR 52973–91 (Sept. 30, 1999).

¹³² See 64 FR 52828, 52833–34 (Sept. 30, 1999); 70 FR 59516–26 (Oct. 12, 2005).

permit or other air permit either directly or by reference.

6. RATA Timeframe Clarification

Currently, appendix A to subpart EEE of part 63, section 5, requires that when a performance test is required under 40 CFR 63.1207 to document compliance with emission standards, a RATA must coincide with the performance test. However, the requirement in appendix A is vague and there is no definition of “coincide,” which has led to some degree of confusion. The EPA is proposing to clarify that a RATA is only required during a CPT and that it must occur within 60 days of the CPT. According to appendix A, the RATA requirement applies only to O₂, CO, and hydrocarbon (HC) CEMS. According to 40 CFR 63.1207(b)(2)(ii), a performance evaluation of CMS (*e.g.*, a RATA for a CEMS) is required only for systems used for compliance with the PCDD/PCDF emission standard under 40 CFR 63.1209(k). According to 40 CFR 63.1209(k), the compliance assurance parameters for PCDD/PCDF are gas temperature at the inlet to a dry PM control device, minimum combustion chamber temperature, maximum flue gas flow rate or production rate, maximum hazardous waste feedrate, PM operating limits, activated carbon injection parameter limits, carbon bed parameter limits, catalytic oxidizer parameter limits, and inhibitor feedrate parameter limits. None of those compliance assurance parameters depend on O₂, CO, or HC CEMS, and so a RATA is not required in conjunction with a CfPT.

To clarify the RATA timeframe, the EPA is proposing to amend the language in of appendix A to subpart EEE of part 63, section 5, to read: “When a comprehensive performance test is also required under § 63.1207 to document compliance with emission standards, the RATA must occur within 60 days of the comprehensive performance test.”

7. Removing the PM CEMS Requirement

Currently, the HWC NESHAP has a never-implemented requirement that HWC owners and operators install, calibrate, maintain, and operate a PM CEMS to demonstrate continuous compliance with the PM standard (40 CFR 63.1209(a)(1)(iii)). The EPA is proposing to remove this requirement and the related standards regarding applicability during PM CEMS correlation tests (40 CFR 63.1206(b)(8)). The EPA is proposing this removal because PM CEMS are technically infeasible for the HWC source category.

The EPA considers the use of PM CEMS to be technically infeasible for

the HWC source category due to the impacts of the dynamic waste profile on the correlation curve for the CEMS. Specifically, PM CEMS measurement is greatly influenced by the PM particle size and make-up, and the dynamic waste profile in HWCs creates a highly variable particle size distribution and make-up. This makes the correlation curve developed under one waste profile inapplicable to another. In those sectors where PM CEMS are applied successfully, the fuel type and emission controls are static, allowing for higher confidence in the correlation curve. Without a valid correlation curve, the PM CEMS will not reliably measure PM emissions, which renders the PM CEMS technically infeasible. Additionally, for those HWCs demonstrating compliance with the PM standards, the use of parametric monitoring (*e.g.*, baghouse pressure drop) is sufficient for monitoring continuous compliance.

Furthermore, since the inclusion of PM CEMS in this standard,¹³³ the EPA is unaware of any successful demonstration of continual use of PM CEMS at an HWC, and at the time of the publication of this proposed rule, the EPA is unaware of a PM CEMS currently installed at an HWC, meaning that PM CEMS is not a demonstrated technology for HWCs. The use of PM CEMS could be technically feasible at certain HWCs if the particle size and make-up is less variable, which is why we are retaining the option that sources may petition to use PM CEMS for compliance monitoring in lieu of compliance with other OPLs (40 CFR 63.1209(a)(5)). The petition would include a demonstration that the PM CEMS is technically feasible for that unit.

Because no units are operating PM CEMS, the cost for installing and operating PM CEMS is not included in the baseline cost for this rulemaking despite the requirement for PM CEMS in the standard. If the EPA chose to implement the PM CEMS requirement, the approximate cost would conservatively be \$192,000 (2023\$) per unit or \$31.3 million (2023\$) if every unit across the industry were to install and operate a PM CEMS.¹³⁴ Removing this requirement would acknowledge that the EPA will not require sources to incur that cost without further rulemaking action. Since units are not currently operating PM CEMS, removing the requirement would not represent a cost savings for existing units. Hence, the estimated cost of this proposal does

not include such cost savings. However, the current information collection request (ICR) for the HWC NESHAP (OMB Control Number 2060–0743) includes the cost to install, validate, and perform correlation tests for PM CEMS for all new units and to perform PM CEMS correlation test costs for some existing units. We are proposing revisions to the ICR to remove the costs associated with installation and operation of PM CEMS, including installation, validation, and correlation test costs. These revisions are reflected in the cost analysis memorandum for this proposal.

8. Removing Expired Methods

While reviewing the HWC NESHAP for the RTR, the EPA found several listed methods that were not correctly incorporated by reference and have since expired. Additionally, when we examined these methods, we found other available methods for meeting the same requirements in the HWC NESHAP and found that these other methods seemed to be preferred options by sources. For these reasons, the EPA is proposing to remove references to the following methods in the HWC NESHAP: ASME QHO–1–1994, QHO–1a–1996, QHO–1–2004 for operator training; ASTM D 6735–01 for measurement of HCl and chlorine gas; and ASTM E–29–90 for rounding and significant figures.

9. Demonstration of Compliance Timeframe

The EPA is proposing that the initial demonstration of compliance timeframe for the new HF and HCN standards would be six months after the relevant compliance date, in accordance with 40 CFR 63.1207(c)(1) and as discussed in section IV.A. of this preamble. However, to prevent two sets of compliance dates for new incinerators, cement kilns, and lightweight aggregate kilns—six months for HF and HCN and 12 months for all other standards—the EPA is proposing that the initial demonstration of compliance would be six months for all standards for all sources.

The EPA clearly laid out the reason that incinerators, cement kilns, and lightweight aggregate kilns were given 12 months for the initial demonstration of compliance with the final replacement standards in the 2005 HWC NESHAP while boilers and HCl production furnaces were given six months—to give sources longer to amortize the cost of the CPT demonstrating compliance with the 2002 HWC NESHAP interim standards before having to retest to demonstrate compliance with the 2005 HWC

¹³³ 64 FR 52828 (Sept. 30, 1999).

¹³⁴ This is based on the cost for installing PM CEMS on new units in the current HWC NESHAP ICR, OMB Control Number 2060–0743.

NESHAP.¹³⁵ This goal has been accomplished, and so we believe it is appropriate to remove this outdated timeframe from the rule.

With the removal of the outdated 12-month demonstration of compliance provision for incinerators, cement kilns, and lightweight aggregate kilns in 40 CFR 63.1207(c)(3), all sources would be subject to the current requirement of 40 CFR 63.1207(c)(1) to commence the initial CPT not later than six months after the compliance date. Compliance dates in the rule have been updated to reflect that initial compliance with the HF and HCN standards is proposed to be three years after promulgation of the final RTR for existing sources and that the initial compliance date for other emission standards remains unchanged.

10. Other Editorial Corrections

The EPA is proposing various editorial corrections to the HWC NESHAP for correctness and clarity:

- Updating definitions in 40 CFR 63.1201(a) as indicated in the full text of proposed revisions to the HWC NESHAP, which can be found in the docket for this proposed rule;
- Removing reference to the general provisions to performance test operating conditions (40 CFR 63.7(e)(1)) and replacing it with a reference to 40 CFR 63.1207(g) in 40 CFR 1206(b)(2);
- Changing “effect” to “affect” in 40 CFR 63.1206(b)(7)(i)(B)(1);
- Reserving 40 CFR 63.1206(b)(8) in accordance with removing the requirement that HWCs install and operate PM CEMS;
- Changing “μgm” to “μg” to align with standard convention where it appears in the rule;
- Clarifying that the “workplan” referenced in 40 CFR 63.1206(c)(5)(ii) is the performance test plan;
- Changing “or” to “and” in 40 CFR 63.1206(c)(6)(v)(A)(7);
- Correcting a cross-referencing error in 40 CFR 63.1206(c)(9)(ii)(C)(2)(iv) to reference paragraph (C)(2) instead of paragraph (B)(2);
- Removing the applicability of 40 CFR 63.7(e)(1) in 40 CFR 63.1207(a);
- Clarifying in 40 CFR 63.1207(e)(1)(i) that the CMS performance evaluation plan in a CfPT must only include CMS performance evaluation for parameters required in 40 CFR 63.1207(b)(2)(ii);
- Revising 40 CFR 63.1207(f)(1)(xv), which was inadvertently left in the subpart when the EPA revised EPA Method 23 in March 2023¹³⁶ and replacing it with the CPT plan

submission requirements associated with the HF work practice standard;

- Clarifying that records must be kept of operating conditions during performance testing in 40 CFR 63.1207(g);
- Removing the option to use Method 0023A to demonstrate compliance with the PCDD/PCDF standards in 40 CFR 63.1208(b)(1)(i) effective three years after the publication date of the final rule;
- Clarifying methods for measuring HCl and chlorine gas in 40 CFR 63.1208(b)(5);
- Removing the cross-reference to a reserved section in 40 CFR 63.1208(b)(7);
- Adjusting the numbering to account for the described changes in 40 CFR 63.1208(b);
- Adding the work practice standard and OPLs for HF in 40 CFR 1209(s);
- Revising the notification tables to reflect the proposed notification changes in 40 CFR 63.1210(a);
- Revising the recordkeeping and reporting tables to reflect the proposed recordkeeping and reporting changes in 40 CFR 63.1211;
- Adding a requirement that sources report if they fail to meet an applicable standard in the excess emissions and CMS performance report and summary report in 40 CFR 63.1211(a);
- Clarifying recordkeeping requirements for periods of SSM and records to be kept for failures to meet an applicable standard in 40 CFR 63.1211(e);
- Correcting the web addresses for HCl and chlorine gas reference concentrations and acute reference exposure levels in 40 CFR 63.1215(b);
- Correcting the web address of the EPA’s *Air Toxics Risk Assessment Reference Library, Volume 2: Facility-Specific Assessment* in 40 CFR 63.1215(c)(4)(i);
- Revising instructions on significant figures and intermediate use in calculations to align with existing EPA policy¹³⁷ in 40 CFR 63.1216(d), 63.1217(d), 63.1218(d), 63.1219(d), 63.1220(f), and 63.1221(d);
- Revising the general provisions applicability table (table 1 to subpart EEE of part 63) to reflect proposed changes to general provisions applicability;
- Revising “NIST traceable calibration standards” to “EPA traceability protocol calibration gases” in section 2 of the appendix to subpart

EEE of part 63 to improve consistency across NESHAP and to better match the intent of the requirement;

- Revising “yearly” to “annually” in section 5 of the appendix to subpart EEE of part 63 for consistent terminology;
- Clarifying who must approve a request to use alternative spans and ranges in section 6.3.5 of the appendix to subpart EEE of part 63;
- Clarifying and adding options for the moisture correction procedure in section 6.4.1 of the appendix to subpart EEE of part 63; and
- Removing the extra word “expressed” in section 6.6 of the appendix to subpart EEE of part 63.

The full text of proposed revisions to the HWC NESHAP can be found in the docket for this proposed rule. We seek comment on these technical revisions (C–14). The EPA is also soliciting comments on what, if any, other clarifications we should make, including but not limited to which emission limits and OPLs apply when hazardous waste is not in the combustion chamber and the combustor is not complying with an otherwise applicable requirement under 40 CFR 63.1206(b)(1)(ii) (C–15).

F. What compliance dates are we proposing?

The EPA is proposing that existing facilities must be in compliance with the HF and HCN limits within three years after promulgation of the final rule, under CAA section 112(i)(3)(A).¹³⁸ We propose that existing sources must demonstrate compliance with the HF and HCN limits no later than six months after the compliance date. We propose this timeline for compliance and demonstration of compliance with these limits because we recognize that most facilities may currently be unaware of their HF and HCN emissions. These facilities may conduct pre-testing to determine their current HF and HCN emissions, determine if modifications must be made to their processes or control devices, implement any changes, submit a performance test plan, get the performance test plan approved, and schedule and complete a performance test to demonstrate compliance. We expect that facilities demonstrating compliance with new emission limits may choose to conduct a CPT in conjunction with their demonstration of initial compliance if operational changes must be made to

¹³⁷ Memorandum *Performance Test Calculation Guidelines* (John Seitz, 1990) available in the docket for this action (Docket ID No. EPA–HQ–OAR–2004–0022).

¹³⁸ *U.S. Sugar*, 113 F.4th at 995 (section 112(i)(3)(A) “permits EPA to establish a delayed ‘compliance date’ for any existing-source emission standard, which may fall up to 3 years after the effective date of such standard”) (alteration in original).

¹³⁵ 69 FR 21338 (Apr. 20, 2004).

¹³⁶ 88 FR 16732 (Mar. 20, 2023).

comply with the new limits. We also recognize that some sources may be required to submit an alternative test method for approval to the EPA to demonstrate compliance with new HCN standards. Additionally, a CPT plan must be submitted for approval at least a year before the test commences, and we expect that approximately the same amount of time will be required for the demonstration of initial compliance with the HF and HCN standards, leaving two years for sources to determine their current emissions and determine any process changes needed to comply with the new emission limits. Taken together, the EPA anticipates that three years for compliance and an additional six months for the demonstration of compliance is a reasonable timeframe for existing sources and is as expeditious as practicable given our experience with similar industries.

The EPA is proposing that new sources, as determined by the date of this proposal, must be in compliance with the HF and HCN emission limits upon initial startup and must demonstrate compliance with the HF and HCN emission limits no later than six months after initial startup. New sources would also require time for unit pre-testing, tuning operational parameters, submitting a CPT plan and getting it approved, and scheduling and performing an initial CPT. Some sources may also need to submit an alternative test method request to the EPA for approval to demonstrate compliance with the HCN standard. Based on our experience with this and similar industries, the EPA believes that this is a reasonable timeframe for new sources and is as expeditious as practicable.

For electronic reporting for all sources, the EPA is proposing that for performance test and performance evaluations including RATA, which utilize the ERT, electronic reporting begins 90 days after the publication date of the final rule. In the EPA's experience, since the ERT has been available for use for over a decade, and stack testing firms are well acquainted with its use, 90 days is sufficient time to begin electronic reporting using the ERT. For notifications of intent to comply, eligibility demonstrations, periodic SSM reports, and compliance progress reports, which are uploads in PDF, the EPA is proposing to allow 60 days from the date of the final rule to begin electronic reporting. As these reports are not being changed, but only the manner of submission, we believe 60 days would be sufficient time for facilities to enroll in CEDRI if not already enrolled and to submit these reports electronically. For the NOC and

the excess emissions and CMS performance reports and summary reports, which would use a spreadsheet template, the EPA is proposing to allow one year from the date of the final rule or one year from the date the template becomes available on the CEDRI homepage to begin electronic reporting. We believe that one year is necessary to ensure that facilities can become acquainted with the spreadsheet template and begin entering data into the new format.

The EPA is proposing that all facilities must comply with the SSM work practice standard within 180 days after promulgation of the final rule or upon initial startup, whichever is later. The EPA anticipates that most facilities are already operating according to this work practice standard; however, the EPA acknowledges that some facilities may not have an approved SSM plan, though all should have an SSM plan. The EPA anticipates that 180 days is a reasonable timeframe for any facilities without an approved SSM plan to review their SSM plan, submit it for approval, and receive approval. Furthermore, the EPA anticipates that 180 days is a reasonable timeframe for facilities with an approved SSM plan who may choose to revise their plans and resubmit them for approval, if required, based on the contents of this action. The AWFCO part of the SSM work practice standards is already implemented at all facilities and does not require additional time for compliance.

The EPA is proposing that all other revisions to the HWC NESHAP would become applicable on the effective date of the final rule. These revisions are technical corrections, clarifications, and deregulatory actions that do not require demonstrations of compliance or immediate action on the part of regulated entities.

V. Summary of Cost, Environmental, and Economic Impacts

A. What are the affected sources?

The HWC source category includes incinerators, cement kilns, lightweight aggregate kilns, solid fuel boilers, liquid fuel boilers, and HCl production furnaces that combust hazardous waste. Currently, the EPA has identified 163 HWCs at 92 facilities owned by 57 parent corporate entities and the Federal government. Of these 163 HWCs, 62 are incinerators, 61 are liquid fuel boilers, 17 are HCl production furnaces, 14 are cement kilns, seven are solid fuel boilers, and two are lightweight aggregate kilns. We estimate that four

new HWCs may begin operations in the next five years.

B. What are the air quality impacts?

The EPA does not anticipate that the proposed amendments to this subpart will materially impact air quality. Analysis of the collected data indicates that the proposed emission limits for HF and HCN are currently being achieved by all subject sources, and so the proposed amendments would not result in any changes to air quality. In addition, the work practice standards for SSM are based on practices already utilized by industry and thereby do not affect the stringency of standards. The addition of electronic reporting, changes to title V permit requirements, and other ministerial actions also do not impact the stringency of the standards. However, the proposed amendments would prevent backsliding in HAP emissions for current sources and would prevent the future release of HAP from new sources by establishing new source standards for HF and HCN.

C. What are the cost impacts?

The proposed revisions to the HWC NESHAP are expected to have minimal cost impacts. The costs are associated with initial and periodic emissions performance testing, electronic reporting, and reviewing the revised provisions. The EPA expects 92 facilities to be affected by the rule. The EPA anticipates that all facilities can comply with the proposed rule without the installation of any new APCDs. Furthermore, the EPA expects that compliance testing for new emission limits will coincide with currently required emissions testing, requiring minimal extra costs. The EPA also estimates cost savings associated with proposed changes to title V requirements. The EPA estimates that the total cost per facility in year one (2026) is \$3,600 (2024\$), and the subsequent annual costs per facility are estimated to be \$2,400 (2024\$).

For these 92 affected existing facilities, the total cost of the action over years one through three is estimated to be \$770,000 (2024\$). The analysis for this rule also assumes that three new facilities will begin operation with estimated cost savings of \$190,000 (2024\$) per facility in the first year of operation, primarily associated with the proposed removal of the PM CEMS requirement, reducing the three-year incremental cost of this rulemaking to \$225,000 (2024\$), or an average annual cost of \$75,000 (2024\$). These costs do not account for the incremental burden for the EPA. After accounting for EPA burden, the estimated total annual cost

of this action, averaged over years one through three, is estimated at \$70,000 (2024\$). For more information on these estimates, please refer to the cost memorandum¹³⁹ prepared for this action as well as the economic impact analysis¹⁴⁰ for this proposed rule.

D. What are the economic impacts?

The economic impact of this action is calculated as the annual cost as a percent of revenues for affected entities. Using the total annual costs for this action averaged over years one through three from the proposal, no affected entity is expected to incur an annual cost of more than 0.16 percent of their revenues. Based on our analyses, nine affected parent entities are expected to have cost savings associated with this proposal. Given these results, we expect that the economic impact of this action should be small.

E. What are the benefits?

As explained earlier in this preamble, we do not estimate that this action would lead to material changes in HAP emissions from the HWC source category. Given this outcome, we do not believe that there would be monetized benefits, positive or negative, based on emissions changes expected from this proposal. However, the proposed amendments would prevent backsliding in HAP emissions for current sources and would prevent the future release of HAP from new sources by establishing new source standards for HF and HCN.

F. What analysis of children's environmental health did we conduct?

This action is subject to the EPA's Policy on Children's Health (<https://www.epa.gov/children/childrens-health-policy-and-plan>) because the rule has considerations for human health. Accordingly, we have evaluated the environmental health effects of the HWC source category to early life exposure (the lifestages from conception, infancy, early childhood, and through adolescence until 21 years of age) and lifelong health.

In summary, the residual risk assessment found that the MIR posed by emissions from the source category is 9-in-1 million. The total estimated cancer

incidence is 0.07. The population exposed to cancer risk greater than or equal to 1-in-1 million is approximately 540,000 people. The maximum chronic noncancer TOSHI is estimated to be 0.3 (for respiratory effects).

The results of this evaluation are contained in sections IV.B. and C. of this preamble and further documented in the risk report, *Residual Risk Assessment for the Hazardous Waste Combustors Source Category in Support of the 2025 Risk and Technology Review Proposed Rule*, which is available in the docket for this proposed rule.

This action is consistent with the EPA's Policy on Children Health because the risk assessment accounts for early life exposures. For example, for carcinogens that act via a mutagenic mode of action (*i.e.*, chemicals that cause cancer by damaging genes), we estimate risks to reflect the increased carcinogenicity of such chemicals during childhood.

VI. Request for Comments

We solicit comments on this proposed action. In addition to general comments on this proposed action, we are also interested in additional data that may improve the risk assessments and other analyses. We are specifically interested in receiving any improvements to the data used in the site-specific emissions profiles used for risk modeling. Such data should include supporting documentation in sufficient detail to allow characterization of the quality and representativeness of the data or information. Section VII. of this preamble provides more information on submitting data corrections.

Additionally, we are soliciting comment on the following topics:

- Setting the HF and HCN standards pursuant to CAA section 112(d)(6) rather than setting the HF and HCN standards exclusively pursuant to CAA sections 112(d)(2), (d)(3), and (h)(2), as discussed in section IV.A of this preamble. (C–1)
- Any comments, data, and other information regarding the analyses for our proposed MACT floor standards and the beyond-the-floor options and our determinations, as discussed in section IV.A of this preamble. (C–2)
- Whether strategies other than cost per ton of pollutant reduced would be more appropriate when considering cost in evaluating beyond-the-floor standards, as discussed in section IV.A.1. of this preamble. (C–3)
- The establishment of an HBEL for HAP, including HF and HCN, as discussed in section IV.A.1. of this preamble. (C–4)

- If the EPA were to establish an HBEL, what would be the most appropriate format for such a limit (*i.e.*, a single numeric limit or an alternative standard like 40 CFR 63.1215), as discussed in section IV.A.1. of this preamble. (C–5)

- The appropriateness of the proposed work practice standard for the control of HF emissions, and whether additional work practice standards should be included, as discussed in section IV.A.2.a. of this preamble. (C–6)

- Which operating parameter limits (*e.g.*, maximum stack gas flow rate) may be appropriate for inclusion of the cement kiln's inherent control of HCl and thereby HF in the proposed work practice standard, as discussed in section IV.A.3.a. of this preamble. (C–7)
- Whether HWC cement kilns should be subcategorized for purposes of setting emission limit(s) for HCN, and, if so, how, as discussed in section IV.A.3.b. of this preamble. (C–8)

- Whether there are additional control measures for emission sources subject to the HWC standards that are necessary to provide an ample margin of safety to protect public health, as discussed in section IV.C.2. of this preamble. (C–9)

- Whether we should consider additional developments not addressed in this preamble or in the technical memorandum for emission sources subject to the HWC NESHAP, as discussed in section IV.D. of this preamble. (C–10)

- Whether and how we should establish regulations within this and other New Source Performance Standards or NESHAPs in response to the D.C. Circuit's *SSM Litigation Group* decision, as described in section IV.E.1. of this preamble. (C–11)

- The content, layout, and overall design of the electronic reporting templates as discussed in section IV.E.2. of this preamble. (C–12)

- The removal of the requirement for area sources to obtain a title V permit including any specific reliance interests relevant to the existing requirements for HWC area sources to obtain title V permits as discussed in section IV.E.3. of this preamble. (C–13)

- The technical revisions discussed in section IV.E.10. of this preamble. (C–14)

- What, if any, other clarifications we should make, including but not limited to which emission limits and OPLs apply when hazardous waste is not in the combustion chamber and the combustor is not complying with an otherwise applicable requirement under 40 CFR 63.1206(b)(1)(ii) as discussed in section IV.E.10 of this preamble. (C–15)

¹³⁹ See the memorandum *Hazardous Waste Combustors (HWC) NESHAP—Cost Impacts of Proposed Amendments*, which is available in the docket for this proposed rule (Docket ID No. EPA–HQ–OAR–2004–0022).

¹⁴⁰ See the memorandum *Economic and Small Entity Impact Analysis for the Proposed National Emission Standards for Hazardous Air Pollutants from Hazardous Waste Combustors Risk and Technology Review*, which is available in the docket for this proposed rulemaking (Docket ID No. EPA–HQ–OAR–2004–0022).

- An approach to set standards for HAP without current regulation only “as necessary” based on current emissions levels. (C–16)

VII. Submitting Data Corrections

The site-specific emissions profiles used in the source category risk analysis are available for download on the RTR website at <https://www.epa.gov/stationary-sources-air-pollution/hazardous-waste-combustors-national-emission-standards-hazardous>. The data files include detailed information for each HAP emissions release point for the facilities in the source category.

If you believe that the data are not representative or are inaccurate, please identify the data in question, provide your reason for concern, and provide any “improved” data that you have, if available. When you submit data, we request that you provide documentation of the basis for the revised values to support your suggested changes. To submit comments on the data downloaded from the RTR website, complete the following steps:

1. Within this downloaded file, enter suggested revisions to the data fields appropriate for that information.
2. Gather documentation for any suggested emissions revisions (e.g., performance test reports, material balance calculations).
3. Send the entire downloaded file with suggested revisions and all accompanying documentation to Docket ID No. EPA–HQ–OAR–2004–0022 (through the method described in the **ADDRESSES** section of this preamble).
4. If you are providing comments on a single facility or multiple facilities, you need only submit one file for all facilities. The file should contain all suggested changes for all sources at that facility (or facilities).

VIII. Statutory and Executive Order Reviews

Additional information about these statutes and Executive Orders can be found at <https://www.epa.gov/laws-regulations/laws-and-executive-orders>.

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

This action is not a significant regulatory action and therefore was not submitted to the Office of Management and Budget (OMB) for review. The EPA has prepared an economic analysis of the potential costs and benefits associated with this action. The economic analysis is described in section V. of this preamble. This analysis, *Economic and Small Entity*

Impact Analysis for the Proposed National Emission Standards for Hazardous Air Pollutants from Hazardous Waste Combustors Risk and Technology Review, is available in the docket for this proposed rule.

B. Executive Order 14192: Unleashing Prosperity Through Deregulation

This action is not expected to be an Executive Order 14192 regulatory action because this action is not significant under Executive Order 12866.

C. Paperwork Reduction Act (PRA)

The information collection activities in this proposed rule have been submitted for approval to the Office of Management and Budget (OMB) under the PRA. The ICR document that the EPA prepared has been assigned EPA ICR number 1773.14, OMB Control Number 2060–0743. You can find a copy of the ICR in the docket for this proposed rule, and it is briefly summarized here.

This action proposes revisions to the current ICR for the HWC NESHAP. The goal of this revision is to incorporate new monitoring, reporting, and recordkeeping requirements associated with revisions to the HWC NESHAP. The key revisions to this subpart are the addition of new emission limits and work practice standards, removal of exemptions for emissions during periods of SSM, removal of the requirement to install and operate PM CEMS, and addition of e-reporting using CEDRI to replace physically mailing many of the reports and notifications required under this subpart. These revisions require modifications to the monitoring, reporting, and recordkeeping requirements of the rule. The information collected in this ICR will be used to ensure compliance with this subpart. All information submitted to the Agency in response to the ICR will be managed in accordance with applicable laws and the EPA’s regulations governing treatment of confidential business information at 40 CFR part 2, subpart B. Any information determined to constitute a trade secret will be protected under 18 U.S.C. 1905.

Respondents/affected entities: The respondents to the recordkeeping and reporting requirements are owners or operators of hazardous waste combustors subject to emission standards under 40 CFR part 63, subpart EEE.

Respondent’s obligation to respond: Mandatory under the National Emission Standards for Hazardous Air Pollutants from Hazardous Waste Combustors (40 CFR part 63, subpart EEE).

Estimated number of respondents: On average, approximately 165 respondents per year (assuming one new source per year).

Frequency of response: The frequency of response varies by notification or report, as required in 40 CFR part 63, subpart EEE. Generally, respondents will have one-time responses, semiannual responses, and responses every five years.

Total estimated burden: The average annual recordkeeping and reporting burden for all facilities to comply with the requirements of this proposal is estimated to be 2,420 hours. Burden is defined at 5 CFR 1320.3(b).

Total estimated cost: The average annual labor cost for all facilities to comply with the requirements of this proposal is estimated to be \$267,000 per year, and this proposal is estimated to provide an average annual capital, operation, and maintenance cost savings of \$180,000 per year.

An agency may not conduct or sponsor, and a person is not required to respond to, an ICR unless it displays a currently valid OMB control number. The OMB control numbers for the EPA’s regulations in 40 CFR are listed in 40 CFR part 9.

Submit your comments on the Agency’s need for this information, the accuracy of the provided burden estimates and any suggested methods for minimizing respondent burden to the EPA using the docket identified at the beginning of this proposed rule. The EPA will respond to any ICR-related comments in the final rule. You may also send your ICR-related comments to OMB’s Office of Information and Regulatory Affairs using the interface at <https://www.reginfo.gov/public/do/PRAMain>. Find this particular ICR by selecting “Currently under Review—Open for Public Comments” or by using the search function. OMB must receive comments no later than December 10, 2025.

D. Regulatory Flexibility Act (RFA)

I certify that this action will not have a significant economic impact on a substantial number of small entities under the RFA. The small entities subject to the requirements of this action are eight small businesses out of the 57 affected entities (or 14 percent of the total). These small businesses are estimated to experience an impact ranging from a cost savings of 0.01 percent to an adverse impact of 0.16 percent, measured as a percentage of their revenues. Two of these eight small businesses are estimated to experience cost savings under this action. Details of this analysis are presented in the

memorandum *Economic and Small Entity Impact Analysis for the Proposed National Emission Standards for Hazardous Air Pollutants from Hazardous Waste Combustors Risk and Technology Review*, available in the docket for this proposed rule.

E. Unfunded Mandate Reform Act (UMRA)

This action does not contain an unfunded mandate of \$100 million or more as described in UMRA, 2 U.S.C. 1531–1538, and does not significantly or uniquely affect small governments. While this action creates an enforceable duty on the private sector, the cost does not exceed \$100 million or more.

F. 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 Federal government and the states, or on the distribution of power and responsibilities among the various levels of government.

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

This action does not have Tribal implications as specified in Executive

Order 13175. The EPA is not aware of any hazardous waste combustor unit owned or operated by Tribal governments. This action will not have substantial direct costs or impacts 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 the proposed amendments.

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

Executive Order 13045 directs Federal agencies to include an evaluation of the health and safety effects of the planned regulation on children in Federal health and safety standards and explain why the regulation is preferable to potentially effective and reasonably feasible alternatives. This action is not subject to Executive Order 13045 because it is not a significant regulatory action under section 3(f)(1) of Executive Order 12866, and because the EPA does not believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. Furthermore, this action

provides additional emission limits and work practices that will benefit all ages, including children.

However, the EPA's Policy on Children's Health applies to this action. Information on how the Policy was applied is available under section V.F. of this preamble.

I. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use

This action is not a "significant energy action" because it is not a significant regulatory action under Executive Order 12866.

J. National Technology Transfer and Advancement Act (NTTAA)

This rulemaking does not involve technical standards.

List of Subjects in 40 CFR Part 63

Environmental protection, Air pollution control, Hazardous substances, Reporting and recordkeeping requirements.

Lee Zeldin,

Administrator.

[FR Doc. 2025–19815 Filed 11–7–25; 8:45 am]

BILLING CODE 6560–50–P

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Federal Register

Vol. 90, No. 215

Monday, November 10, 2025

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FEDERAL REGISTER PAGES AND DATE, OCTOBER

49009-49214	3
49215-49246	4
49247-50482	5
50483-50488	6
50489-50740	7
50741-50856	10

CFR PARTS AFFECTED DURING OCTOBER

At the end of each month the Office of the Federal Register publishes separately a List of CFR Sections Affected (LSA), which lists parts and sections affected by documents published since the revision date of each title.

3 CFR

Proclamations:

10987.....49211

Executive Orders:

14357.....50725

14358.....50729

Administrative Orders:

Notices:

Notice of November 5,

2025.....50735

Notice of November 5,

2025.....50737

Notice of November 5,

2025.....50739

6 CFR

13.....49009

139.....49247

8 CFR

Proposed Rules:

1.....49062

103.....49062

204.....49062

207.....49062

208.....49062

209.....49062

210.....49062

212.....49062

214.....49062

215.....49062

216.....49062

235.....49062

236.....49062

240.....49062

244.....49062

245.....49062

245a.....49062

264.....49062

287.....49062

333.....49062

335.....49062

14 CFR

39.....49215, 49248, 49251

22 CFR

126.....50489

37 CFR

Proposed Rules:

42.....50492

39 CFR

111.....50741

Proposed Rules:

3050.....49016

40 CFR

52.....50742

180.....49254

721.....49218

Proposed Rules:

63.....50814

82.....50766

721.....49016, 49148, 49180

42 CFR

405.....49266

410.....49266

414.....49266

424.....49266

425.....49266

427.....49266

428.....49266

495.....49266

512.....49266

50 CFR

218.....50504

622.....49014

648.....50490, 50743

679.....49234, 49235, 49236,

50483

LIST OF PUBLIC LAWS Note: No public bills which have become law were received by the Office of the Federal Register for inclusion	in today's List of Public Laws. Last List September 9, 2025	Public Laws Electronic Notification Service (PENS) PENS is a free email notification service of newly enacted public laws. To subscribe, go to https://	portalguard.gsa.gov/ __layouts/PG/register.aspx. Note: This service is strictly for email notification of new laws. The text of laws is not available through this service. PENS cannot respond to specific inquiries sent to this address.
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