

**ENVIRONMENTAL PROTECTION AGENCY****40 CFR Part 63**

[EPA-HQ-OAR-2017-0357; FRL-9999-59-OAR]

RIN 2060-AT02

**National Emission Standards for Hazardous Air Pollutants: Generic Maximum Achievable Control Technology Standards Residual Risk and Technology Review for Ethylene Production****AGENCY:** Environmental Protection Agency (EPA).**ACTION:** Proposed rule.

**SUMMARY:** The U.S. Environmental Protection Agency (EPA) is proposing amendments to the National Emission Standards for Hazardous Air Pollutants (NESHAP): Generic Maximum Achievable Control Technology Standards. The source category addressed in this action is Ethylene Production. The EPA is proposing decisions concerning the residual risk and technology review (RTR), including proposing amendments pursuant to technology review for storage vessels and heat exchange systems. The EPA is also proposing amendments to correct and clarify regulatory provisions related to emissions during periods of startup, shutdown, and malfunction (SSM), including removing general exemptions for periods of SSM, adding work practice standards for periods of SSM where appropriate, and clarifying regulatory provisions for certain vent control bypasses. Lastly the EPA is proposing to add monitoring and operational requirements for flares; and add provisions for electronic reporting of performance test results and reports and Notification of Compliance Status (NOCS) reports. We estimate that these proposed amendments will reduce hazardous air pollutants (HAP) emissions from this source category by 62 tons per year (tpy).

**DATES:** *Comments.* Comments must be received on or before November 25, 2019. 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 November 8, 2019.

*Public hearing.* If anyone contacts us requesting a public hearing on or before October 15, 2019, we will hold a hearing. Additional information about the hearing, if requested, will be

published in a subsequent **Federal Register** document and posted at <https://www.epa.gov/stationary-sources-air-pollution/acetal-resins-acrylic-modacrylic-fibers-carbon-black-hydrogen>. 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-2017-0357 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](mailto:a-and-r-docket@epa.gov). Include Docket ID No. EPA-HQ-OAR-2017-0357 in the subject line of the message.
- *Fax:* (202) 566-9744. Attention Docket ID No. EPA-HQ-OAR-2017-0357.
- *Mail:* U.S. Environmental Protection Agency, EPA Docket Center, Docket ID No. EPA-HQ-OAR-2017-0357, 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 questions about this proposed action, contact Andrew Bouchard, Sector Policies and Programs Division (E-143-01), Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; telephone number: (919) 541-4036; and email address: [bouchard.andrew@epa.gov](mailto:bouchard.andrew@epa.gov). For specific information regarding the risk modeling methodology, contact Mark Morris, Health and Environmental Impacts Division (C539-02), Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; telephone number: (919) 541-5416; and email address: [morris.mark@epa.gov](mailto:morris.mark@epa.gov). For questions about monitoring

and testing requirements, contact Gerri Garwood, Sector Policies and Programs Division (D-245-05), Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; telephone number: (919) 541-2406; and email address: [garwood.gerri@epa.gov](mailto:garwood.gerri@epa.gov). For information about the applicability of the NESHAP to a particular entity, contact Marcia Mia, Office of Enforcement and Compliance Assurance (OECA), U.S. Environmental Protection Agency, WJC South Building (Mail Code 2227A), 1200 Pennsylvania Avenue NW, Washington, DC 20460; telephone number: (202) 564-7042; and email address: [mia.marcia@epa.gov](mailto:mia.marcia@epa.gov).

**SUPPLEMENTARY INFORMATION:**

*Public hearing.* Please contact Ms. Virginia Hunt at (919) 541-0832 or by email at [hunt.virginia@epa.gov](mailto:hunt.virginia@epa.gov) to request a public hearing, to register to speak at the public hearing, or to inquire as to whether a public hearing will be held.

*Docket.* The EPA has established a docket for this rulemaking under Docket ID No. EPA-HQ-OAR-2017-0357. All documents in the docket are listed in *Regulations.gov*. Although listed, 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. Publicly available docket materials are available either electronically in *Regulations.gov* or in hard copy at the EPA Docket Center, Room 3334, WJC West Building, 1301 Constitution Avenue NW, Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the EPA Docket Center is (202) 566-1742.

*Instructions.* Direct your comments to Docket ID No. EPA-HQ-OAR-2017-0357. The EPA's policy is that all comments received will be included in the public docket without change and may be made available online at <https://www.regulations.gov/>, including any personal information provided, unless the comment includes information claimed to be CBI or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through <https://www.regulations.gov/> or email. This

type of information should be submitted by mail as discussed below.

The EPA may publish any comment received to its public docket. 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). For additional submission methods, the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit <https://www.epa.gov/dockets/commenting-epa-dockets>.

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 be free of any defects or viruses. For additional information about the EPA's public docket, visit the EPA Docket Center homepage at <https://www.epa.gov/dockets>.

**Submitting CBI.** Do not submit information containing CBI to the EPA through <https://www.regulations.gov/> or email. 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, mark the outside of the digital storage media as CBI and then 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 *Instructions*

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. 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. Send or deliver information identified as CBI only to the following address: OAQPS Document Control Officer (C404-02), OAQPS, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, Attention Docket ID No. EPA-HQ-OAR-2017-0357.

**Preamble Acronyms and Abbreviations.** 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:

ACC American Chemistry Council  
 AEGL acute exposure guideline level  
 AERMOD air dispersion model used by the HEM-3 model  
 AFPM American Fuel & Petrochemical Manufacturers  
 AMEL alternative means of emission limitation  
 APCD air pollution control device  
 ATSDR Agency for Toxic Substances and Disease Registry  
 BAAQMD Bay Area Air Quality Management District  
 BACT best available control technology  
 BDL elow detection levels  
 Btu British thermal units  
 BWON benzene waste operations NESHAP  
 CAA Clean Air Act  
 CalEPA California EPA  
 CBI Confidential Business Information  
 CDX Central Data Exchange  
 CEDRI Compliance and Emissions Data Reporting Interface  
 CEMS continuous emission monitoring system(s)  
 CFR Code of Federal Regulations  
 CMS continuous monitoring systems  
 CO carbon monoxide  
 CO<sub>2</sub> carbon dioxide  
 CPMS continuous parametric monitoring system(s)  
 DLL detection level limited  
 EBU enhanced biological unit  
 ECHO enforcement and compliance history online  
 EFR external floating roof  
 EMACT ethylene production MACT  
 EPA Environmental Protection Agency  
 ERPG Emergency Response Planning Guideline  
 ERT Electronic Reporting Tool  
 FTIR Fourier transform infrared spectrometry  
 GACT generally available control technologies  
 HAP hazardous air pollutant(s)  
 HCl hydrochloric acid

HEM-3 Human Exposure Model, Version 1.1.0  
 HF hydrogen fluoride  
 HI hazard index  
 HQ hazard quotient  
 HRVOC highly reactive volatile organic compounds  
 IBR incorporation by reference  
 ICR Information Collection Request  
 IFR internal floating roof  
 IRIS Integrated Risk Information System  
 km kilometer  
 kPa kilopascals  
 LAER lowest achievable emission rate  
 LDAR leak detection and repair  
 LEL lower explosive limit  
 lpm liters per minute  
 MACT maximum achievable control technology  
 m<sup>3</sup> cubic meter  
 mg/m<sup>3</sup> milligrams per cubic meter  
 Mg/yr megagrams per year  
 MIR maximum individual risk  
 MMBtu million British thermal units  
 MON miscellaneous organic chemical manufacturing NESHAP  
 MPGF multi-point ground flare(s)  
 MTVP maximum true vapor pressure  
 NAAQS National Ambient Air Quality Standards  
 NAICS North American Industry Classification System  
 NATA National Air Toxics Assessment  
 NEI national emission inventory  
 NESHAP national emission standards for hazardous air pollutants  
 NHVcz net heating value in the combustion zone gas  
 NHVdil net heating value dilution parameter  
 NHVvg net heating value in the vent gas  
 NOCS notification of compliance status  
 NPDES National Pollutant Discharge Elimination System  
 NRDC Natural Resources Defense Council  
 NSPS new source performance standards  
 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  
 OSHA Occupational Safety and Health Administration  
 PAH polycyclic aromatic hydrocarbons  
 PB-HAP hazardous air pollutants known to be persistent and bio-accumulative in the environment  
 PDF portable document format  
 PM particulate matter  
 PM<sub>2.5</sub> particulate matter less than 2.5 microns in diameter  
 POM polycyclic organic matter  
 ppm parts per million  
 ppmv parts per million by volume  
 ppmvd parts per million by volume, dry basis  
 ppmw parts per million by weight  
 PRA Paperwork Reduction Act  
 PRD pressure relief device(s)  
 psig pounds per square inch gauge  
 RACT reasonably available control technology  
 RATA relative accuracy test audit  
 REL reference exposure level

RFA Regulatory Flexibility Act  
 RfC reference concentration  
 RfD reference dose  
 RTR residual risk and technology review  
 SAB Science Advisory Board  
 SCAQMD South Coast Air Quality Management District  
 SCC source classification code  
 SOCM I synthetic organic chemical manufacturing industry  
 SSM startup, shutdown, and malfunction  
 TAB total annual benzene  
 TAC Texas Administrative Code  
 TCEQ Texas Commission on Environmental Quality  
 TOSHI target organ-specific hazard index  
 tpy tons per year  
 TRIM.FaTE Total Risk Integrated Methodology.Fate, Transport, and Ecological Exposure model  
 TSM total selected metals  
 UF uncertainty factor  
 µg/m<sup>3</sup> microgram per cubic meter  
 UMRA Unfunded Mandates Reform Act  
 URE unit risk estimate  
 VCS voluntary consensus standards  
 VOC volatile organic compound(s)

*Organization of this document.* The information in this preamble is organized as follows below. In particular, section IV of this preamble describes the majority of the agency's rationale for the proposed actions in this preamble. Section IV.A specifies proposed monitoring and operational requirements for flares in the ethylene production source category to ensure that the level of control from the original MACT standards is achieved by these air pollution control devices (APCD). To ensure that CAA section 112 standards continuously apply (*Sierra Club v. EPA, 551 F.3d 1019* (D.C. Cir. 2008)), section IV.A also proposes work practice standards for periods of SSM for when flares are used as an APCD, proposes work practice standards for periods of SSM for certain vent streams (*i.e.* PRD releases and maintenance vents), proposes clarifications for vent control bypasses for certain vent streams (*i.e.*, closed vent systems containing bypass lines, in situ sampling systems, and flares connected to fuel gas systems), and proposes work practice standards for decoking operations for ethylene cracking furnaces (which is currently defined as a shutdown activity in the Ethylene Production NESHAP).

Section IV.B of this preamble summarizes the results of the risk assessment while section IV.C of this preamble summarizes our proposed decisions regarding the results of the risk assessment. Section IV.D of this preamble summarizes the results of our technology review, and proposes revisions for storage vessels and heat exchange systems. Section IV.E of this preamble summarizes other changes we are proposing, including general

regulatory language changes related to the removal of SSM exemptions, electronic reporting, and other minor clarifications identified as part our review of the NESHAP and as part of the other proposed revisions in this action. Lastly, section IV.F of this preamble summarizes our rationale for the compliance dates we are proposing.

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## I. General Information

### A. Does this action apply to me?

Table 1 of this preamble lists the NESHAP and associated regulated industrial source category that is 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, once promulgated, will be directly applicable to the affected sources. Federal, state, local, and tribal government entities would not be affected by this proposed action. As defined in the *National Emission Standards for Hazardous Air Pollutants; Revision of Initial List of Categories of Sources and Schedule for Standards Under Sections 112(c) and (e) of the Clean Air Act Amendments of 1990* (61 FR 28197, June 4, 1996), the Ethylene Production source category includes any chemical manufacturing process unit in which ethylene and/or propylene are produced by separation from petroleum refining process streams or by subjecting hydrocarbons to high temperatures in the presence of steam.<sup>1</sup> The ethylene production unit includes the separation of ethylene and/or propylene from associated streams such as a C4 product,<sup>2</sup> pyrolysis gasoline, and pyrolysis fuel oil. The ethylene production unit does not include the manufacture of Synthetic Organic Chemical Manufacturing Industry (SOCMI) chemicals such as the production of butadiene from the C4 stream and aromatics from pyrolysis gasoline.

<sup>1</sup> In the June 4, 1996, document that revised the Initial List of Source Categories, the EPA added seven categories of major sources that included a source category listed as "Ethylene Processes," (61 FR 28197); however, subsequent regulatory actions taken by the EPA, including the initial NESHAP development (*e.g.*, 65 FR 76408, December 6, 2000) and current regulatory text at 40 CFR part 63, subpart YY refer to the source category as "Ethylene Production."

<sup>2</sup> The C4 product stream is a hydrocarbon product stream from an ethylene production unit consisting of compounds with four carbon atoms (*e.g.*, butanes, butenes, butadienes).

TABLE 1—NESHAP AND INDUSTRIAL SOURCE CATEGORIES AFFECTED BY THIS PROPOSED ACTION

Source category	NESHAP	NAICS code <sup>1</sup>
Ethylene Production .....	Generic Maximum Achievable Control Technology Standards	325110

<sup>1</sup> 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. Following signature by the EPA Administrator, the EPA will post a copy of this proposed action at <https://www.epa.gov/stationary-sources-air-pollution/acetal-resins-acrylic-modacrylic-fibers-carbon-black-hydrogen>. Following publication in the **Federal Register**, the EPA will post the **Federal Register** version of the proposal and key technical documents at this same website. Information on the overall RTR program is available at <https://www3.epa.gov/ttn/atw/rrisk/trtpg.html>.

A redline version of the regulatory language that incorporates the proposed changes in this action is available in the docket for this action (Docket ID No. EPA-HQ-OAR-2017-0357).

## II. Background

*A. What is the statutory authority for this action?*

The statutory authority for this action is provided by sections 112 and 301 of the Clean Air Act (CAA), as amended (42 U.S.C. 7401 *et seq.*). Section 112 of the CAA establishes a two-stage regulatory process to develop standards for emissions of HAP from stationary sources. Generally, the first stage involves establishing technology-based standards and the second stage involves evaluating those standards that are based on maximum achievable control technology (MACT) to determine whether additional standards are needed to address any remaining risk associated with HAP emissions. This second stage is commonly referred to as the “residual risk review.” In addition to the residual risk review, the CAA also requires the EPA to review standards set under CAA section 112 every 8 years to determine if there are “developments in practices, processes, or control technologies” that may be appropriate to incorporate into the standards. 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.” The discussion that follows identifies the most relevant statutory sections and

briefly explains the contours of the methodology used to implement these statutory requirements. A more comprehensive discussion appears in the document titled *CAA Section 112 Risk and Technology Reviews: Statutory Authority and Methodology*, in the docket for this rulemaking.

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 source standards and area source standards. “Major sources” are those that emit or have the potential to emit 10 tpy or more of a single HAP or 25 tpy or more of any combination of HAP. All other sources are “area sources.” 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.” The EPA must also consider control options that are more stringent than the floor. Standards more stringent than the floor are commonly referred to as beyond-the-floor standards. In certain instances, as provided in CAA section 112(h), the EPA may set work practice standards where it is not feasible to prescribe or enforce a numerical emission standard. For area sources, CAA section 112(d)(5) gives the EPA discretion to set standards based on generally available control technologies or management practices (GACT standards) in lieu of MACT standards.

The second stage in standard-setting focuses on identifying and addressing any remaining (*i.e.*, “residual”) risk according to CAA section 112(f). For source categories subject to MACT standards, section 112(f)(2) of the CAA requires the EPA to determine 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. Section 112(d)(5) of the CAA provides that this residual risk review is not required for categories of area sources subject to GACT standards. Section 112(f)(2)(B) of the CAA further 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) (54 FR 38044, September 14, 1989). The EPA notified Congress in the 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 (the Court) 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 to develop standards under CAA section 112(f)(2) is 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)<sup>3</sup> of approximately 1 in 10 thousand.” 54 FR 38045, September 14, 1989. If risks are unacceptable, the EPA must determine the emissions standards necessary to reduce risk to an acceptable level without considering costs. In the second step of the approach, the EPA considers whether the emissions standards provide an ample margin of safety to protect public health “in consideration

<sup>3</sup> 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.

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.” *Id.* 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, the EPA considers 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 8 years. In conducting this review, which we call the “technology review,” the EPA is not required to recalculate the MACT floor. *Natural Resources Defense Council (NRDC) v. EPA*, 529 F.3d 1077, 1084 (D.C. Cir. 2008). *Association of Battery Recyclers, Inc. v. EPA*, 716 F.3d 667 (D.C. Cir. 2013). The EPA may consider cost in deciding whether to revise the standards pursuant to CAA section 112(d)(6).

*B. What is this source category and how does the current NESHAP regulate its HAP emissions?*

The Ethylene Production MACT standards (herein called the EMACT standards) for the Ethylene Production source category are contained in the Generic Maximum Achievable Control Technology (GMACT) NESHAP which also includes MACT standards for several other source categories. The EMACT standards were promulgated on July 12, 2002 (67 FR 46258) and codified at 40 CFR part 63, subparts XX and YY. As promulgated in 2002, and further amended on April 13, 2005 (70 FR 19266), the EMACT standards regulate HAP emissions from ethylene production units located at major sources. An ethylene production unit is a chemical manufacturing process unit in which ethylene and/or propylene are produced by separation from petroleum refining process streams or by subjecting hydrocarbons to high temperatures in the presence of steam. The EMACT defines the affected source as all storage vessels, ethylene process vents, transfer racks, equipment, waste streams, heat exchange systems, and ethylene

cracking furnaces and associated decoking operations that are associated with each ethylene production unit located at a major source as defined in CAA section 112(a).

As of January 1, 2017, there were 26 ethylene production facilities in operation and subject to the EMACT standards. This is based on our search of the National Emission Inventory (NEI) and the EPA’s Enforcement and Compliance History Online (ECHO) database ([www.echo.epa.gov](http://www.echo.epa.gov)), and facility responses to our CAA section 114 request (see section II.C of this preamble for details about our CAA section 114 request). We are also aware of the expansion and construction of several facilities. Based upon this anticipated growth for the Ethylene Production source category, we estimate that a total of 31 ethylene production facilities will ultimately be subject to the EMACT standards. A complete list of facilities that are currently subject, or will be subject, to the EMACT standards is available in Appendix A of the memorandum titled *Review of the RACT/BACT/LAER Clearinghouse Database for the Ethylene Production Source Category*, which is available in Docket ID No. EPA-HQ-OAR-2017-0357.

*C. What data collection activities were conducted to support this action?*

In July 2014, the EPA issued a request, pursuant to CAA section 114, to collect information from ethylene production facilities owned and operated by nine entities (*i.e.*, corporations). This effort focused on gathering comprehensive information about process equipment, control technologies, point and fugitive emissions, and other aspects of facility operations. Companies completed the survey and submitted responses (and follow-up responses) to the EPA between October 2014 and September 2015. Additionally, in April 2016, the EPA requested historical monitoring and compliance data for heat exchange systems and ethylene cracking furnaces, emissions source sampling for certain pollutants for heat exchange systems, and stack testing for certain pollutants for ethylene cracking furnaces under both normal operation as well as during decoking operations. The results of these requests were submitted to the EPA between the fall of 2016 and spring of 2017. The EPA has used the collected information to fill data gaps, establish the baseline emissions and control levels for purposes of the regulatory reviews, to identify the most effective control measures, and estimate the environmental and cost impacts

associated with the regulatory options considered and reflected in this proposed action. The information not claimed as CBI by respondents is available in the memorandum titled *Data Received From Information Collection Request for the Ethylene Production Source Category*, in Docket ID No. EPA-HQ-OAR-2017-0357.

*D. What other relevant background information and data are available?*

We are relying on certain technical reports and memoranda that the EPA developed for flares used as APCDs in the petroleum refinery sector and new source performance standards (NSPS) (80 FR 75178, December 1, 2015). For completeness of the rulemaking record for this action and for ease of reference in finding these items in the publicly available Refinery rulemaking Docket, we are including in the docket for this rulemaking (Docket ID No. EPA-HQ-OAR-2017-0357) a list of specific technical support documents in Table 1 of the memorandum titled *Control Option Impacts for Flares Located in the Ethylene Production Source Category*. The Petroleum Refinery sector and NSPS rulemaking Docket is located at Docket ID No. EPA-HQ-OAR-2010-0682.

In addition, the EPA is incorporating into the docket for this rulemaking, materials associated with a number of site-specific alternative means of emission limitation (AMEL) requests for facilities electing to use multi-point ground flares (MPGFs) as an APCD. These site-specific AMEL requests for MPGFs have been approved by the EPA because the MPGF can achieve at least equivalent reductions in emissions as the underlying flare operational standards in various NESHAP and/or NSPS. The EPA receives these AMEL requests because MPGF are designed to operate above the current maximum permitted velocity requirements for flares in the General Provisions at 40 CFR 63.11(b). Given that the EPA has provided notice and sought comments on certain specific AMEL requests, the underlying AMEL requests submitted by industry, MPGF test data, technical memorandums, **Federal Register** documents<sup>4</sup> and other supporting and related material that formed the basis of the AMEL requests and approved alternative operating conditions have been placed in a publicly available docket at Docket ID No. EPA-HQ-OAR-2014-0738. We consider all items in

<sup>4</sup> 80 FR 8023, February 13, 2015; 80 FR 52426, August 31, 2015; 81 FR 23480, April 21, 2016; 82 FR 16392, April 4, 2017; 82 FR 27822, June 19, 2017; and 83 FR 18034, April 25, 2018.

Docket ID No. EPA-HQ-OAR-2014-0738 part of our rulemaking record as well, given that this docket is specific to MPGF AMEL requests. We are, therefore, incorporating this docket by reference in this rule.

Lastly, the EPA is incorporating into the docket for this rulemaking, all materials associated with the development of the current GMACT and EMACT standards from Docket ID No. A-97-17, Docket ID No. A-98-22, and Docket ID No. OAR-2204-0411. Publicly available docket materials are available either electronically at <https://www.regulations.gov/>, or in hard copy at the EPA Docket Center, EPA WJC West Building, Room 3334, 1301 Constitution Ave. NW, Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the EPA Docket Center is (202) 566-1742.

### 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 NESHAP, 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 NESHAP, “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.” 54 FR 38046, September 14, 1989. 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. 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 NESHAP approach provides flexibility regarding factors the EPA may consider in making determinations and how the EPA may weigh those factors for each source

category. The EPA conducts a risk assessment that provides estimates of the MIR posed by the HAP emissions 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.<sup>5</sup> 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 EPA’s response to comments on our policy under the Benzene NESHAP where the EPA explained that:

“[t]he 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 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.’”

See 54 FR 38057, September 14, 1989. Thus, the level of the MIR is only one factor to be weighed in determining acceptability of risk. The Benzene NESHAP explained that “an 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.” *Id.* at 38045.

<sup>5</sup> 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 exposure to the HAP to the level at or below which no adverse chronic noncancer effects are expected; the HI is the sum of HQs for HAP that affect the same target organ or organ system.

Similarly, with regard to the ample margin of safety analysis, the EPA stated in the Benzene NESHAP 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.” *Id.* at 38061. We also consider the uncertainties associated with the various risk analyses, as discussed earlier in this preamble, in our determinations of acceptability and ample margin of safety.

The EPA notes that it has not considered certain health information to date in making residual risk determinations. At this time, 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 concentrations and contributions from other sources in the area.”<sup>6</sup>

<sup>6</sup> Recommendations of the SAB Risk and Technology Review (RTR) Methods Panel are provided in their report, which is available at:

In response to the SAB recommendations, the EPA incorporates cumulative risk analyses into its RTR risk assessments, including those reflected in this proposal. 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 are concerned about the 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 significantly greater associated uncertainties than the source category or facility-wide estimates. Such aggregate or cumulative assessments would compound those uncertainties, making the assessments too unreliable.

#### *B. How do we perform the technology review?*

Our technology review 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 applying each development. This analysis informs our decision of whether it is “necessary” to revise the emissions 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”:

- 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 (or last updated) the NESHAP, we review a variety of data sources in our investigation of potential practices, processes, or controls to consider. 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, we provide a complete 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 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. The seven

sections that follow this paragraph describe how we estimated emissions and conducted the risk assessment. The docket for this rulemaking contains the following document, which provides more information on the risk assessment inputs and models: *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*. The methods used to assess risk (as described in the seven 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;<sup>7</sup> and described in the SAB review report issued in 2010. 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?

For each facility that we determined to be subject to the EMAX standards (see section II.B of this preamble), we gathered emissions data from Version 1 of the 2011 NEI. For each NEI record, we reviewed the source classification code (SCC), emission unit, and process descriptions, and then assigned the record to an emission source type (*i.e.*, each record was labeled storage vessel, process vent, transfer rack, equipment leak, waste, heat exchange system, cracking furnace, decoking pot, PRD, other ethylene source type, or non-ethylene source type).

In May 2014, the EPA provided member companies of the American Chemistry Council (ACC) and the American Fuel & Petrochemical Manufacturers (AFPM) an opportunity to voluntarily review their NEI records for completeness and accuracy, given that these records would form the underlying basis of our emissions modeling input files for the residual risk review. The NEI records were sent in separate Microsoft® Excel worksheet(s) via email to each company that operates at least one facility in the Ethylene Production source category. Each company was afforded an opportunity to review (and revise, if necessary) emission values, emission release point parameters, coordinates, and emission source type assignments. All revisions and changes from these voluntary reviews were received between June

<sup>7</sup> U.S. EPA. *Risk and Technology Review (RTR) Risk Assessment Methodologies: For Review by the EPA’s Science Advisory Board with Case Studies—MACT I Petroleum Refining Sources and Portland Cement Manufacturing*, June 2009. EPA–452/R–09–006. <https://www3.epa.gov/airtoxics/rtr/rtrpg.html>.



2014 through October 2014, and then incorporated into the modeling file.

Also, as part of the mandatory July 2014 CAA section 114 request (see section II.C of this preamble for details about our CAA section 114 request), the EPA asked companies to provide emission release point parameters and coordinates, for all emission release points associated with ethylene production if this information had not been previously submitted as part of their voluntary review. In response to these requests, companies also submitted process flow diagrams illustrating the connectivity between each process and the emission release points. We used all this information to reevaluate each NEI record in the modeling file and to update emission release point parameter data. In other words, we used the CAA section 114 response data wherever possible in lieu of the 2011 NEI and/or voluntary review data.

Finally, we reviewed each of the emission source types to incorporate recent data and to ensure the data were complete and representative. For instance, for the modeling file, we replaced the 2011 NEI ethylene cracking furnace and decoking operation emissions data with the ethylene cracking furnace and decoking operation stack test data that we received from the CAA section 114 responses because we generally consider stack test data to be much more representative of emissions from these operations than emission estimates made in the absence of this data. For each of the other emission source types associated with an ethylene production unit (*i.e.*, storage vessels, ethylene process vents, transfer racks, equipment leaks, waste streams, and heat exchange systems), we compared emissions between all facilities, and, based on this comparison, we observed some inconsistencies with the reported emissions between the different emission sources. For example, certain facilities did not report emissions for an emission source type while others did so. Therefore, we focused on the following two criteria to determine whether facility emissions were both complete and representative: (1) A facility should have emissions for all emission source types (provided that the emission source type exists at the facility), and (2) a facility should have emissions for all emission source types above source-specific emission thresholds. If either of those criteria were not met for an emission source type at a facility, then we applied a model emissions profile to update the modeling file. These model emissions

profiles, in concert with the stack test data received from the CAA section 114 responses, were also used to develop model plants for the new ethylene production facilities currently under construction and for recent major expansions at existing facilities for which annual emissions data were not available to the Agency. For further details on the assumptions and methodologies used to estimate actual emissions, identify the emissions release characteristics, develop model emissions profiles, and develop model plants, see Appendix 1 of the document titled *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*, which is available in the docket for this rulemaking. We solicit comment on additional information for the Ethylene Production source category that the EPA could consider to estimate actual emissions.

## 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 19998–19999, April 15, 2005) and in the proposed and final Hazardous Organic NESHAP RTR (71 FR 34428, June 14, 2006, and 71 FR 76609, December 21, 2006, respectively). 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 national emission standards. 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, September 14, 1989.)

Apart from emissions from heat exchange systems and PRD releases, we have determined that the actual emissions data are reasonable estimates of the MACT-allowable emissions levels for the Ethylene Production source category. For heat exchange systems, the MACT-allowable emissions were assessed using a HAP speciation profile at the annualized mass leak rate of 29.5 tpy allowed by the underlying MACT

standard at 40 CFR part 63, subpart XX. For atmospheric PRD releases, the MACT-allowable emissions were assessed using a single atmospheric PRD release identified from a review of excess emissions reported over a 7.5-year period for approximately 30 percent of the facilities in the source category.

The ability to estimate MACT-allowable emissions from the actual emissions dataset is largely dependent on the format of the standard for a given emissions source as well as the types of controls employed for the source. With respect to the various types of controls used within the Ethylene Production source category, the most prevalent is the use of a flare as a combustion control device. A flare can be used to control emissions for a single emissions source, or, as is generally the case, to control emissions from multiple emission sources/emission source types.

Flares are designed to handle a large range of variable flowrates and compositions of combustible waste gases. Within the Ethylene Production source category, flares generally control emissions from multiple emission source types. Consideration of this, along with not having a specific limit on how much gas can be combusted in a flare (given that in many cases multiple emissions sources are being controlled by this control device), means that it is extremely difficult to determine an allowable emission rate for flares. For purposes of this RTR, we have determined that flares in the Ethylene Production source category are currently complying with certain design and operational requirements that are generally expected to achieve 98-percent destruction efficiencies or control. HAP emissions inventories for flares in the Ethylene Production source category are developed using engineering knowledge and, in many instances, presume this 98-percent level of control. The Agency is unaware of any data that suggest that flares used as controls in the Ethylene Production source category are consistently overcontrolling HAP emissions beyond 98-percent control. And, while the Agency is proposing new operating requirements for flares used as controls in this source category to ensure at least 98-percent control given that more recent studies have shown that some flares are operating less efficiently than 98-percent control (see section IV.A.1 of this preamble), for purposes of the MACT-allowable risk analysis, we are required to evaluate whether it is necessary to tighten the existing MACT standard and subsequent level of performance a flare is expected to



achieve. Thus, weighing all of these factors for flares, we believe that the actual emission levels are a reasonable estimation of the MACT-allowable emissions levels where the performance standards allow the use of a flare as an APCD (e.g., storage vessels, ethylene process vents, equipment leaks, transfer racks, and waste operations).

For equipment leaks, which are currently subject to work practice standards, there would be no difference between actual and MACT-allowable emissions for facilities in the Ethylene Production source category, provided the facilities are complying with the EACT standards as well as not conducting additional work practices proven to reduce emissions beyond those required by the rule. We are aware of only one rule in the State of Texas, which is the Texas Commission of Environmental Quality (TCEQ) Highly Reactive Volatile Organic Compounds (HRVOC) Rule (i.e., 30 TAC Chapter 115, Subchapter H, Division 3), that may contain more stringent leak definitions and/or monitoring frequencies for certain pieces of equipment for the eight facilities located in Texas that might be subject to this rule. However, we note based on our review of the Texas rule that specific facilities, which are located in the Houston-Galveston-Brazoria area, still conduct a leak detection and repair (LDAR) program using EPA Method 21; that the vast majority of equipment (i.e., more than 95 percent of all equipment surveyed in the CAA section 114 request), including almost all pieces of equipment in gas and vapor service that would tend to highly contribute to the overall equipment leak air emissions, are complying with the same leak definition as in the EACT standards; and that the TCEQ HRVOC Rule generally requires quarterly monitoring while the EACT standards have varying degrees of monitoring frequencies depending on the percentage of leaking equipment that could lead to more stringent, the same, or less stringent frequencies that would require an EPA Method 21 measurement and repair of a leaking component (if measured). Therefore, weighing all of these factors for equipment leaks, we determined that the actual emission levels for equipment leaks are a reasonable estimation of the MACT-allowable emissions levels.

For waste operations, the EACT standards include various work practice standards for the collection system of waste streams as well as a performance standard for the treatment of these waste streams. Assuming that the equipment in the collection system is maintained properly and is in good working

condition (as required), and that no facilities are employing additional work practices proven to reduce emissions beyond those required in the rule (we are unaware of any that are doing additional work practices), there would be no difference in the actual emissions level and the level allowed by the work practice standards for the collection of waste streams. In general, for this performance standard, it is possible that sources could over-control emission sources resulting in the actual emissions being lower than the MACT-allowable emissions. However, for waste operations, we are not aware of any such over-control. Therefore, we believe that the actual waste operations emission levels are a reasonable estimation of the MACT-allowable emissions levels.

For heat exchange systems, the EACT standards include a LDAR work practice where facilities are required to monitor for potential leaks of HAP from process fluids into the cooling water of a heat exchange system. Emissions of HAP from heat exchange systems result when leakage of HAP from process fluids into the cooling water occurs and then that cooling water is exposed to air (e.g., in a cooling tower for a closed-loop system or from trenches/ponds in a once-through system). If a leak is detected, it is only required to be repaired in a heat exchange system if the exit mean concentration is at least 10 percent greater than the entrance mean of the listed HAP (total or speciated) in Table 1 to subpart XX of 40 CFR part 63 (using a one-sided statistical procedure at the 0.05 level of significance) and if it is at least 3.06 kilograms per hour (kg/hr). Therefore, for example, a leak of 3.05 kg/hr or less of any HAP (total or speciated) that is listed in Table 1 to subpart XX of 40 CFR part 63 need not be repaired. If we assume that all the HAP at a 3.05 kg/hr leak rate would be emitted to the atmosphere after the process fluids leak into cooling water and then that cooling water is exposed to atmosphere, we would be left with an annual MACT-allowable emissions level for heat exchange systems of 29.5 tpy (i.e., 3.05 kg/hr  $\times$  0.00110231 tons/kg  $\times$  8,760 hours per year (hr/yr)) of HAP (total or speciated) listed in Table 1 to subpart XX of 40 CFR part 63. In order to determine a reasonable HAP speciation profile to assess the MACT-allowable risk at the 29.5 tpy mass emission rate, we reviewed historical heat exchange system compliance data gathered under our CAA section 114 request. Given that 40 CFR part 63, subpart XX requires a monitoring sensitivity that would

enable detection of a leak of 3.06 kg/hr or greater of the HAP listed in Table 1 to subpart XX of 40 CFR part 63, we focused our analysis on determining a reasonable HAP speciation profile based on historical leaks at or above 3.06 kg/hr. This was done for the purposes of removing records in the dataset that have a higher level of uncertainty surrounding them (given the monitoring sensitivity requirement in the rule), as well as to remove the uncertainty in biased data where any reported historical smaller leaks may have been predominately driven by data that were reported at the detection level but were not actually measured. Thus, upon reviewing the historical heat exchange system compliance data, we found records of 10 speciated HAP leaks above 3.06 kg/hr that we averaged for purposes of forming the basis of our HAP speciation profile for the MACT-allowable emission level for heat exchange systems. The HAP speciation profile analysis is available in Appendix 1 of the document titled *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*, which is available in the docket for this rulemaking.

For ethylene cracking furnaces and associated decoking operations, based on new information obtained through our CAA section 114 request, we have determined that HAP are being emitted from these source types and their actual emissions, which were measured from various ethylene cracking furnaces and associated decoking operations during the stack testing conducted pursuant to the CAA section 114 request, are allowed by the rule. As such, we determined that the actual emissions are equal to MACT-allowable emissions for these operations.

Finally, in order to estimate the risk impacts of emissions from a PRD release, we reviewed TCEQ's Air Emission Event Report Database (<http://www2.tceq.texas.gov/oce/eer/>) over a 7.5-year period (i.e., January 1, 2010, to July 7, 2017) for roughly 30 percent of all operating ethylene production facilities (i.e., seven of 26 ethylene production facilities) in the source category that were chosen at random and that have been in operation since January 1, 2010. Accordingly, we believe these randomly selected facilities are a good representation of all ethylene production facilities in the source category. After reviewing TCEQ's database for reportable air emissions events for these seven facilities over a 7.5-year period, we determined that there were four reported emissions events that occurred from atmospheric

PRDs (e.g., events where a PRD did not release emissions to an APCD like a flare) on equipment in the Ethylene Production source category. A closer inspection of these records, however, reveals that only one of these events was actually an atmospheric PRD release on a properly operating PRD. Therefore, for MACT-allowable emissions for PRD releases, and in keeping with our conservative approach, we assumed that each facility would have this reported release of HAP (i.e., 46.8 pounds (lbs) of 1,3-butadiene) occur once in a 7.5-year period (given that this is the duration of the data we reviewed) and modeled an annualized PRD release of HAP of 0.003 tpy of 1,3-butadiene from the centroid of each ethylene production facility.

For further details on the assumptions and methodologies used to estimate MACT-allowable emissions, see Appendix 1 of the document titled *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*, which is available in the docket for this rulemaking.

3. How do we conduct dispersion modeling, determine inhalation exposures, and estimate individual and population inhalation risks?

Both long-term 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-3).<sup>8</sup> The HEM-3 performs three primary risk assessment activities: (1) Conducting dispersion modeling to estimate the concentrations of HAP in ambient air, (2) estimating long-term 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, used by the HEM-3 model, is one of the EPA's preferred models for assessing HAP concentrations from industrial facilities.<sup>9</sup> To perform the dispersion modeling and to develop the preliminary risk estimates, HEM-3 draws on three data libraries. The first

<sup>8</sup> For more information about HEM-3, go to <https://www.epa.gov/fera/risk-assessment-and-modeling-human-exposure-model-hem>.

<sup>9</sup> 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, November 9, 2005).

is a library of meteorological data, which is used for dispersion calculations. This library includes 1 year (2017) of hourly surface and upper air observations from 824 meteorological stations, selected to provide coverage of the United States and Puerto Rico. A second library of United States Census Bureau census block<sup>10</sup> internal point locations and populations provides the basis of human exposure calculations (U.S. Census, 2010). 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, September 14, 1989) and the limitations of Gaussian dispersion models, including AERMOD.

For each facility, we calculate the MIR as the cancer risk associated with a continuous lifetime (24 hours per day, 7 days per week, 52 weeks per year, 70 years) exposure to the maximum concentration at the centroid of each inhabited census block. 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 microgram of the pollutant per cubic meter of air. For residual risk assessments, we generally use UREs from the EPA's Integrated Risk Information System (IRIS). 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

<sup>10</sup> A census block is the smallest geographic area for which census statistics are tabulated.

a manner consistent with the 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 HAP<sup>11</sup> 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

<sup>11</sup> EPA's 2005 *Guidelines for Carcinogen Risk Assessment* classifies carcinogens as: "carcinogenic to humans," "likely to be carcinogenic to humans," and "suggestive evidence of carcinogenic potential." These classifications also coincide with the terms "known carcinogen, probable carcinogen, and possible carcinogen," respectively, which are the terms advocated in EPA's *Guidelines for Carcinogen Risk Assessment*, published in 1986 (51 FR 33992, September 24, 1986). In August 2000, the document, *Supplemental Guidance for Conducting Health Risk Assessment of Chemical Mixtures* (EPA/630/R-00/002), was published 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://yosemite.epa.gov/sab/sabproduct.nsf/214C6E915BB04E14852570CA007A682C/\\$File/ecadv02001.pdf](https://yosemite.epa.gov/sab/sabproduct.nsf/214C6E915BB04E14852570CA007A682C/$File/ecadv02001.pdf).

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” ([https://iaspub.epa.gov/sor\\_internet/registry/termreg/searchandretrieve/glossariesandkeywordlists/search.do?details=&vocabName=IRIS%20Glossary](https://iaspub.epa.gov/sor_internet/registry/termreg/searchandretrieve/glossariesandkeywordlists/search.do?details=&vocabName=IRIS%20Glossary)). 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/mrls/index.asp>); (2) the CalEPA Chronic Reference Exposure Level (REL) (<https://oehha.ca.gov/air/crn/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0>); or (3) as noted above, a scientifically credible dose-response value that has been developed in a manner consistent with the 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 conservative assumptions about emission rates, meteorology, and exposure location. In this proposed rulemaking, 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,<sup>12</sup> we are revising 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 Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule* and in Appendix 5 of the report: *Technical Support Document for Acute Risk Screening Assessment*. We will be applying this revision in RTR rulemakings proposed on or after June 3, 2019.

To assess the potential acute risk to the maximally exposed individual, we use the peak hourly emission rate for each emission point, reasonable worst-case air dispersion conditions, and the point of highest off-site exposure. Specifically, we assume that peak emissions from the source category and reasonable worst-case air dispersion conditions (*i.e.*, 99th percentile) 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 (AEGs), 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 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.”<sup>13</sup> 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. AEGs represent

threshold exposure limits for the general public and are applicable to emergency exposures ranging from 10 minutes to 8 hours.<sup>14</sup> They are guideline levels for “once-in-a-lifetime, short-term exposures to airborne concentrations of acutely toxic, high-priority chemicals.” *Id.* at 21. The AEG-1 is specifically defined as “the airborne concentration (expressed as ppm (parts per million) or mg/m<sup>3</sup> (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 AEG-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.” *Id.* AEG-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.” *Id.*

ERPGs are “developed for emergency planning and are intended as health-based guideline concentrations for single exposures to chemicals.”<sup>15</sup> *Id.* at 1. The ERPG-1 is defined as “the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects or without perceiving a clearly defined, objectionable odor.” *Id.* at 2. Similarly, the ERPG-2 is defined as “the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to

<sup>14</sup> National Academy of Sciences, 2001. *Standing Operating Procedures for Developing Acute Exposure Levels for Hazardous Chemicals*, page 2. Available at [https://www.epa.gov/sites/production/files/2015-09/documents/sop\\_final\\_standing\\_operating\\_procedures\\_2001.pdf](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 AEG program continues to operate at the EPA and works with the National Academies to publish final AEGs (<https://www.epa.gov/aegl>).

<sup>15</sup> *ERPGs Procedures and Responsibilities*. March 2014. American Industrial Hygiene Association. Available at: <https://www.aiha.org/get-involved/AIHAGuidelineFoundation/emergencyResponsePlanningGuidelines/Documents/ERPG%20Committee%20Standard%20Operating%20Procedures%20%20-%20March%202014%20Revision%20%28Updated%2010-2-2014%29.pdf>.

<sup>12</sup> See, e.g., U.S. EPA. *Screening Methodologies to Support Risk and Technology Reviews (RTR): A Case Study Analysis* (Draft Report, May 2017. <https://www3.epa.gov/ttn/atw/rrisk/rtrpg.html>).

<sup>13</sup> 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>.

1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action." *Id.* at 1.

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).

For the acute inhalation risk assessment of the Ethylene Production source category, we did not use the default acute emissions multiplier of 10, but rather factors of 2, 4, 5, and 10, depending on the emission process group. In general, hourly emissions estimates were based on peak-to-mean ratios for 37 emission process groups ranging from a factor of 2 to 10, with emissions from transfer racks and other emission process groups where sufficient information did not exist to adequately assess peak hourly emissions (e.g., flares controlling various unknown emissions sources) having the highest hourly peak emissions at a factor of 10 times the annual average. A further discussion of why these factors were chosen can be found in Appendix 1 of the document titled *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*, which is available in the docket for this rulemaking.

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 (even under the conservative assumptions of the screening assessment), and no further analysis is performed for these HAP. In cases where an acute HQ from the screening step is greater than 1, we consider additional site-specific data to develop a more refined estimate of the potential for acute exposures of concern. For this source category, the data refinements employed consisted of determining the highest HQ value that might occur outside facility boundaries. These refinements are discussed more fully in the document titled *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*, which is available in the docket for this rulemaking.

4. How do we conduct the multipathway exposure and risk screening assessment?

The EPA conducted 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 determined whether any sources in the source category emit any HAP known to be persistent and bioaccumulative in the environment (PB-HAP), as identified in the EPA's Air Toxics Risk Assessment Library (See Volume 1, Appendix D, at <http://www.epa.gov/fera/risk-assessment-and-modeling-air-toxics-risk-assessment-reference-library>).

For the Ethylene Production source category, we identified PB-HAP emissions of arsenic compounds, cadmium compounds, lead compounds, mercury compounds, and polycyclic organic matter (POM) (of which polycyclic aromatic hydrocarbons (PAH) is a subset), so we proceeded to the next step of the evaluation. With the exception of lead, the human health risk screening assessment for PB-HAP consists of three tiers. We call this first evaluation the Tier 1 screening assessment. In a Tier 1 screening assessment, we determine whether the facility-specific emission rates of PB-HAP are large enough to warrant further evaluation of the human health risk through ingestion exposure under reasonable worst-case conditions. To facilitate this step, we used 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 arsenic compounds, cadmium compounds, chlorinated dibenzodioxins and furans, mercury compounds, and POM. Based on the EPA estimates of toxicity and bioaccumulation potential, the pollutants above represent a conservative list for inclusion in multipathway risk assessments for RTR rules. (See Volume 1, Appendix D at [https://www.epa.gov/sites/production/files/201308/documents/volume\\_1\\_reflibrary.pdf](https://www.epa.gov/sites/production/files/201308/documents/volume_1_reflibrary.pdf).) In this assessment, we compare the facility-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 lead compounds) to correspond to a maximum excess lifetime cancer risk of 1-in-1 million (i.e., for arsenic compounds, polychlorinated dibenzodioxins and furans, and POM) or, for HAP that cause noncancer health effects (i.e., cadmium compounds and mercury compounds), a maximum HQ of 1. 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 (ingestion rates are decoupled into separate upper-bound ingestion rates for the fisher, farmer, and gardener scenarios).

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/farmer scenario. 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. For the Tier 2 farmer scenario, we assume the farmer consumes meat, eggs, vegetables, and fruit grown near the facility. If further Tier 2 screening is necessary for the farmer scenario, we may apply the gardener scenario. For the gardener scenario, we assume the gardener only grows and consumes eggs, vegetables, and fruit products at the same ingestion rate as the farmer. If PB-HAP emission rates do not exceed a Tier 2 screening value of 1, we consider those PB-HAP emissions to pose risks below a level of concern.

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 USGS waterbody data. If the PB-HAP emission rates for a facility exceed the Tier 2 screening threshold emission rates and sufficient data are available, we may conduct a Tier 3 screening assessment. If PB-HAP emission rates do not exceed

a Tier 2 screening value of 1, we consider those PB–HAP emissions to pose risks below a level of concern. If, based on additional analysis and review, it is determined that no subsistence farming operations are in the area, then the farmer scenario is not used in Tier 3 and only gardener screening values are reported. If information obtained suggests that subsistence farming operations do not exist, the EPA considers the gardener scenario to be the most possible in all RTR evaluations.

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 if the Tier 3 screening assessment indicates that risks above levels of concern cannot be ruled out.

In evaluating the potential multipathway risk from emissions of lead compounds, rather than developing a screening threshold emission rate, we compare maximum estimated chronic inhalation exposure concentrations to the level of the current National Ambient Air Quality Standard (NAAQS) for lead.<sup>16</sup> Values below the level of the primary (health-based) lead NAAQS are considered to have a low potential for multipathway risk.

For further information on the multipathway assessment approach, see the document titled *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*, which is available in the docket for this rulemaking.

<sup>16</sup> 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 NESHA 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 67002/3; 73 FR 67000/3; 73 FR 67005/1. In addition, applying the level of the primary lead NAAQS at the risk acceptability step is conservative, since that primary lead NAAQS reflects an adequate margin of safety.

5. How did 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 section 112(f)(2)(A) of the CAA. Section 112(a)(7) of the CAA 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.”

The EPA focuses on eight HAP, which are referred to as “environmental HAP,” in its screening assessment: Six PB–HAP and two acid gases. The PB–HAP included in the screening assessment are arsenic compounds, cadmium compounds, dioxins/furans, POM, mercury (both inorganic mercury and methyl mercury), and lead compounds. The acid gases included in the screening assessment are hydrochloric acid (HCl) and hydrogen fluoride (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 lead), 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, and no-observed-adverse-effect level. 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 to 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 document titled *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*, which is available in the docket for this rulemaking.

b. Environmental Risk Screening Methodology

For the environmental risk screening assessment, the EPA first determined whether any facilities in the Ethylene Production source category emitted any of the environmental HAP. For the Ethylene Production source category, we identified emissions of arsenic compounds, cadmium compounds, HCl, hydrofluoric acid, lead, mercury, and POM. Because one or more of the environmental HAP evaluated 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, arsenic compounds, cadmium compounds, dioxins/furans, POM, mercury (both inorganic mercury and methyl mercury), and lead compounds. With the exception of lead, 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 back-calculate Tier 1 screening threshold emission rates. The screening threshold emission rates represent the emission rate in tons of pollutant per year 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 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., 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 lead, we compared the average modeled air concentrations (from HEM-3) of lead around each facility in the source category to the level of the secondary NAAQS for lead. The secondary lead 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."

#### 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 section 112(a)(7) of the CAA) 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 km<sup>2</sup>; 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 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 document titled *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*, which is available in the docket for this action.

#### 6. How did 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 the HAP emissions not only 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 this source category, we conducted the facility-wide assessment using a dataset compiled from the 2011 NEI. The source category records of that NEI dataset were removed, evaluated, and updated as described in section II.C of this preamble. Once a quality assured source category dataset was available, it was placed back with the remaining records from the NEI for that facility. Also, because a preliminary screening of facility-wide risks based on the 2011 NEI indicated the potential for ethylene oxide to be a whole facility risk driver, we updated the facility-wide modeling file for ethylene oxide emissions using

the 2014 NEI data set given that this was the best available data for this pollutant. 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 document titled: *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*, which is available in the docket for this rulemaking, 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.

#### 7. 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 conservative 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 below. Also included are those uncertainties specific to our acute screening assessments, multipathway screening assessments, and our environmental risk screening assessments. A more thorough discussion of these uncertainties is included in the document titled *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*, which is available in the docket for this rulemaking. 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 annual totals for certain years, and they do not reflect short-term fluctuations during the course of a year or variations from year to year. 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 there is uncertainty in ambient concentration estimates associated with any model, including the EPA's recommended regulatory dispersion model, 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 under- or overestimate ambient levels (e.g., meteorology and receptor locations). On balance, 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 location 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 every effort is made 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 likely dominate 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 under nor overestimate when looking at the maximum individual risk 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 in qualitative terms. We note, as a preface to this discussion, a point on dose-response uncertainty that is stated in 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" (EPA's *2005 Guidelines for Carcinogen Risk Assessment*, page 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.<sup>17</sup> 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.<sup>18</sup> 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,<sup>19</sup> 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., 4 hours) to derive an acute dose-response value at another exposure duration (e.g., 1 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

<sup>18</sup> 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.

<sup>19</sup> 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.

<sup>17</sup> IRIS glossary ([https://ofmpub.epa.gov/sor\\_internet/registry/termreg/searchandretrieve/glossariesandkeywordlists/search.do?details=&glossaryName=IRIS%20Glossary](https://ofmpub.epa.gov/sor_internet/registry/termreg/searchandretrieve/glossariesandkeywordlists/search.do?details=&glossaryName=IRIS%20Glossary)).



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 are lacking 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 unspicified (*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 above, there are several factors specific to the acute exposure assessment that the EPA conducts as part of the risk review under section 112 of the CAA. The accuracy of an acute inhalation exposure assessment depends on the simultaneous occurrence of independent factors that may vary greatly, such as hourly emissions 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) 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 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 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 (dioxins, POM, mercury, cadmium, and arsenic) and two acid gases (HF and hydrogen chloride). For lead, we use AERMOD to determine ambient air concentrations, which are then compared to the secondary NAAQS standard for lead. 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.<sup>20</sup>

Model uncertainty concerns whether the model adequately represents the actual processes (*e.g.*, movement and accumulation) that might occur in the environment. For example, does the model adequately describe 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 RTR.

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

<sup>20</sup> 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.

exceed screening threshold emission rates (*i.e.*, screen out), 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: Arsenic, cadmium, dioxins/furans, lead, mercury (both inorganic and methyl mercury), 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 HAP 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, 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 taking in addition to those identified in the risk and technology review?

In addition to the proposed actions on the risk review and technology review discussed further in this section, we are proposing the following: (1) Adding monitoring and operational requirements for flares used as APCDs; (2) consistent with *Sierra Club v. EPA*, 551 F.3d 1019 (D.C. Cir. 2008), ensuring that CAA section 112 standards apply continuously by proposing to add provisions and clarifications for periods of SSM and bypasses, including for PRD releases, bypass lines on closed vent systems, in situ sampling systems, maintenance activities, and certain gaseous streams routed to a fuel gas system; and (3) consistent with *Sierra Club v. EPA*, 551 F.3d 1019 (D.C. Cir.

2008), proposing to remove the shutdown exemption for decoking operations (*i.e.*, the decoking of ethylene cracking furnace radiant tubes) and add work practice standards for this emission source. The results and proposed decisions based on the analyses performed pursuant to CAA section 112(d)(2) and (3) are presented below.

##### 1. Flares

The EPA is proposing under CAA section 112(d)(2) and (3) to amend the operating and monitoring requirements for flares used as APCDs in the Ethylene Production source category. We have determined that the current requirements for flares are not adequate to ensure the level of destruction efficiency needed to conform with the EMACT standards. As previously explained, with respect to the various types of controls used within the Ethylene Production source category, a flare is the most prevalent APCD. A flare can be used to control emissions from either a single emissions source (*e.g.*, ethylene process vent), or multiple emission sources (*e.g.*, storage vessels, process vents, and transfer racks). In the development of the EMACT standards, the EPA stated that “It is generally accepted that combustion devices achieve a 98 weight-percent reduction in HAP emissions. . . .” (65 FR 76428, December 6, 2000). The requirements applicable to flares, which are used to control emissions from various emission sources in this source category, are set forth in the General Provisions to 40 CFR part 63 and cross-referenced in 40 CFR part 63, subpart SS for storage vessels, ethylene process vents, transfer racks, and equipment leaks; and set forth in the General Provisions to 40 CFR part 60 and cross-referenced in 40 CFR part 61, subpart FF for waste operations. In general, flares used as APCDs are expected to achieve 98-percent HAP destruction efficiencies when designed and operated according to the requirements in the General Provisions. Studies on flare performance,<sup>21</sup> however, indicate that these General Provisions requirements are inadequate to ensure proper performance of flares at refineries and other petrochemical facilities (including ethylene production units), particularly when either assist steam or assist air is

<sup>21</sup> For a list of studies, refer to the technical report titled *Parameters for Properly Designed and Operated Flares*, in Docket ID No. EPA-HQ-OAR-2010-0682-0191, which has been incorporated into the docket for this rulemaking. (See section II.D of this preamble, which addresses the incorporation of certain EPA rulemaking dockets such as this one into the docket for this rulemaking.)

used. In addition, over the last decade, flare minimization efforts at these facilities have led to an increasing number of flares operating at well below their design capacity, and while these efforts have resulted in reduced flaring of gases by a number of facilities implementing cost saving projects to recover gases that would otherwise be flared and extract usable fuel value from them (*e.g.*, by using these gases to offset costs of natural gas that would have been used in a boiler or process heater at the ethylene production facility), situations of over assisting with either steam or air have become exacerbated, leading to the degradation of flare combustion efficiency. Therefore, these proposed amendments will ensure that ethylene production facilities that use flares as APCDs meet the MACT standards at all times when controlling HAP emissions.

The General Provisions of 40 CFR 60.18(b) and 40 CFR 63.11(b) each specify that flares be: (1) Steam-assisted, air-assisted, or non-assisted; (2) operated at all times when emissions may be vented to them; (3) designed for and operated with no visible emissions (except for periods not to exceed a total of 5 minutes during any 2 consecutive hours); and (4) operated with the presence of a pilot flame at all times. These General Provisions also specify both the minimum heat content of gas combusted in the flare and maximum exit velocity at the flare tip. The General Provisions specify monitoring for the presence of the pilot flame and the operation of a flare with no visible emissions. For other operating limits, 40 CFR part 63, subpart SS includes an initial flare compliance assessment to demonstrate compliance but specifies no monitoring requirements to ensure continuous compliance.

In 2012, the EPA compiled information and test data collected on flares and summarized its preliminary findings on operating parameters that affect flare combustion efficiency in a technical report titled *Parameters for Properly Designed and Operated Flares*, in Docket ID No. EPA-HQ-OAR-2010-0682-0191, which has been incorporated into the docket for this rulemaking.<sup>22</sup> The EPA submitted this report, along with a charge statement and a set of charge questions to an external peer review panel.<sup>23</sup> The panel,

<sup>22</sup> See section II.D of this preamble, which addresses the incorporation of certain EPA rulemaking dockets such as this one into the docket for this rulemaking.

<sup>23</sup> These documents can also be found at <https://www.epa.gov/stationary-sources-air-pollution/review-peer-review-parameters-properly-designed-and-operated-flares>.

consisting of individuals representing a variety of backgrounds and perspectives (*i.e.*, industry, academia, and environmental experts, and industrial flare consultants), concurred with the EPA's assessment that the following three primary factors affect flare performance: (1) The flow of the vent gas to the flare; (2) the amount of assist media (*e.g.*, steam or air) added to the flare; and (3) the combustibility of the vent gas/assist media mixture in the combustion zone (*i.e.*, the net heating value, lower flammability, and/or combustibles concentration) at the flare tip. In response to peer review comments, the EPA performed a validation and usability analysis on all available test data as well as a failure analysis on potential parameters discussed in the technical report as indicators of flare performance. The peer review comments are in the memorandum titled *Peer Review of Parameters for Properly Designed and Operated Flares*, available in Docket ID No. EPA-HQ-OAR-2010-0682-0193, which has been incorporated into the docket for this rulemaking. These analyses resulted in a change to the population of test data the EPA used, and helped form the basis for the flare operating limits promulgated in the 2015 Petroleum Refinery Sector final rule at 40 CFR part 63, subpart CC (80 FR 75178, December 1, 2015).<sup>24</sup> We are also relying on the same analyses and proposing the same operating limits for flares used as APCDs in the Ethylene Production source category. The Agency believes, given the results from the various data analyses conducted for the Petroleum Refinery Sector final rule, that the operating limits promulgated for flares used in the petroleum refinery sector are also appropriate, reasonable, and will ensure flares used as APCDs in the Ethylene Production source category meet 98-percent destruction efficiency at all times. Therefore, we are proposing at 40 CFR 63.1103(e)(4) to directly apply the petroleum refinery flare rule requirements in 40 CFR part 63, subpart CC to flares in the Ethylene Production source category with clarifications,

including, but not limited to, specifying that several definitions in 40 CFR part 63, subpart CC, that apply to petroleum refinery flares also apply to flares in the Ethylene Production source category, adding a definition and requirements for pressure-assisted multi-point flares, and specifying additional requirements when a gas chromatograph or mass spectrometer is used for compositional analysis.

The remainder of this section of the preamble includes a discussion of requirements that we are proposing for flares used as APCDs in the Ethylene Production source category, along with impacts and costs associated with these proposed revisions. Specifically, this action proposes to retain the General Provisions requirements of 40 CFR 63.11(b) and 40 CFR 60.18(b) that flares used as APCDs in the Ethylene Production source category operate pilot flame systems continuously and that flares operate with no visible emissions (except for periods not to exceed a total of 5 minutes during any 2 consecutive hours) when the flare vent gas flow rate is below the smokeless capacity of the flare. In addition, this action proposes to consolidate measures related to flare tip velocity and proposes new operational and monitoring requirements related to the combustion zone gas. Further, in keeping with the elimination of the SSM exemption as discussed in section IV.E.1.a of this preamble, this action proposes a work practice standard related to the visible emissions and velocity limits during periods when the flare is operated above its smokeless capacity (*e.g.*, periods of emergency flaring). Currently, the EMACT standards cross-reference the General Provisions at 40 CFR 60.18(b) and 40 CFR 63.11(b) for the operational requirements for flares used as APCD (through reference of 40 CFR part 63, subpart SS, and 40 CFR part 61, subpart FF). This proposal eliminates cross-references to the General Provisions and instead specifies all operational and monitoring requirements that are intended to apply to flares used as APCDs in the EMACT standards.

#### a. Pilot Flames

The EMACT standards reference the flare requirements in 40 CFR 60.18(b) and 40 CFR 63.11(b) (through reference of 40 CFR part 63, subpart SS, and 40 CFR part 61, subpart FF), which specify that a flare used as an APCD should operate with a pilot flame present at all times. Pilot flames are proven to improve flare flame stability and even short durations of an extinguished pilot could cause a significant reduction in flare destruction efficiency. In this

action, we are proposing to remove the cross-reference to the General Provisions and instead include the existing provision that flares operate with a pilot flame at all times and be continuously monitored for a pilot flame using a thermocouple or any other equivalent device directly in the EMACT standards. We are also proposing to add a continuous compliance measure that would consider each 15-minute block when there is at least 1 minute where no pilot flame is present when regulated material is routed to the flare as a deviation of the standard. See section IV.A.1.e of this preamble for our rationale for proposing to use a 15-minute block averaging period for determining continuous compliance. We solicit comment on the proposed revisions for flare pilot flames.

#### b. Visible Emissions

The EMACT standards reference 40 CFR 60.18(b) and 40 CFR 63.11(b) (through reference of 40 CFR part 63, subpart SS and 40 CFR part 61, subpart FF), which specify that a flare used as an APCD should operate with visible emissions for no more than 5 minutes in a 2-hour period. Owners or operators of these flares are required to conduct an initial performance demonstration for visible emissions using EPA Method 22 of 40 CFR part 60, appendix A-7. We are proposing to remove the cross-reference to the General Provisions and include the limitation on visible emissions directly in the EMACT standards. We are also proposing to clarify that the initial 2-hour visible emissions demonstration should be conducted the first time regulated materials are routed to the flare.

With regard to continuous compliance with the visible emissions limitation, we are proposing daily visible emissions monitoring for whenever regulated material is routed to the flare and also visible emissions monitoring for whenever visible emissions are observed from the flare. On days the flare receives regulated material, we are proposing to require owners or operators of flares to monitor visible emissions at a minimum of once per day while the flare is receiving regulated material using an observation period of 5 minutes and EPA Method 22 of 40 CFR part 60, appendix A-7. Additionally, whenever regulated material is routed to the flare and there are visual emissions from the flare, we are proposing that another 5-minute visible emissions observation period be performed using EPA Method 22 of 40 CFR part 60, appendix A-7, even if the minimum required daily visible

<sup>24</sup> See technical memorandum titled *Flare Performance Data: Summary of Peer Review Comments and Additional Data Analysis for Steam-Assisted Flares*, in Docket ID No. EPA-HQ-OAR-2010-0682-0200 for a more detailed discussion of the data quality and analysis; the technical memorandum titled *Petroleum Refinery Sector Rule: Operating Limits for Flares*, in Docket ID No. EPA-HQ-OAR-2010-0682-0206 for a more detailed discussion of the failure analysis and the technical memorandum titled *Flare Control Option Impacts for Final Refinery Sector Rule*, in Docket ID No. EPA-HQ-OAR-2010-0682-0748 for additional analyses on flare performance standards based on public comments received on the proposed Refinery Sector Rule.

emission monitoring has already been performed. For example, if an employee observes visual emissions, the owner or operator of the flare would perform a 5-minute EPA Method 22 observation in order to check for compliance upon initial observation or notification of such event. In addition, in lieu of daily visible emissions observations performed using EPA Method 22 of 40 CFR part 60, appendix A-7, we are proposing that owners and operators be allowed to use video surveillance cameras. We believe that video surveillance cameras would be at least as effective as the proposed daily 5-minute visible emissions observations using EPA Method 22.

We are also proposing to extend the observation period for a flare to 2 hours whenever visible emissions are observed for greater than 1 continuous minute during any of the 5-minute observation periods. We acknowledge that operating a flare near the incipient smoke point (the point at which black smoke begins to form within the flame) results in good combustion at the flare tip; however, smoking flares can contribute significantly to emissions of particulate matter 2.5 micrometers in diameter and smaller (PM<sub>2.5</sub>) emissions. Thus, while increasing the allowable period for visible emissions may be useful from an operational perspective, we do not believe the allowable period for visible emissions should be increased to more than 5 minutes in any 2-hour period. We solicit comment on the proposed allowable period for visible emissions from flares.

As discussed later in this section, we are proposing additional operational and monitoring requirements for flares used as APCDs in the Ethylene Production source category that we expect will result in owners or operators of ethylene production units installing equipment that can be used to fine-tune and control the amount of assist steam or air introduced at the flare tip such that combustion efficiency of the flare will be maximized. These monitoring and control systems will assist flare owners or operators to operate near the incipient smoke point without exceeding the visible emissions limit. While combustion efficiency may be highest at the incipient smoke point, it is not significantly higher than the combustion efficiency achieved by the proposed operating limits discussed in section IV.A.1.d of this preamble. As seen in the performance curves for flares, there is very limited improvement in flare performance beyond the performance achieved at the proposed operating limits (see technical memorandum titled *Petroleum Refinery*

*Sector Rule: Operating Limits for Flares*, in Docket ID No. EPA-HQ-OAR-2010-0682-0206, which has been incorporated into the docket for this rulemaking). We solicit comments and data on appropriate periods of visible emissions that would encourage operation at the incipient smoke point.

In addition, we are proposing that the owner or operator establish the smokeless capacity of each flare based on design specification of the flare, and that the visible emissions limitation only apply when the flare vent gas flow rate is below its smokeless capacity. We are proposing a work practice standard for the limited times (*i.e.*, during emergency releases) when the flow to the flare exceeds the smokeless capacity of the flare, based on comments the EPA received on the proposed Petroleum Refinery Sector Rule. In the Petroleum Refinery Sector final rule, the EPA explained that numerous comments on the proposal suggested that flares are not designed to meet the visible emissions requirements when operated beyond their smokeless capacity (80 FR 75178, December 1, 2015). According to commenters, flares are typically designed to operate in a smokeless manner at 20- to 30-percent of full hydraulic load. Thus, they claimed, flares have two different design capacities: A “smokeless capacity” to handle normal operations and typical process variations and a “hydraulic load capacity” to handle very large volumes of gases discharged to the flare as a result of an emergency shutdown. According to commenters, this is inherent in all flare designs and has not previously been an issue because flare operating limits did not apply during malfunction events.

For this proposed work practice standard, owners or operators would need to develop a flare management plan that identifies procedures for limiting discharges to the flare as a result of process upsets or malfunctions that cause the flare to exceed its smokeless capacity. In addition, for any flare that exceeds both the smokeless design capacity and visible emissions limit, we are proposing that owners or operators would need to conduct a specific root cause analysis and take corrective action to prevent the recurrence of a similarly caused event (similar to the prevention measures we are proposing in this rule to minimize the likelihood of a PRD release, see section IV.A.2.a of this preamble). We are proposing that if the root cause analysis indicates that the exceedance of the visible emissions limit is caused by operator error or poor maintenance, then the exceedance would be

considered a deviation from the work practice standard. We are also proposing that a second event within a rolling 3-year period from the same root cause on the same equipment would be considered a deviation from the standard. Further, we are proposing that events caused by force majeure would be excluded from a determination of whether there has been a second event. Finally, and again excluding force majeure events, we are proposing that a third visible emissions limit exceedance occurring from the same flare in a rolling 3-year period would be a deviation of the work practice standard, regardless of the cause. We are proposing to define a force majeure event as a release of HAP, either directly to the atmosphere from a PRD or discharge via a flare, that is demonstrated to the satisfaction of the Administrator to result from an event beyond the owner or operator’s control, such as natural disasters; acts of war or terrorism; loss of a utility external to the ethylene production unit (*e.g.*, external power curtailment), excluding power curtailment due to an interruptible service agreement; and fire or explosion originating at a near or adjoining facility outside of the owner or operator’s control that impacts the ethylene production unit’s ability to operate.

With regard to the proposed rolling 3-year period for assessing a deviation of the work practice standard, the EPA evaluated the impacts of different frequencies and time periods to the number of events that would be the “backstop” (*i.e.*, a deviation of the standard) to ensure that corrective actions are meaningfully applied (see the memorandum, *Control Option Impacts for Flares Located in the Ethylene Production Source Category*, in Docket ID No. EPA-HQ-OAR-2017-0357). The EPA assumed, based on a survey of a subset of ethylene production flares and their visible emission events and velocity exceedances over a number of years, that the best performers would have no more than one event every 7 years, or a probability of 14.3 percent of having an event in any given year (see Appendix B of the memorandum, *Control Option Impacts for Flares Located in the Ethylene Production Source Category*, in Docket ID No. EPA-HQ-OAR-2017-0357 for more information). The EPA found that, over a long period of time such as 20 years, about half of these best performers would have two events in a 3-year period, which would still result in about half of the “best performing” flares having a deviation of the work practice

standard if it was limited to two events in 3 years. Conversely, the EPA found that, over a long period of time such as 20 years, only 6 percent of the best performing flares would have three events in 3 years. Based on this analysis, three events in 3 years would appear to be “achievable” for the average of the best performing flares.

### c. Flare Tip Velocity

The EMACT standards reference the flare provisions in 40 CFR 60.18(b) and 40 CFR 63.11(b) (through reference of 40 CFR part 63, subpart SS and 40 CFR part 61, subpart FF), which specify maximum flare tip velocities based on flare type (non-assisted, steam-assisted, or air-assisted) and the net heating value of the flare vent gas. (Based on responses to the CAA section 114 request previously discussed in section II.C of this preamble, approximately 95 percent of all flares used as APCDs in the Ethylene Production source category are either steam- or air-assisted.) These maximum flare tip velocities are required to ensure that the flame does not “lift off” the flare (*i.e.*, a condition where a flame separates from the tip of the flare and there is space between the flare tip and the bottom of the flame), which could cause flame instability and/or potentially result in a portion of the flare gas being released without proper combustion. We are proposing to remove the cross-reference to the General Provisions and consolidate the provisions for maximum flare tip velocity into the EMACT standards as a single equation, irrespective of flare type (*i.e.*, steam-assisted, air-assisted, or non-assisted).

Based on analysis conducted for the Petroleum Refinery Sector final rule, the EPA identified air-assisted test runs with high flare tip velocities that had high combustion efficiencies (see technical memorandum, Petroleum Refinery Sector Rule: Evaluation of Flare Tip Velocity Requirements, in Docket ID No. EPA-HQ-OAR-2010-0682-0212). These test runs exceeded the maximum flare tip velocity limits for air-assisted flares using the linear equation in 40 CFR 63.11(b)(8). When these test runs were compared with the test runs for non-assisted and steam-assisted flares, air-assisted flares appeared to have the same operating envelope as the non-assisted and steam-assisted flares. Therefore, for air-assisted flares used as APCDs in the Ethylene Production source category, we are proposing to require the use of the same equation that non-assisted and steam-assisted flares currently use to establish the flare tip velocity operating limit. We are also proposing that the owner or

operator determine the flare tip velocity on a 15-minute block average basis. See section IV.A.1.e of this preamble for our rationale for proposing to use a 15-minute block averaging period for determining continuous compliance.

In addition, we are proposing the same work practice standard for flare tip velocity during emergency releases (when the flow to the flare exceeds the smokeless capacity of the flare) as we are proposing for visible emissions. Specifically, instead of owners and operators meeting the flare tip velocity operating limit at all times, we are proposing that the owner or operator establish the smokeless capacity of each flare based on design specification of the flare, and that the flare tip velocity operating limit would only apply when the flare vent gas flow rate is below its smokeless capacity. We are proposing a work practice standard for the limited times (*i.e.*, during emergency releases) when the flow to the flare exceeds the smokeless capacity of the flare, based on comments the EPA received on the proposed Petroleum Refinery Sector final rule. In the Petroleum Refinery Sector final rule, the EPA explained that numerous comments on the proposal suggested that flares are not designed to meet the flare tip velocity requirements when being operated beyond their smokeless capacity (80 FR 75178, December 1, 2015). According to commenters, flares are commonly operated during emergency releases at exit velocities greater than 400 feet per second (which is 270 miles per hour) and that this is inherent in all flare designs and has not previously been an issue because flare operating limits did not apply during malfunction events.

For the proposed work practice standard, owners or operators would develop a flare management plan identifying procedures that they intend to follow in order to limit discharges to the flare as a result of process upsets or malfunctions that cause the flare to exceed its flare tip velocity operating limit. In addition, we are proposing that owners or operators would conduct a specific root cause analysis and take corrective action to prevent the recurrence of a similarly caused event, similar to the prevention measures we are proposing in this rule to minimize the likelihood of a PRD release (see section IV.A.2.a of this preamble), for any flare event above smokeless design capacity that also exceeds the flare tip velocity operating limit. We are proposing that if the root cause analysis indicates that the exceedance is caused by operator error or poor maintenance, then the exceedance would be considered a deviation from the work

practice standard. We are also proposing that a second event within a rolling 3-year period from the same root cause on the same equipment would be considered a deviation from the standard. Further, we are proposing that events caused by force majeure (see section IV.A.1.b of this preamble for a proposed definition of force majeure) would be excluded from a determination of whether there has been a second event. Finally, and again excluding force majeure events, we are proposing that a third opacity exceedance occurring from the same flare in a rolling 3-year period would be a deviation of the work practice standard, regardless of the cause. As previously explained in section IV.A.1.b of this preamble, we believe three events in 3 years appear to be “achievable” for the average of the best performing flares. We solicit comment on the proposed work practice standard for flare tip velocity during emergency releases (when the flow to the flare exceeds the smokeless capacity of the flare).

Finally, we are also proposing not to include the provision for the special flare tip velocity equation in the General Provisions at 40 CFR 63.18(c)(3)(i)(A) and 40 CFR 63.11(b)(6)(i)(A) for non-assisted flares with hydrogen content greater than 8 percent. This equation, which was developed based on limited data from a chemical manufacturer, has very limited applicability for flares used as APCDs in the Ethylene Production source category because it only provides an alternative for non-assisted flares with large quantities of hydrogen. Based on the response from the CAA section 114 request, approximately 95 percent of all flares (operated by the 21 facilities that responded to the CAA section 114 request) are either steam- or air-assisted. Furthermore, we are proposing other compliance alternatives that we believe provide a better way for flares used as APCDs in the Ethylene Production source category with high hydrogen content to comply with the rule while ensuring proper destruction performance of the flare (see section IV.A.1.d of this preamble for the proposed compliance alternatives). Therefore, for non-assisted flares with hydrogen content greater than 8 percent that are used as APCDs in the Ethylene Production source category, we are not proposing including this special flare tip velocity equation as a compliance alternative. We request comment on the need to include this equation.

d. Net Heating Value of the Combustion Zone Gas

The current provisions for flares in 40 CFR 60.18(b) and 40 CFR 63.11(b) specify that the flare vent gas meet a minimum net heating value of 200 British thermal units per standard cubic foot (Btu/scf) for non-assisted flares and 300 Btu/scf for air- and steam-assisted flares. The EMACT standards reference these provisions (through reference of 40 CFR part 63, subpart SS and 40 CFR part 61, subpart FF), but neither the General Provisions nor the EMACT standards include specific requirements for monitoring the net heating value of the flare vent gas. Moreover, recent flare testing results indicate that the minimum net heating value alone does not address instances when the flare may be over-assisted because it only considers the gas being combusted in the flare and nothing else (e.g., no assist media). However, many industrial flares use steam or air as an assist medium to protect the design of the flare tip, promote turbulence for the mixing, induce air into the flame, and operate with no visible emissions. Using excessive steam or air results in dilution and cooling of flared gases and can lead to operating a flare outside its stable flame envelope, reducing the destruction efficiency of the flare. In extreme cases, over-steaming or excess aeration can snuff out a flame and allow regulated material to be released into the atmosphere without complete combustion. As previously noted, because approximately 95 percent of all flares used as APCDs in the Ethylene Production source category are either steam- or air-assisted (based on the 21 facilities that responded to the CAA section 114 request), it is critical that we ensure the assist media is accounted for in some form or fashion. Recent flare test data have shown that the best way to account for situations of over-assisting is to consider the properties of the mixture of all gases at the flare tip in the combustion zone when evaluating the ability to combust efficiently. As discussed in the introduction to this section, the external peer review panel concurred with our assessment that the combustion zone properties at the flare tip are critical parameters to know in determining whether a flare will achieve good combustion. The General Provisions, however, solely rely on the net heating value of the flare vent gas.

In this action, in lieu of requiring compliance with the operating limits for net heating value of the flare vent gas in the General Provisions, we are proposing a single minimum operating limit for the net heating value in the

combustion zone gas (NHVcz) of 270 Btu/scf during any 15-minute period for steam-assisted, air-assisted, and non-assisted flares used as APCDs in the Ethylene Production source category. The Agency believes, given the results from the various data analyses conducted for the Petroleum Refinery Sector Rule, that this NHVcz operating limit promulgated for flares used in the Petroleum Refinery Sector source category is also appropriate, reasonable, and will ensure flares used as APCDs in the Ethylene Production source category meet 98-percent destruction efficiency at all times when operated in concert with the other proposed suite of requirements that flares need to comply with (e.g., continuously lit pilot flame requirements, visible emissions requirements, and flare tip velocity requirements) (see the memoranda titled *Petroleum Refinery Sector Rule: Operating Limits for Flares* and *Flare Control Option Impacts for Final Refinery Sector Rule* in Docket ID Nos. EPA-HQ-OAR-2010-0682-0206 and EPA-HQ-OAR-2010-0682-0748, respectively). In addition, we are proposing that owners or operators may use a corrected heat content of 1,212 Btu/scf for hydrogen, instead of 274 Btu/scf, to demonstrate compliance with the NHVcz operating limit; however, owners or operators who wish to use the corrected hydrogen heat content must have a system capable of monitoring for the hydrogen content in the flare vent gas. The 1,212 Btu/scf value is based on a comparison between the lower flammability limit and net heating value of hydrogen compared to light organic compounds and has been used in several consent decrees to which the EPA is a party. Based on analyses conducted for the Petroleum Refinery Sector Rule (see the memorandum titled *Flare Control Option Impacts for Final Refinery Sector Rule*, in Docket ID No. EPA-HQ-OAR-2010-0682-0748), the EPA determined that using a 1,212 Btu/scf value for hydrogen greatly improves the correlation between combustion efficiency and the combustion zone net heating value over the entire array of data. Using the net heating value of 1,212 Btu/scf for hydrogen also greatly reduced the number of “type 2 failures,” which are instances when the combustion efficiency is high, but the gas does not meet the NHVcz limit.

Furthermore, in addition to the NHVcz operating limit, we are proposing a net heating value dilution parameter (NHVdil) for certain flares that operate with perimeter assist air. For air-assisted flares, use of too much perimeter assist air can lead to poor

flare performance. Further, based on our analysis of the air-assisted flare dataset, (see technical memorandum, *Petroleum Refinery Sector Rule: Operating Limits for Flares*, in Docket ID No. EPA-HQ-OAR-2010-0682-0206), we determined a NHVdil of 22 British thermal units per square foot is necessary to ensure that there is enough combustible material available to adequately combust the gas and pass through the flammability region and also ensure that degradation of flare performance from excess aeration does not occur. We found that including the flow rate of perimeter assist air in the calculation of the NHVcz does not identify all instances of excess aeration and could (in some instances) even allow facilities to send very dilute vent gases to the flare that would not combust (i.e., vent gases below their lower flammability limit could be sent to flare). Instead, the data suggest that the diameter of the flare tip, in concert with the amount of perimeter assist air (and other parameters used to determine NHVcz), provides inputs necessary to calculate whether this type of flare is over-assisted. This dilution parameter is consistent with the combustion theory that the more time the gas spends in the flammability region above the flare tip, the more likely it will combust. Also, because both the volume of the combustion zone (represented by the diameter here) and how quickly this gas is diluted to a point below the flammability region (represented by perimeter assist air flow rate) characterize this time, it is logical that we propose such a parameter.

We also found that some assist steam lines are purposely designed to entrain air into the lower or upper steam at the flare tip; and for flare tips with an effective tip diameter of 9 inches or more, there are no flare tip steam induction designs that can entrain enough assist air to cause a flare operator to have a deviation of the NHVdil operating limit without first deviating from the NHVcz operating limit. Therefore, we are proposing to allow owners or operators of flares whose only assist air is from perimeter assist air entrained in lower and upper steam at the flare tip and with a flare tip diameter of 9 inches or greater to comply only with the NHVcz operating limit. Steam-assisted flares with perimeter assist air and an effective tip diameter of less than 9 inches would remain subject to the requirement to account for the amount of assist air intentionally entrained within the calculation of NHVdil. However, we recognize that this assist air cannot be directly measured, but the quantity of

air entrained is dependent on the assist steam rate and the design of the steam tube's air entrainment system. Therefore, we are proposing provisions to specify that owners or operators of these smaller diameter steam-assisted flares use the steam flow rate and the maximum design air-to-steam ratio of the steam tube's air entrainment system for determining the flow rate of this assist air. Using the maximum design ratio will tend to over-estimate the assist air flow rate, which is conservative with respect to ensuring compliance with the NHVdil operating limit.

Finally, we are proposing to require owners or operators to record and calculate 15-minute block average values for these parameters. Our rationale for selecting a 15-minute block averaging period is provided in section IV.A.1.e of this preamble.

#### e. Data Averaging Periods for Flare Gas Operating Limits

We are proposing to use a 15-minute block averaging period for each proposed flare operating parameter to ensure that the flare is operated within the appropriate operating conditions. We consider a short averaging time to be the most appropriate for assessing proper flare performance because flare vent gas flow rates and composition can change significantly over short periods of time. Furthermore, because destruction efficiency can fall precipitously when a flare is controlling vent gases below (or outside) the proposed operating limits, short time periods where the operating limits are not met could seriously impact the overall performance of the flare.

Moreover, a 15-minute averaging period is consistent with the test data and the analysis used to establish the operating limits in this proposed rule. Ninety-three percent of the flare test runs used as bases for establishing the proposed operating limits ranged in duration from 5 to 30 minutes, and 77 percent of the runs ranged in duration from 5 to 20 minutes. As previously explained, the failure analysis considered minute-by-minute test run data, but gas chromatography compositional analyses generally require 10 to 15 minutes to conduct. Therefore, many of the compositional data still reflect set values over 10- to 15-minute time intervals and shorter averaging times are not practical. To be consistent with the available test data and to ensure there are no short periods of significantly poor destruction efficiencies, we are proposing 15-minute block averaging times.

In addition, the EPA conducted a Monte Carlo analysis (based on

comments the EPA received on the proposed Petroleum Refinery Sector Rule) to help assess the impacts of extending the averaging time on the test average flare dataset of 15-minute runs to 1-hour or 3-hour averaging time alternatives (see the memorandum, *Flare Control Option Impacts for Final Refinery Sector Rule*, in Docket ID No. EPA-HQ-OAR-2010-0682-0748). While the EPA considered it reasonable to provide a longer averaging time for logistical reasons, the Monte Carlo analysis demonstrated that short periods of poor flare performance can affect the ability of a flare to achieve the desired control efficiency. Consequently, the EPA promulgated a 15-minute averaging period requirement to ensure that the 98-percent control efficiency for flares is achieved at all times (80 FR 75178, December 1, 2015).

Given the short averaging times for the operating limits, we are proposing special calculation methodologies to enable owners or operators to use "feed forward" calculations to ensure compliance with the operating limits on a 15-minute block average. Specifically, we propose using the results of the compositional analysis determined just prior to a 15-minute block period for the next 15-minute block average. Owners or operators of flares will then know the vent gas properties for the upcoming 15-minute block period and can adjust assist gas flow rates relative to vent gas flow rates to comply with the proposed operating limits. In other words, "feed forward" means that owners or operators would use the net heating value in the vent gas (NHVg) going into the flare in one 15-minute period to adjust the assist media (*i.e.*, steam or air) and/or the supplemental gas in the next 15-minute period, as necessary, to calculate an NHVcz limit of 270 Btu/scf or greater using the proposed equation. We recognize that when a subsequent measurement value is determined, the instantaneous NHVcz based on that compositional analysis and the flow rates that exist at the time may not be above 270 Btu/scf. We are proposing that this is not a deviation of the operating limit. Rather, we propose that the owner or operator is only required to make operational adjustments based on that information to achieve, at a minimum, the net heating value limit for the subsequent 15-minute block average. We are, however, proposing that failure to make adjustments to assist media or supplemental natural gas using the NHVg from the previous period in the equation provided for calculating an NHVcz limit of 270 Btu/scf, would be a deviation of the

operating limit. Alternatively, because the owner or operator could directly measure the NHVg on a more frequent basis, such as with a calorimeter (and optional hydrogen analyzer), the process control system is able to adjust more quickly, and the owner or operator can make adjustments to assist media or supplemental natural gas more quickly. In this manner, the owner or operator is not limited by relying on NHVg data that may not represent the current conditions. We are, therefore, also proposing that the owner or operator may opt to use the NHVg in such instances from the same period to comply with the operating limit. For examples of "feed forward" calculations, please see Attachment 3 of the memorandum titled *Flare Control Option Impacts for Final Refinery Sector Rule*, in Docket ID No. EPA-HQ-OAR-2010-0682-0748.

In addition, we are also proposing that owners or operators of flares that elect to use grab sampling and engineering calculations to determine compliance must still assess compliance on a 15-minute block average. The composition of each grab sample is to be used for the duration of the episode or until the next grab sample is taken. We are soliciting comment on whether this approach is appropriate, and whether grab samples are needed on a more frequent basis to ensure compliance with the operating limits.

Finally, we are proposing to clarify at 40 CFR 63.1103(e)(4)(xiii) that when determining compliance with the flare tip velocity and combustion zone operating limits specified in 40 CFR 63.670(d) and (e), the initial 15-minute block period starts with the 15-minute block that includes a full 15 minutes of the flaring event. In other words, we are proposing to clarify that the owner or operator demonstrate compliance with the velocity and NHVcz requirements starting with the block that contains the fifteenth minute of a flaring event; and the owner or operator is not required to demonstrate compliance for the previous 15-minute block in which the event started and contained only a fraction of flow.

#### f. Flares in Dedicated Service

We are proposing an alternative monitoring approach for flares in dedicated service that have consistent composition and flow. We believe that these types of flares, which have limited flare vent gas streams, do not need to have the same type of ongoing monitoring requirements as those with more variable waste streams. Thus, we are proposing an option that owners or operators can use to demonstrate



compliance with the operating requirements for flares that are in dedicated service to a specific emission source, such as a transfer rack operation consistently loading the same material. We are proposing that owners or operators will need to submit an application for the use of this alternative compliance option. We are proposing that the application must include a description of the system, characterization of the vent gases that could be routed to the flare based on a minimum of seven grab samples (14 daily grab samples for continuously operated flares), and specification of the net heating value that will be used for all flaring events (based on the minimum net heating value of the grab samples). We are also proposing to allow engineering estimates to characterize the amount of gas flared and the amount of assist gas introduced into the system. For example, we believe that the use of fan curves to estimate air assist rates would be acceptable. We propose that flare owners or operators would use the net heating value determined from the initial sampling phase and measured or estimated flare vent gas and assist gas flow rates, if applicable, to demonstrate compliance with the standards.

#### g. Pressure-Assisted Multi-Point Flares

Pressure-assisted flares are conceptually similar, yet technically different in both design and operation compared to more traditional elevated flare tip designs (e.g., steam-assisted, air-assisted, and non-assisted flare tips). Pressure-assisted flares operate by taking advantage of the pressure upstream of the flare tip to create a condition whereby air is drawn into contact and mixed with high exit velocity flared gas, resulting in smokeless flare operation and emissions reductions at least as equivalent to those of traditional flares types, if properly designed and operated. Pressure-assisted flares can be used in a single flare burner type layout or in staged arrays with many identical flare burners. These staged arrays can either be elevated or at ground level. In the Ethylene Production source category, we are only aware of ground level staged array systems that are commonly referred to as multi-point ground flares (MPGF) given that they have multiple (e.g., hundreds) of flare burners at ground level. The flare burners in a MPGF are designed with a staging system that opens and closes staging valves according to gas pressure in the flare header with the result that stages, and accompanying flare burners for those stages, are either activated to

control emissions as the flare vent gas flow and pressure increase in the flare header or deactivated as the flare vent gas flow and pressure decrease in the flare header. The flare burners in a MPGF are typically lit with a pilot flame system where the first burners on a stage are lit by the pilot flame and the flame propagates (i.e., cross-lights) down the stage to the remaining burners on the stage. The MPGF system is typically surrounded by a panel type fence to allow air in for combustion as well as to protect nearby workers from the radiant heat of the flare system.

In the Ethylene Production source category, MPGF are currently used as secondary flares to control large emissions events that result during periods of SSM. With the elimination of the SSM exemption (see section IV.E.1 of this preamble for additional discussion), proposing requirements for this unique flare type is an important consideration given that some facilities currently use them as APCD. Based on our review of recently approved AMEL requests for MPGF and the underlying data analyses that supported those decisions (see section II.D of this preamble), MPGF can achieve at least equivalent reductions in volatile organic compounds (VOC) and organic HAP as traditional elevated flares, however, different operating requirements are needed for these flare types to ensure a high level of control is achieved given that the individual flare burners are designed to operate at high velocities (i.e., up to sonic velocity).

In reviewing the initial MPGF AMEL requests by Dow Chemical and ExxonMobil (80 FR 8023–8030, February 13, 2015), the Agency noted two general conclusions from the test data supporting the AMEL requests that were consistent with 1985 studies<sup>25</sup> conducted by the EPA on pressure-assisted flares. The first general conclusion was that “flare head design can influence the flame stability curve.” The second general conclusion was that “stable flare flames and high (>98–99%) combustion and destruction efficiencies are attained when flares are operated within operating envelopes specific to each flare burner and gas mixture tested. Operation beyond the edge of the operating envelope can result in rapid flame de-stabilization and a decrease in combustion and destruction efficiencies.” In reviewing all the available data in the MPGF AMEL docket (i.e., Docket ID No. EPA–HQ–

<sup>25</sup> Pohl, J. and N. Soelberg. 1985. *Evaluation of the efficiency of industrial flares: Flare head design and gas composition*. EPA–600/2–85–106. Prepared for U.S. EPA Office of Air Quality Planning and Standards.

OAR–2014–0738), we found these two general observations were still valid conclusions and focused our analyses of the test data on tests where olefinic waste gas mixtures were being combusted. This was done because, as discussed earlier, waste gas characteristics (along with flare burner design) can influence the flame stability curve. Thus, since these tests are representative of waste gas mixtures expected to be controlled at ethylene production facilities, we focused our review on these specific data. The data clearly show that for some test runs flare flameouts occurred, meaning the flares were not operated within the proper envelope to produce a stable flame. The data from the AMEL requests also show flare flameouts occur from various burners when the NHVcz of the olefin waste gas mixture are less than 800 Btu/scf. Thus, we selected a minimum NHVcz of 800 Btu/scf to ensure the MPGF is operated within the proper envelope to produce a stable flame and achieve high destruction efficiencies at least equivalent to those as the underlying Ethylene Production MACT standards. Also, given that rapid flame de-stabilization can occur when pressure-assisted multi-point flares are operated outside their proper operating envelope, ensuring there is always enough heat content in the vent gases sent to these types of flares so that flare flameouts will not occur is critically important. Thus, to that end, we are proposing to not allow use of the “feed forward” calculation approach (discussed in section IV.A.1.e of this preamble) to demonstrate compliance with the NHVcz limit of 800 Btu/scf. We are only proposing allowance of complying with a straight 15-minute block average for these flare types.

Another unique characteristic of MPGF is that they may use a cross-lighting pilot flame system as a means of ignition to initially combust the waste gases sent to the flare burners on a particular staged array. Thus, we also reviewed the equipment specific set-ups in the test data that allowed for successful cross-lighting of MPGF. Based on our review of the data, it appears that one option would be for facilities to conduct performance demonstrations to demonstrate successful cross-lighting on a minimum of three burners (i.e., as outlined in the *Framework for Streamlining Approval of Future Pressure-Assisted MPGF AMEL Requests*, 81 FR 23480, April 21, 2016). However, given the data before us in the MPGF AMEL docket, and rather than requiring facilities to conduct a performance demonstration, it appears

that an equipment standard that sets an upper end on the distance between burners of 6 feet is adequate to ensure a successful cross-lighting on a stage of burners in a MPGF.

Furthermore, in reviewing the site-specific AMEL standards that facilities are complying with for MPGF,<sup>26</sup> we believe that if these same site-specific standards are applied to all MPGF at ethylene production facilities, owners or operators would demonstrate at least equivalent emissions reductions as the underlying Ethylene Production MACT standards as well as demonstrate at least equivalent reductions with the operational and monitoring requirements we are proposing for more traditional, elevated flare tips. Therefore, we are proposing that owners or operators of MPGF: (1) Maintain an NHVcz ≥ 800 Btu/scf; (2) continuously monitor the NHVcz and flare vent gas flow rate; (3) continuously monitor for the presence of a pilot flame, and if cross-lighting is used on a particular stage of burners, then continuously monitor to ensure that the stage has a minimum of two pilots per stage that will ignite all flare vent gases sent to that stage; (4) operate the MPGF with no visible emissions (except for 5 minutes during any 2 consecutive hours); (5) maintain a distance of no greater than 6 feet between any two burners in series on a stage of burners that use cross-lighting; and (6) monitor to ensure staging valves for each stage of the MPGF operate properly so that the flare will control vent gases within the proper flow and pressure ranges based on the flare manufacturer’s recommendations.

Finally, although we are unaware of any ethylene production facilities that use multi-point elevated flares, we recognize that an owner or operator may elect to use this type of flare design in the future. Given the design similarities of a multi-point elevated flare when compared to a MPGF (*i.e.*, each flare type uses pressure-assisted burners with

staged arrays), we determined that our analyses of the test data (including our review of approved AMEL requests) related to MPGF that control olefin waste gases, could also apply to multi-point elevated flares that combust olefin waste gases. Therefore, we are proposing that owners and operators of multi-point elevated flares must meet the same requirements that we are proposing for MPGF. In other words, the proposed requirements discussed in this section of the preamble would apply to all pressure-assisted multi-point flares (*i.e.*, MPGF and multi-point elevated flares). We are soliciting comment on whether this approach is appropriate, and whether test data are available for multi-point elevated flares that control olefin waste gases. We are also soliciting comment on whether the proposed requirements for pressure-assisted multi-point flares should ultimately supersede the currently approved MPGF AMEL requests at ethylene production facilities.

**h. Impacts of the Flare Operating and Monitoring Requirements**

The EPA expects that the newly proposed requirements for flares used as APCDs in the Ethylene Production source category discussed in this section will affect all flares at ethylene production units. Based on facility responses to our CAA section 114 request, we estimate that there are 96 flares of traditional elevated flare tip designs (*e.g.*, steam-assisted, air-assisted, and non-assisted flare tips) operating at ethylene production units that receive flare vent gas flow on a regular basis (*i.e.*, other than during periods of SSM). Also, based on information received from AMEL requests (see section II.D of this preamble), we estimate there are six pressure-assisted MPGF in the source category. Costs were estimated for each flare for a given facility, considering current monitoring systems already installed on each individual flare. Given

that the same type of equipment is used for flares in the Ethylene Production source category and for the petroleum refinery sector, costs for any additional monitoring systems needed were estimated based on installed costs received from petroleum refineries and, if installed costs were unavailable, costs were estimated based on vendor-purchased equipment. The baseline emission estimate and the emission reductions achieved by the proposed rule were estimated based on current vent gas and steam flow data submitted by industry representatives. The results of the impact estimates are summarized in Table 2 of this preamble. We note that the requirements for flares we are proposing in this action will ensure compliance with the EACT standards when flares are used as an APCD. Because we are not changing the underlying EACT standards, we did not include any of the estimated excess emissions from flares in the summary of total estimated emissions reductions for this action (*i.e.*, 62 tpy of HAP). However, we estimate that the proposed operational and monitoring requirements have the potential to reduce excess emissions from flares by approximately 1,430 tpy of HAP and 13,020 tpy of VOC. The VOC compounds are non-methane, non-ethane total hydrocarbons. According to the modeling file we used to assess residual risk (see section III.C.1 of this preamble), there are approximately 30 individual HAP compounds included in the emission inventory for flares, but many of these are emitted in trace quantities. A little more than half of the HAP emissions from flares are attributable to 1,3-butadiene and benzene, followed by hexane, toluene, and xylenes. For more detail on the impact estimates, see the technical memorandum titled *Control Option Impacts for Flares Located in the Ethylene Production Source Category* in Docket ID No. EPA-HQ-OAR-2017-0357.

TABLE 2—NATIONWIDE COST IMPACTS OF PROPOSED AMENDMENTS TO ENSURE PROPER FLARE PERFORMANCE

Control description	Total capital investment (million \$)	Total annualized costs (million \$/yr)
Flare Operational and Monitoring Requirements .....	44.8	9.8
Work Practice Standards for Flares Operating Above Their Smokeless Capacity .....	0.75	0.18
Total .....	45.6	9.98

<sup>26</sup> 80 FR 52426, August 31, 2015; 81 FR 23480, April 21, 2016; and 82 FR 27822, June 19, 2017.

## 2. Vent Control Bypasses

### a. Pressure Relief Devices

The current definition of “ethylene process vent” at 40 CFR 63.1103(e)(2) states that “relief valve discharges” are not ethylene process vents. Instead, the EMACT standard recognizes relief valve discharges to be the result of malfunctions. The acronym “PRD” means pressure relief device and is common vernacular to describe the variety of devices regulated as pressure relief valves (see the end of this section for our proposed revisions to the definitions of pressure relief device and relief valve, to provide clarity). PRDs are designed to remain closed during normal operation. Typically, the Agency considers PRD releases as the result of an overpressure in the system caused by operator error, a malfunction such as a power failure or equipment failure, or other unexpected cause that results in immediate venting of gas from process equipment in order to avoid safety hazards or equipment damage. For the Ethylene Production source category, emissions vented directly to the atmosphere by a PRD in organic HAP service contain HAP that are otherwise regulated under the EMACT standards.

The EMACT standards regulate PRDs when they are seated through equipment leak provisions (*i.e.*, conduct EPA Method 21 monitoring after each pressure release using a leak definition of 500 ppm); however, these provisions do not apply to an emissions release from a PRD. In addition, the EMACT standards follow the EPA’s previous practice of exempting SSM events from otherwise applicable emission standards. Consequently, with PRD releases defined as unplanned, nonroutine, and the result of malfunctions, the EMACT standards did not restrict PRD releases to the atmosphere but instead treated them similar to all malfunctions that are subject to the SSM exemption provision. In *Sierra Club v. EPA*, 551 F.3d 1019 (D.C. Cir. 2008), the Court determined SSM exemptions in section 112 standards violate the CAA. Section IV.E.1 of this preamble contains additional discussions on the removal of the SSM exemption provision for this source category. As a result, we evaluated the EMACT standard for PRDs to ensure a standard continuously applies, consistent with the *Sierra Club v. EPA* decision.

CAA section 112(d)(1) specifies that the EPA may “distinguish among classes, types, and sizes of sources” when establishing standards. (In establishing standards under CAA section 112(d), the EPA may

“distinguish among classes, types, and sizes of sources within a category or sub-category.” CAA section 112(d)(1). See *Sierra Club v. EPA*, 479 F.3d 875, 885 (D.C. Cir. 2007). We are proposing two subcategories of PRDs for the EMACT standard to distinguish between classes of PRDs: (1) PRDs designed to vent through a closed vent system to a control device or to a process, fuel gas system, or drain system (referred to as PRDs that vent to a control system); and (2) PRDs designed to vent to the atmosphere. We are proposing to subcategorize PRDs by class because of design differences between the numerous PRDs at ethylene production facilities that are vented to a control system and PRDs that vent to the atmosphere. Ethylene production facilities are currently required to evaluate PRDs as part of their risk management and process safety management programs. When implementing these programs, facilities identify PRDs that they intend to control as compared to those they elect not to control (and that are vented to the atmosphere). Facilities do not control certain PRDs because of technical or site-specific safety considerations, such as PRDs that release chemicals that could result in freezing or plugging the vent to the control system.

We evaluated each subcategory of PRDs separately to ensure that a standard would apply continuously. Essentially, PRDs that vent to a control system are already complying with the process vent standards (see section IV.D.2 of this preamble for a summary of the EMACT standards for ethylene process vents) and are, thus, already appropriately regulated. Therefore, minimal revisions to the EMACT standard for PRDs that vent to a control system are warranted as a result of removing the SSM exemption. We are proposing at 40 CFR 63.1107(h)(4) that PRDs that vent through a closed vent system to a control device or to a process, fuel gas system, or drain system must meet minimum requirements for the applicable control system. However, PRDs that vent to atmosphere cannot meet the current ethylene process vent standards. Therefore, we examined whether it would be feasible to regulate PRDs that vent to atmosphere under CAA section 112(d)(2) and (3). As detailed here, we determined it was feasible to regulate PRDs that vent to atmosphere under CAA section 112(h) and are proposing work practice standards at 40 CFR 63.1107(h)(3) that are intended to reduce the number of PRD releases and will incentivize owners or operators to eliminate the

causes of PRD releases to the atmosphere.

No ethylene production facility is subject to numeric emission limits for PRDs that vent to the atmosphere. In addition, we do not believe it is appropriate to subject PRDs that vent to the atmosphere to numeric emission limits due to technological and economical limitations that make it impracticable to measure emissions from such PRDs. CAA section 112(h)(1) states that the EPA may prescribe a work practice standard or other requirement, consistent with the provisions of CAA sections 112(d) or (f), in those cases where, in the judgment of the Administrator, it is not feasible to enforce an emission standard. CAA section 112(h)(2)(B) further defines the term “not feasible” in this context as meaning that “the application of measurement technology to a particular class of sources is not practicable due to technological and economic limitations.” We consider it appropriate to establish a work practice standard for PRDs that vent to atmosphere as provided in CAA section 112(h), because the application of a measurement methodology for PRDs that vent to atmosphere is not practicable due to technological and economic limitations. First, it is not practicable to use a measurement methodology for PRD releases that vent to atmosphere. PRDs are designed to remain closed during normal operations and release emissions only during nonroutine and unplanned events, and the venting time can be very short and may vary widely in composition and flow rate. These unique event characteristics make it infeasible to collect a grab sample of the gases when a PRD release occurs, and a single grab sample would also likely not account for potential variation in vent gas composition. Additionally, it would be economically prohibitive to construct an appropriate conveyance and install and operate continuous monitoring systems for each individual PRD that vents to atmosphere in order to attempt to quantitatively measure a release event that may occur only a few times in a 3-year period. See *U.S. v. Sugar Corp.*, 830 F.3d 579, 664–67 (D.C. Cir. 2016). Further, we have not identified any available, technically feasible continuous emission monitoring system (CEMS) that can accurately determine a mass release quantity of VOC or HAP given the flow, composition, and composition variability of potential PRD releases that vent to the atmosphere from ethylene production units. Rather, we have identified only monitoring

systems capable of alerting an owner or operator of when a PRD release occurs. Consequently, we propose to conclude that it is appropriate to establish a work practice standard for PRDs that vent to atmosphere as provided in CAA section 112(h).

We also reviewed information about ethylene production facilities to determine how the best performers are minimizing emissions from PRDs that vent to atmosphere. We first reviewed the requirements in EPA's Chemical Accident Prevention Provisions (40 CFR part 68) and Occupational Safety and Health Administration's (OSHA) Process Safety Management rule (29 CFR 1910.119). These rules focus on planning for and minimizing or preventing scenarios which would result in releases of chemicals. For example, as stated in appendix C to the OSHA rule: "Process safety management is the proactive identification, evaluation and mitigation or prevention of chemical releases that could occur as a result of failures in process, procedures or equipment." The rules are applicable to any equipment in the process, and relief valves are identified in each rule as an applicable source to evaluate. The EPA and OSHA rules have similar requirements, except that applicability determination is unique to each rule. Owners or operators are subject to the EPA's Chemical Accident Prevention Provisions at 40 CFR part 68 if a process has more than a threshold quantity of a regulated substance. Regulated substances and their thresholds are listed at 40 CFR 68.130. Owners or operators are subject to OSHA's Process Safety Management rule at 29 CFR 1910.119 if a process involves either a chemical that is above specified threshold quantities (listed in appendix A to 29 CFR 1910.119) or a Category 1 flammable gas or liquid. Ethylene production facilities are subject to the Chemical Accident Prevention Provisions rule, as identified in their title V permit (40 CFR 68.215 requires permits to list part 68 as an applicable requirement, if subject). As a result, we further reviewed this rule for consideration in developing the work practice standard.

The EPA's Chemical Accident Prevention Provisions require a prevention program. Ethylene production facilities would fall under either prevention program 1 or 3 (due to the NAICS code). We evaluated program 3, which is more stringent, because it is our understanding that ethylene production facilities would not meet the program 1 criteria, based on a review of the rule's applicability requirements and preamble rationale. Furthermore,

since program 3 is the most stringent program, we believe the best performers in the source category are following this program. The program 3 prevention program includes: Documentation of process safety information, conducting a hazard analysis, documentation of operating procedures, employee training, on-going maintenance, and incident investigations. The process safety information documented must include information pertaining to the hazards of the regulated substances in the process, the technology of the process, and the process equipment (including relief valves). When conducting the hazard analysis, facilities must identify, evaluate, and control the hazards in the process; controls may consider the application of detection methodologies (e.g., process monitoring and control instrumentation) to provide early warning of releases. The operating procedures must address multiple operating scenarios (e.g., normal operations, startup, emergency shutdown) and provide instructions for safely conducting process activities. The acts of conducting the hazard analysis and documenting operating procedures are similar to prevention measures, discussed below, though we note a specific number of measures or controls is not specified for the program 3 prevention program. Incident investigations must document the factors that contributed to an incident and any resolutions and corrective actions (incident investigations are consistent with root cause analysis and corrective action, discussed below). Facilities are also required to document this information in a Risk Management Plan that must be updated at least every 5 years.

Next, we considered that some companies operating ethylene production facilities also own and operate petroleum refineries and may have established company-wide best practices as a result of specific state and Federal requirements. For example, petroleum refineries located in certain counties in California are subject to and complying with specific requirements for PRDs such as the Bay Area Air Quality Management District (BAAQMD) Rule 8–28–304 and South Coast Air Quality Management District (SCAQMD) Rule 1173. The BAAQMD rule requires implementation of three prevention measures and both rules require root cause analysis and corrective action for certain PRDs. These rules also formed the basis of the work practice standards promulgated for PRD releases at petroleum refineries in the Petroleum Refinery Sector RTR

performed by the EPA (80 FR 75178, December 1, 2015).

Considering our review of the EPA's Chemical Accident Prevention Provisions and company-wide best practices that ethylene facilities may have implemented, we expect that the best performing ethylene production facilities have implemented a program for PRDs that vent to atmosphere that consists of using at least three prevention measures and performing root cause analysis and corrective action in the event that a PRD does release emissions directly to the atmosphere. We used this information as the basis of the work practice standards that we are proposing at 40 CFR 63.1107(h)(3). Examples of prevention measures include: Flow indicators, level indicators, temperature indicators, pressure indicators, routine inspection and maintenance programs or operator training, inherently safer designs or safety instrumentation systems, deluge systems, and staged relief systems where the initial PRD discharges to a control system.

We are also proposing a limit on the number of PRD releases that would result in a deviation to the work practice standard for PRDs that vent to atmosphere. We believe setting criteria to determine a deviation is necessary for the work practice to be effective. We considered limits on the number of PRD releases in both 3- and 5-year periods. Based on a Monte Carlo analysis of random rare events (as conducted for the Petroleum Refinery Sector MACT),<sup>27</sup> we note that it is quite likely to have two or three events in a 5-year period when a long time horizon (e.g., 20 years) is considered. Therefore, we are proposing to limit the number of PRD releases from a single PRD to either two or three (depending on the root cause) in a 3-year period as the basis of a deviation of the work practice standard. We considered it reasonable to use a 3-year period rather than a 5-year period given that company-wide best practices forming the basis of the work practice standards promulgated for PRD releases at petroleum refineries are also our underlying basis for the proposed work practice standards at ethylene production facilities. We are proposing that it is a deviation of the work practice standard if a single PRD that vents to atmosphere has two releases within a 3-year period due to the same root cause. We believe that this provision will help ensure that root cause/corrective action are conducted effectively. Otherwise, we are proposing that it is a deviation of the work practice standard if a single

<sup>27</sup> See 80 FR 75217, December 1, 2015.

PRD that vents to atmosphere has three releases within a 3-year period for any reason. In addition, we are proposing that any PRD release for which the root cause was determined to be operator error or poor maintenance is a deviation of the work practice standard. We are proposing that “force majeure” events would not be included when counting the number of releases. As previously discussed in section IV.A.1.b of this preamble, we are proposing to define “Force majeure” as including events resulting from natural disasters, acts of war or terrorism, or external power curtailment beyond the facility’s control. These types of events are beyond the control of the owner or operator. We are providing that these events should not be included in the event count, but that they would be subject to the root cause analysis in order to confirm whether the release was caused by a force majeure event.

In addition, consistent with our treatment of ethylene process vents (in general, an open PRD is essentially the same as an ethylene process vent that is vented directly to the atmosphere), we believe that it is appropriate to exclude certain types of PRDs that have very low potential to emit based on their type of service, size, and/or pressure from the proposed work practice standard for PRD releases that vent to atmosphere. Both the Chemical Accident Prevention Provisions and the California Petroleum Refinery PRD rules also exempt or impose simpler requirements for certain PRDs. We are proposing at 40 CFR 63.1107(h)(5) that the following types of PRDs would not be subject to the work practice standard for PRDs that vent to the atmosphere: (1) PRDs with a design release pressure of less than 2.5 pounds per square inch gauge (psig); (2) PRDs in heavy liquid service; (3) PRDs that are designed solely to release due to liquid thermal expansion; and (4) pilot-operated and balanced bellows PRDs if the primary release valve associated with the PRD is vented through a control system. Each of the types of PRDs that we are proposing are not subject to the work practice standard are discussed in greater detail here. With regard to PRDs with a design release pressure of less than 2.5 psig, it is technically infeasible to pipe sources with a release pressure of less than 2.5 psig to a flare (or other similar control system) because the back pressure in the flare header system generally exceeds 2.5 psig. Therefore, we are proposing that PRDs with a design release pressure of less than 2.5 psig are not subject to the work practice standard. With regard to PRDs in heavy liquid service, any

release from a PRD in heavy liquid service would have a visual indication of a leak and any repairs to the valve would have to be further inspected and, if necessary, repaired under the existing equipment leak provisions. Therefore, we are proposing that PRDs in heavy liquid service are not subject to the work practice standard. In addition, we are proposing that PRDs designed solely to release due to liquid thermal expansion are not subject to the work practice standard. We expect that releases from these thermal relief valves would be small. Finally, we are also proposing that pilot-operated PRDs (where emissions can be released to the atmosphere through a pilot discharge vent) and balanced bellow PRDs (where emissions can be released to the atmosphere through a bonnet vent) are not subject to the work practice standard, if the primary release valve associated with the pilot-operated or balanced bellows PRD is vented through a control system. Pilot-operated and balanced bellows PRDs are primarily used for pressure relief when the back pressure of the discharge vent may be high or variable. Conventional pressure relief devices act on a differential pressure between the process gas and the discharge vent. If the discharge vent pressure increases, the vessel pressure at which the PRD will open increases, potentially leading to vessel over-pressurization that could cause vessel failure. Balanced bellows PRDs use a bellow to shield the pressure relief stem and top portion of the valve seat from the discharge vent pressure. A balanced bellows PRD will not discharge gas to the atmosphere during a release event, except for leaks through the bonnet vent due to bellows failure or fatigue. Pilot-operated PRDs use a small pilot safety valve that discharges to the atmosphere to effect actuation of the primary valve or piston, which then discharges to a control system. Balanced bellows or pilot operated PRDs are considered a reasonable and necessary means to safely control the primary PRD release.

For all PRDs in organic HAP service, owners or operators would still be required to comply with the LDAR provisions, as they are currently applicable. Therefore, all PRDs that vent to the atmosphere would still perform LDAR to ensure the PRD properly reseats if a release does occur, and PRDs that vent to control systems would still be exempt from LDAR requirements given that if a release were to occur from these specific class of PRDs, it would vent to a closed vent system and control device.

Finally, to ensure compliance with the proposed work practice standard for

PRDs that vent to the atmosphere, we are also proposing to require that sources monitor these PRDs using a system that is capable of identifying and recording the time and duration of each pressure release and of notifying operators that a pressure release has occurred. Pressure release events from PRDs that vent to atmosphere have the potential to emit large quantities of HAP. Where a pressure release occurs, it is important to identify and mitigate it as quickly as possible. For purposes of estimating the costs of this requirement, we assumed that operators would install electronic monitors on PRDs that vent to atmosphere to identify and record the time and duration of each pressure release. However, we are proposing to allow owners and operators to use a range of methods to satisfy these requirements, including the use of a parameter monitoring system (that may already be in place) on the process operating pressure that is sufficient to indicate that a pressure release has occurred as well as record the time and duration of that pressure release. Based on our cost assumptions, the nationwide capital cost of installing these electronic monitors is \$966,000 and the annualized capital cost is \$130,000 per year.

We also considered requiring all PRDs to be vented to a control device as a beyond-the-floor requirement. While this would provide additional emission reductions beyond those we are establishing as the MACT floor, these reductions come at significant costs. Capital costs for requiring control of all PRDs that vent to atmosphere is estimated to be approximately \$13.1 million compared to \$1.43 million for the requirements described above. The total annualized cost for requiring control of all PRDs that vent to atmosphere is estimated to be approximately \$2.58 million/year compared to \$270,000 per year for the requirements described above. We estimate that the incremental cost-effectiveness of requiring control of all PRDs that vent to atmosphere compared to the requirements described above exceeds \$40 million per ton of HAP reduced. Consequently, we conclude that this is not a cost-effective option.

The EPA is also proposing a requirement that any future installed pilot-operated PRDs be the non-flowing type. As previously noted, under CAA section 112(d)(1), the EPA may “distinguish among classes, types, and sizes of sources” when establishing standards. There are two designs of pilot-operated PRDs: Flowing and non-flowing. When a flowing pilot-operated PRD is actuated, the pilot discharge vent

continuously releases emissions; however, when a non-flowing pilot-operated PRD is actuated, the pilot discharge vent does not vent continuously. Although we expect pilot discharge vent emissions to be minimal for both designs, limiting the future use of flowing pilot-operated PRDs is warranted to prevent continuous release of emissions. Therefore, we are proposing at 40 CFR 63.1107(h)(8) to require future installation and operation of non-flowing pilot-operated PRDs at all affected sources.

Although “pressure relief device” is defined in 40 CFR part 63, subpart YY (and applies to the other source categories regulated under the NESHAP, including Acetal Resins Production, Acrylic and Modacrylic Fiber Production, Carbon Black Production, Cyanide Chemicals Manufacturing, Hydrogen Fluoride Production, Polycarbonate Production, and Spandex Production source categories), “relief valve” is not defined. Therefore, we are proposing a definition of “pressure relief device” and “relief valve” that would only apply to the EMACT standards. We are proposing to define “pressure relief device” as a valve, rupture disk, or similar device used only to release an unplanned, nonroutine discharge of gas from process equipment in order to avoid safety hazards or equipment damage. A pressure relief device discharge can result from an operator error, a malfunction such as a power failure or equipment failure, or other unexpected cause. Such devices include conventional, spring-actuated relief valves, balanced bellows relief valves, pilot-operated relief valves, rupture disks, and breaking, buckling, or shearing pin devices. We are proposing to define “relief valve” as a type of pressure relief device that is designed to re-close after the pressure relief.

For details on the assumptions and methodologies used in this analysis, see the technical memorandum titled *Review of Regulatory Alternatives for Certain Vent Streams in the Ethylene Production Source Category*, which is in Docket ID No. EPA-HQ-OAR-2017-0357.

#### b. Closed Vent System Containing Bypass Lines

The EMACT standards require ethylene process vents to vent through a closed vent system and APCD that meet the requirements of 40 CFR part 63, subpart SS. For a closed vent system containing bypass lines that can divert the stream away from the APCD to the atmosphere, the EMACT standards require the owner or operator to either:

(1) Install, maintain, and operate a continuous parametric monitoring system (CPMS) for flow on the bypass line that is capable of detecting whether a vent stream flow is present at least once every hour, or (2) secure the bypass line valve in the non-diverting position with a car-seal or a lock-and-key type configuration (These bypass line requirements are in 40 CFR part 63, subpart SS.) Under option 2, the owner or operator is also required to inspect the seal or closure mechanism at least once per month to verify the valve is maintained in the non-diverting position (see 40 CFR 63.998(d)(1)(ii)(B) for more details). To ensure standards apply to ethylene process vents at all times, we are proposing at 40 CFR 63.1103(e)(6) that an owner or operator may not bypass the APCD at any time, and if a bypass is used, then we are proposing that owners or operators estimate and report the quantity of organic HAP released. We are proposing this revision because bypassing APCD could result in a release of regulated organic HAP to the atmosphere to be consistent with *Sierra Club v. EPA*, 551 F.3d 1019 (D.C. Cir. 2008), where the Court determined that standards under CAA section 112(d) must provide for compliance at all times. We are also proposing that the use of a cap, blind flange, plug, or second valve on an open-ended valve or line is sufficient to prevent a bypass.

#### c. In Situ Sampling Systems (Online Analyzers)

The current definition of “ethylene process vent” at 40 CFR 63.1103(e)(2) states that “in situ sampling systems (online analyzers)” are not ethylene process vents. For several reasons, we are proposing to remove “in situ sampling systems (online analyzers)” from the list of vents not considered ethylene process vents. First, the language used in this exclusion is inconsistent. We generally consider “in situ sampling systems” to be non-extractive samplers or in-line samplers. There are certain in situ sampling systems where the measurement is determined directly through a probe placed in the process stream line. Such sampling systems do not have an atmospheric vent, so excluding these from the definition of “ethylene process vent” is not meaningful. The parenthetical term “online analyzers” generally refers to sampling systems that feed directly to an analyzer located at the process unit and has been interpreted to exclude the “online” analyzer’s vent from the definition of ethylene process vent. As these two terms do not consistently refer to the

same type of analyzer, the provision is ambiguous.

Second, we find that there is no technical reason to include analyzer vents in a list of vents not considered ethylene process vents. For extractive sampling systems and systems with purges, the equipment leak provisions in the EMACT standards require that the material be returned to the process or controlled. Thus, the only potential emissions from any sampling system compliant with the EMACT equipment leak provisions would be from the analyzer’s “exhaust gas” vent. The parenthetical term “online analyzers” indicates that the focus of the exemption is primarily on the analyzer (or analyzer vent) rather than the sampling system. This phrase has been interpreted to exclude the “online” analyzer’s vent from the definition of ethylene process vents. Analyzer venting is expected to be routine (continuous or daily intermittent venting).

We are proposing to delete this exclusion from the definition of “ethylene process vent” and to require these vents to meet the standards applicable to ethylene process vents at all times. We solicit comment on the existence of any online analyzers and why such vents are not amenable to control.

#### d. Maintenance Activities

The current definition of “ethylene process vent” at 40 CFR 63.1103(e)(2) states that “episodic or nonroutine releases such as those associated with startup, shutdown, and malfunction” are not ethylene process vents. We are proposing to remove “episodic or nonroutine releases” from the list of vents not considered ethylene process vents in order to ensure that the EMACT standard includes emission limits that apply at all times consistent with *Sierra Club v. EPA*. Because the definition of “ethylene process vent” only includes gas streams that are continuously discharged, clarification in this definition is also needed to ensure “episodic or nonroutine releases” are also covered. Thus, we are proposing that gas streams that are “periodically discharged” be included in the definition of ethylene process vent, and we are proposing a definition for “periodically discharged” at 40 CFR 63.1103(e)(2). Since vent streams that are “periodically discharged” were previously excluded from control requirements, we determined that the best performers would be controlling vent streams that had concentrations greater than 20 parts per million by volume HAP (*i.e.*, the control level

currently for ethylene process vents) and total volatile organic compound emissions of 50 lbs per day or more (*i.e.*, the control level of mass emissions for vent streams during periods of startup, shutdown, and maintenance from state permits for the best performing sources discussed further in this section).

We recognize that this proposed change for vent streams that are “periodically discharged” will affect certain maintenance activities such as those that require equipment openings, and we consider maintenance activities a separate class of startup and shutdown emissions because there must be a point in time when the equipment can be opened and any emissions are vented to the atmosphere. We also acknowledge that it would require a significant effort to identify and characterize each of these potential release points (*e.g.*, for permitting purposes).

We reviewed state permit conditions and determined the best performers permits specify that they meet certain conditions before they open equipment to the atmosphere. The conditions include thresholds regarding the lower explosive limit (LEL) and the mass of gas that may be emitted. Therefore, we are proposing a work practice standard at 40 CFR 63.1103(e)(5) that prior to opening process equipment to the atmosphere during maintenance events, the equipment first be drained and purged to a closed system so that the hydrocarbon content is less than or equal to 10 percent of the LEL. For those situations where 10-percent LEL cannot be demonstrated, we are proposing that the equipment may be opened and vented to the atmosphere if the pressure is less than or equal to 5 psig, provided there is no active purging of the equipment to the atmosphere until the LEL criterion is met. We are proposing this 5 psig threshold to acknowledge a certain minimum pressure must exist for the flare header system (or other similar control system) to operate properly. We are also proposing that equipment may be opened when there is less than 50 lbs of VOC that may be emitted to the atmosphere.

We also acknowledge that installing a blind to prepare equipment for maintenance may be necessary and by doing so, the owner or operator may not be able to meet the proposed maintenance vent conditions mentioned above (*e.g.*, a valve used to isolate the equipment will not seat fully so organic material may continually leak into the isolated equipment). To limit the emissions during the blind installation, we are proposing to require depressurizing the equipment to 2 psig or less prior to equipment opening and

maintaining pressure of the equipment where purge gas enters the equipment at or below 2 psig during the blind flange installation. The low allowable pressure limit will reduce the amount of process gas that will be released during the initial equipment opening and the ongoing 2 psig pressure requirement will limit the rate of purge gas use. Together, these proposed provisions will limit the emissions during blind flange installation and will result in comparable emissions allowed under the proposed maintenance vent conditions mentioned above. We expect these situations to be rare and that the owner or operator would remedy the situation as soon as practical (*e.g.*, replace the isolation valve or valve seat during the next turnaround in the example provided above). Therefore, we are only proposing that this alternative maintenance vent limit be used under those situations where the proposed primary limits (*i.e.*, hydrocarbon content is less than or equal to 10 percent of the LEL, pressure is less than or equal to 5 psig, or VOC is less than 50 lbs) are not achievable and blinding of the equipment is necessary.

To demonstrate compliance with this work practice standard, we are proposing provisions that include documenting procedures for equipment openings and verifying that events meet the specific conditions above using site procedures for de-inventorying of equipment for safety purposes (*i.e.*, hot work or vessel entry procedures). We are also proposing that owners or operators document each circumstance where the alternative maintenance vent limit is used, providing an explanation why other criteria could not be met prior to equipment blinding and an estimate of the emissions that occurred during the equipment blinding process. We calculated the capital costs for this work practice to be \$26,000, with annualized capital costs of \$16,000.

See the technical memorandum titled *Review of Regulatory Alternatives for Certain Vent Streams in the Ethylene Production Source Category*, in Docket ID No. EPA-HQ-OAR-2017-0357, for additional details and discussion.

#### e. Flares and Fuel Gas Systems

The current definition of “ethylene process vent” at 40 CFR 63.1103(e)(2) states that “gaseous streams routed to a fuel gas system” are not ethylene process vents because the combustion device (typically a boiler or process heater) burning these gaseous streams as fuel effectively achieve the most stringent level of control (*i.e.*, 98-percent organic HAP reduction or an outlet organic HAP concentration of 20

parts per million by volume (ppmv) for all vent streams). In addition, other EMAX standards (*e.g.*, standards for transfer racks) also allow emissions to be routed to a fuel gas system for compliance purposes. However, there can be instances when gaseous streams from the fuel gas system that would otherwise be combusted in a boiler or process heater are instead routed to a flare (*e.g.*, overpressure in the fuel gas system, used as flare sweep gas, used as flare purge gas). In cases where an emission source is required to be controlled in the EMAX standards but is routed to a fuel gas system, we are proposing that any flare receiving gases from that fuel gas system comply with the flare operating and monitoring requirements discussed in section IV.A.1 of this preamble. We recognize that this proposed provision may require owners or operators that use fuel gas for any purpose (*e.g.*, flare sweep gas, flare purge gas, flare supplemental gas) in other flare APCDs that predominately control emissions from other source categories to comply with the proposed flare revisions discussed in section IV.A.1 of this preamble. Thus, in order to minimize this impact, we are proposing that any flare that utilizes fuel gas whereby the majority (*i.e.*, 50 percent or more) of the fuel gas in the fuel gas system is derived from an ethylene production unit comply with the flare operating and monitoring requirements discussed in section IV.A.1 of this preamble.

#### 3. Ethylene Cracking Furnace Decoking Operations

During normal operation, an ethylene cracking furnace is designed to subject certain hydrocarbon feedstocks (*i.e.*, ethane, propane, butane, naphtha, or gas oils) to high temperatures in the presence of steam to “crack” the feedstock (*i.e.*, break the feedstock molecules apart). The feedstock travels through the furnace through piping (or tubing) and is designed such that the feedstock (and subsequent products formed from the “cracking” of the feedstock) should never come into direct contact with the fuel being burned in the furnace. The feedstock first passes through piping in the top portion of the furnace (called the “convection” section) for preheating; steam is then added after the feedstock has traveled through a portion of the piping. This steam is called diluted steam because it acts as a diluting agent that lowers the partial pressure of the feedstock and keeps the feedstock molecules from recombining once broken apart. The feedstock/steam mixture then passes through piping in



the bottom portion of the furnace (called the “radiant” section or “firebox”) where the “cracking” of the hydrocarbon feedstock occurs inside the piping (or “radiant tube”). The cracked gas products formed from the “cracking” of the hydrocarbon feedstock in each furnace are passed through one or more heat exchangers and aggregated into a cracked gas header via a system of transfer line valves prior to downstream operations.

As hydrocarbon feedstock and steam passes through the radiant tubes of an ethylene cracking furnace, over time, a layer of carbon (*i.e.*, coke) builds up on the interior of the tubing forming a physical restrictive barrier. Because of this buildup, the tubing gradually gets hotter during the cracking process (*i.e.*, the temperature of the tubing typically increases by 3 to 4 degrees Fahrenheit per day even with a constant firebox temperature, because the coke acts as an insulator on the tubing). Eventually, the ethylene cracking furnace must be taken out of production, so that coke buildup can be removed from the tubing. This removal of coke buildup is done through combustion and is known as a decoking operation. The EPA considers the coke combustion activity that occurs within the process (*i.e.*, inside the radiant tubes) the emission source from decoking operations, whereas the emissions generated from the fuel combustion activity in the ethylene cracking furnace radiant section (or firebox) a different emission source part of normal operations (65 FR 76408, December 6, 2000).

Prior to decoking, the fuel firing rate of the ethylene cracking furnace is reduced, and the hydrocarbon feedstock that would otherwise be thermally cracked is stopped, leaving steam as the only stream being sent through the piping (or “radiant tubes”). During this time the radiant tube(s) continues to be purged of any remaining feedstock using steam, and this purge stream is sent downstream through the cracked gas header and into the ethylene production process. After all hydrocarbon feedstock is purged from the radiant tube(s), the steam is stopped, and the radiant tube(s) is isolated from the process using transfer line and decoking valves. Once isolated, oxygen (*i.e.*, air) and steam is gradually added inside the radiant tube(s) until the coke ignites, and the exhaust is diverted through a decoke header to either a large cyclone separation device called a “decoking pot” or back into the ethylene cracking furnace firebox. In the current EMAX standards, decoking an ethylene cracking furnace is specifically listed in the definition of “shutdown,” and

procedures to minimize emissions from decoking are required to be addressed in a facility’s SSM plan.<sup>28</sup> However, with the elimination of the SSM exemption (see section IV.E.1 of this preamble for additional discussion), we are proposing work practice standards to control HAP emissions from decoking operations. The work practices would apply to the decoking of any ethylene cracking furnace at a new or existing affected source subject to this subpart.

We are proposing work practices for decoking operations instead of emission limits due to technological and economic limitations. CAA section 112(h)(1) states that the Administrator may prescribe a work practice standard or other requirements, consistent with the provisions of CAA sections 112(d) or (f), in those cases where, in the judgment of the Administrator, it is not feasible to enforce an emission standard. CAA section 112(h)(2)(B) further defines the term “not feasible” in this context to apply when “the application of measurement technology to a particular class of sources is not practicable due to technological and economic limitations.”

The emissions stream generated from decoking operations (*i.e.*, the combination of coke combustion constituents, air, and steam from the radiant tube(s)) is very dilute with a high moisture content (*e.g.*, generally >95 percent water). As part of our CAA section 114 request, we required companies to perform testing for HAP from this emissions source at certain ethylene cracking furnaces (see section II.C of this preamble for details about our CAA section 114 request). A minimum of three decoking cycles were required to be tested; and emissions data were obtained for three test runs spaced over the entire duration of each decoking cycle. The test data collected from industry confirm that HAP emissions, such as non-PAH organic HAP, occur during decoking operations. However, the majority (*i.e.*, 88 percent) of non-PAH organic HAP were found to be below detection levels (BDL). We regard situations where, as here, the majority of measurements are below detection limits, as measurements that are not “technologically practicable” within the meaning of CAA section 112(h). We have also previously

<sup>28</sup>In other words, the EPA considered only the coke removal activity that takes place inside the radiant tube(s) as the “decoking” operation regulated as a shutdown activity. Ethylene cracking furnaces also experience complete shutdowns (where the furnace firebox is taken completely off-line for maintenance or a scheduled turnaround), and cold startups (where the furnace firebox is initially started up following off-line maintenance or a scheduled turnaround).

reasoned that “application of measurement methodologies” under CAA section 112(h) must also mean that a measurement has some reasonable relation to what the source is emitting (*i.e.*, that the measurement yields a meaningful value). We have further explained that unreliable measurements raise issues of practicability, feasibility, and enforceability. Additionally, we have posited that the application of measurement methodology would also not be “practicable due to . . . economic limitation” within the meaning of CAA section 112(h) because it would result in cost expended to produce analytically suspect measurements. Refer to area source Boiler Rule (75 FR 31906, June 4, 2010) and the NESHAP for the Wool Fiberglass Manufacturing source category (80 FR 45280 and 45312, July 29, 2015).

While the CAA section 114 test data show that PAHs and metal HAP are emitted during decoking operations, the majority of the test runs do not meet the underlying requirements of the test methods to be within +/- 10 percent of isokinetic. Isokinetic sampling is required for any method where compounds may exist in a particle or aerosol phase in order to collect a representative sample with respect to a flow weighted average concentration and particle or aerosol size distribution. Without an appropriate isokinetic sample, the data may be biased and unreliable for compliance demonstrations. The EPA was aware that it would be extremely difficult for facilities to meet the +/- 10-percent isokinetic requirement of the sampling methods during the majority of a decoking cycle; however, data were still gathered so that the Agency could better understand the types of HAP that may be potentially emitted from decoking operations. In order to pull a sample in an isokinetic manner, the tester must have knowledge of the large components of the gas stream such as moisture, oxygen, and carbon dioxide (CO<sub>2</sub>). When a gas stream is nearly pure moisture (greater than 90-percent moisture), even slight deviations in the assumed moisture can cause large changes in the flow through the sampling nozzle, which is controlled through dry gas measurements. For example, an assumed gas stream moisture content of 97 percent with a true gas stream moisture content of 98 percent would cause the isokinetic rate to be off by around 30 percent. The same margin of error in moisture assumption at 10- to 20-percent gas stream moisture content (normal combustion levels) would only cause

the isokinetic rate to be off by a couple of percent. This thin margin of error for moisture assumption makes it extremely difficult to achieve required isokinetic rates at these high moisture conditions. Because it is technically and economically impracticable to achieve representative and precise samples for PAHs and metal HAP for all decoking operations, work practice standards are appropriate. Refer to *U.S. Sugar Corp. v. EPA*, 830 F.3d 579, 666–667 (2016).

As coke builds up in radiant tubes, ethylene yield from cracking furnaces decreases and decoking becomes inevitable. Decoking events are undesirable primarily because owners and operators must take the ethylene cracking furnace completely out of ethylene production service; and radiant tube life is shortened from thermal stresses during decoking. Therefore, there is already incentive to minimize coke formation and decoking events. Based on discussions with industry, as well as a review of facility-specific SSM plans that were submitted to the EPA in response to the CAA section 114 request, we determined that owners and operators already conduct work practices to minimize emissions due to coke combustion. In the next few paragraphs below, we discuss the work practices we identified, and explain how each are feasible and effective in reducing coke combustion emissions.

Ethylene cracking furnace flame impingement occurs when flames from the firebox burners make direct contact with the radiant tube(s), creating hot spots on the interior wall of the radiant tube(s) which can lead to coke buildup and eventual tube failure. Generally, during normal operations, owners and operators visually inspect their firebox burners daily for flame impingement. An inspection may include, but is not limited to, visual inspection of the radiant tube(s) for localized bright spots (this may be confirmed with a temperature gun), use of luminescent powders injected into the burner to illuminate the flame pattern, or continued localized coke build-up causing short runtimes between decoking cycles. During the inspection, if the owner or operator finds flame impingement is occurring, then the burner creating the flame impingement on the radiant tube(s) is taken out of service or the alignment of the burner is adjusted such that it no longer impinges on the radiant tube(s). Other actions taken to correct the flame impingement include: Replacing the burner, adjusting burner configuration, making burner air corrections, repairing a malfunction of the fuel liquid removal equipment, or adding insulation around the radiant

tube(s). By preventing flame impingement during normal operations, thermal stress on the radiant tube(s) is reduced (thus, prolonging radiant tube life) and coke formation inside the radiant tube(s) is minimized, which ultimately leads to less frequent decoking and lower coke combustion emissions.

During decoking operations, some owners and operators also continuously monitor (or use grab samples to monitor) the CO<sub>2</sub> concentration at the radiant tube outlet for indication that the coke combustion in the ethylene cracking furnace radiant tube(s) is complete or near completion. A decrease in CO<sub>2</sub> concentration level indicates that there is less coke buildup inside the radiant tube(s) and the majority of the coke has been removed. By identifying when combustion of the coke inside the radiant tube(s) is slowing or stopping; owners and operators can more accurately predict when to stop decoking operations, thus, reducing thermal stress on the radiant tube(s) (prolonging radiant tube life) and preventing unnecessary coke combustion emissions.

In addition to monitoring the CO<sub>2</sub> concentration, some owners and operators continuously monitor the radiant tube(s) outlet temperature (or coil outlet temperature) during decoking operations to ensure the coke combustion occurring inside the radiant tube(s) is not so aggressive (*i.e.*, too hot) that it damages either the radiant tube(s) or ethylene cracking furnace isolation valve(s). If the radiant tube(s) or ethylene cracking furnace isolation valve(s) is damaged, then coke combustion emissions could leak downstream, upsetting the ethylene production process, instead of being routed through the decoking pot and/or cracking furnace firebox.

Furthermore, after decoking operations are complete, but before returning the ethylene cracking furnace back to normal operations, owners and operators may perform the following two additional maintenance steps: Owners and operators purge the radiant tube(s) with steam and verify that all air is removed. This purge step ensures coke formation is minimized once a feedstock is placed back into the radiant tube(s) during normal operations. Also, some owners and operators apply a coating material to the interior of the radiant tube(s) to protect against coke formation inside the radiant tube(s) during normal operation. As mentioned earlier, minimizing coke formation inside the radiant tube(s) ultimately leads to less frequent decoking and less coke combustion emissions.

Based on our review of the SSM plans as well as discussions with stakeholders, we determined that the best performers conduct daily inspections for flame impingement, while also conducting at least two of the other work practices identified above for reducing coke combustion emissions. Based on this information, we are proposing at 40 CFR 63.1103(e)(7) that owners and operators conduct daily inspections for flame impingement and implement at least two of the other work practices we identified above to minimize coke combustion emissions from the decoking of the radiant tube(s) in each ethylene cracking furnace. If the owner or operator chooses to conduct daily firebox flame impingement inspections during normal operations, we are proposing that records be kept that document the day and time each inspection took place, the results of each inspection, and any repairs made to correct the flame impingement. If the owner or operator chooses to monitor the CO<sub>2</sub> concentration during decoking, we are proposing that records be kept for all measured CO<sub>2</sub> concentration values and the target used to indicate combustion is complete. If the owner or operator chooses to monitor the temperature at the radiant tube(s) outlet during decoking, we are proposing that records be kept for all measured temperature values and the target used to indicate a reduction in temperature of the inside of the radiant tube(s) is necessary. If the owner or operator chooses to purge the radiant tube(s) with steam after decoking, but before returning the ethylene cracking furnace back to normal operations, we are proposing that records be kept to document the verification that all air is removed (*e.g.*, some owners and operators monitor the lower explosive limit). If the owner or operator chooses to apply a coating material to the interior of the radiant tube(s) after decoking, but before returning the ethylene cracking furnace back to normal operations, we are proposing that records be kept to document when the coating was applied. In addition, we are proposing that owners and operators include in the periodic report (already required under this rule), instances where the control measures that the owner or operator selected were not followed. We also did not identify any additional options beyond those identified above (*i.e.*, beyond-the-floor options) for minimizing coke formation and minimizing coke combustion emissions.

Finally, we also identified a work practice that the best performers use to

prevent non-coke combustion HAP emissions from escaping to the atmosphere caused by leaks in the transfer line and decoking valves. To minimize the introduction of additional sources of HAP into the ethylene production process or into the atmosphere, some owners and operators conduct inspections of ethylene cracking furnace isolation valves both prior to decoking the radiant tube(s) (to prevent leaks into the ethylene production process which could lead to unnecessary flare activity) and also prior to returning the ethylene cracking furnace to normal operations (to prevent product from escaping to the atmosphere through the decoking pot or furnace firebox). We note that during a 2013 investigation (see Appendix D of the memorandum titled *Assessment of Work Practice Standards for Ethylene Cracking Furnace Decoking Operations Located in the Ethylene Production Source Category*, which is available in Docket ID No. EPA-HQ-OAR-2017-0357), TCEQ staff documented that a facility released more than 800 tons of VOC (including more than 20 tons of 1,3-butadiene) to the atmosphere through a decoking pot because two motor operated valves remained partially open following a decoking cycle. This release allowed loss of process gases during normal operations. We believe that routine inspections of the ethylene cracking furnace isolation valve could have prevented this incident. Based on this information, we are proposing at 40 CFR 63.1103(e)(8) that owners and operators inspect the applicable ethylene cracking furnace

isolation valve(s) prior to decoking the radiant tube(s) to confirm that the radiant tube(s) being decoked is completely isolated from the ethylene production process. Additionally, prior to returning the ethylene cracking furnace to normal operation, we are proposing owners and operators inspect the applicable ethylene cracking furnace isolation valve(s) to confirm that the radiant tube(s) that was decoked is completely isolated from the decoking pot or furnace firebox. We are also proposing that records documenting the day and time each inspection took place be kept, along with the results of each inspection, and any repairs made to correct any isolation issues that were identified. In addition, we are proposing that owners and operators include in the periodic report (already required under this rule), instances where an isolation valve inspection was not conducted. We did not identify any additional options beyond those identified above (*i.e.*, beyond-the-floor options) that would limit non-coke combustion HAP emissions from escaping to the atmosphere when the ethylene cracking furnaces are taken offline for decoking operations and put back online after decoking operations.

We estimate the nationwide annual cost for implementing these proposed work practices is \$151,300 per year. Further discussion on the proposed work practices is provided in the memorandum titled *Assessment of Work Practice Standards for Ethylene Cracking Furnace Decoking Operations Located in the Ethylene Production Source Category*, which is available in

Docket ID No. EPA-HQ-OAR-2017-0357. We solicit comment on the proposal to implement the work practices we identified above to minimize coke combustion emissions from the decoking of the radiant tube(s) in each ethylene cracking furnace, and whether facilities already have these work practices in place or will need to implement one or more for minimizing emissions from decoking operations from ethylene cracking furnaces. We are also seeking comment on the proposal to inspect isolation valves both prior to decoking and prior to returning the ethylene cracking furnace to normal operations, and on other approaches for minimizing emissions from decoking operations.

*B. What are the results of the risk assessment and analyses?*

As described above, for the Ethylene Production source category, we conducted an inhalation risk assessment for all HAP emitted, and multipathway and environmental risk screening assessments on the PB-HAP emitted. We present results of the risk assessment briefly below and in more detail in the document titled *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*, which is available in the docket for this rulemaking.

1. Inhalation Risk Assessment Results

Table 3 of this preamble provides a summary of the results of the inhalation risk assessment for the source category.

TABLE 3—ETHYLENE PRODUCTION INHALATION RISK ASSESSMENT RESULTS

Number of facilities <sup>1</sup>	Maximum individual cancer risk (in 1 million) <sup>2</sup>		Population at increased risk of cancer ≥ 1-in-1 million		Annual cancer incidence (cases per year)		Maximum chronic noncancer TOSHI <sup>3</sup>		Maximum screening acute noncancer HQ <sup>4</sup>
	Based on . . .		Based on . . .		Based on . . .		Based on . . .		Based on actual emissions level
	Allowable emissions level	Actual emissions level	Allowable emissions level	Actual emissions level	Allowable emissions level	Actual emissions level	Actual emissions level	Allowable emissions level	
31 .....	100	100	2.8 million ...	4.6 million ...	0.1	0.2	1	1	HQ <sub>REL</sub> = <1

<sup>1</sup> Number of facilities evaluated in the risk analysis.  
<sup>2</sup> Maximum individual excess lifetime cancer risk due to HAP emissions from the source category.  
<sup>3</sup> Maximum TOSHI. The target organ systems with the highest TOSHI for the source category are neurological and reproductive. The respiratory TOSHI was calculated using the CalEPA chronic REL for acrolein. The EPA is in the process of updating the IRIS RfC for acrolein.  
<sup>4</sup> The maximum estimated acute exposure concentration was divided by available short-term threshold values to develop an array of HQ values. HQ values shown use the lowest available acute threshold value, which in most cases is the REL. When an HQ exceeds 1, we also show the HQ using the next lowest available acute dose-response value.

The results of the inhalation risk modeling using actual emissions data, as shown in Table 3 of this preamble, indicate the estimated cancer MIR is 100-in-1 million, with naphthalene and benzene as the major contributors to the risk. The total estimated cancer incidence from this source category is 0.1 excess cancer cases per year, or one

excess case in every 10 years. Approximately 2.8 million people were estimated to have cancer risks above 1-in-1 million from HAP emitted from the facilities in this source category. The estimated maximum chronic noncancer TOSHI for the source category is 1 (neurological and respiratory) driven by emissions of manganese and

epichlorohydrin. No one is exposed to TOSHI levels above 1. Risk results from the inhalation risk assessment using the MACT-allowable emissions indicate that the estimated cancer MIR is 100-in-1 million with naphthalene and benzene emissions driving the risks, and that the estimated maximum chronic noncancer TOSHI is

1 with manganese and epichlorohydrin as the major contributors to the TOSHI. The total estimated cancer incidence from this source category considering allowable emissions is 0.2 excess cancer cases per year or 1 excess case in every 5 years. Based on allowable emission rates, 4.6 million people were estimated to have cancer risks above 1-in-1 million.

2. Acute Risk Results

As shown in Table 3 of this preamble, the worst-case acute HQ (based on the REL) is less than 1. This value is the highest HQ that is outside facility boundaries. No facilities are estimated to have an HQ greater or equal to than 1 based on any benchmark (REL, AEGL, or EPRG). Acute risk estimates for each facility and pollutant are provided in the risk document titled *Residual Risk Assessment for the Ethylene Production Source Category in Support of the 2019 Risk and Technology Review Proposed Rule*, which is available in the docket for this rulemaking.

3. Multipathway Risk Screening Results

Potential multipathway health risks under a fisher and farmer/gardener scenario were identified using a three-tier screening assessment of the PB-HAP emitted by facilities in this source category. All 31 of the ethylene production facilities have reported emissions of carcinogenic PB-HAP (arsenic and POM). All 31 facilities exceeded a Tier 1 cancer screening value for arsenic, and all but five exceeded a Tier 1 cancer screening value for POM. All 31 facilities have reported emissions of non-carcinogenic PB-HAP (cadmium and mercury). Nineteen facilities exceeded a Tier 1 cancer screening value for mercury, and four exceeded a Tier 1 noncancer screening value for cadmium. For facilities that exceeded the Tier 1 multipathway screening values for one or more PB-HAP, we used additional

facility site-specific information to perform an assessment through Tiers 2 and 3, as necessary, to determine the maximum chronic cancer and noncancer impacts for the source category. For cancer, the highest exceedance of a Tier 2 screening value was by a factor of 30, and further analyses were not performed. For noncancer, there are two facilities that exceed a Tier 3 screening value by a factor of 2 for mercury. In other RTRs where we have exceeded either Tier 2 or Tier 3 screening values of 1 and performed refined facility-specific assessments, the refined estimates have always been at least 80 percent lower than those estimated by the Tier 2 or Tier 3 screening values. For example, in the petroleum refinery RTR, a refined facility-specific assessment was performed for noncancer risk from mercury. The results of this analysis showed that estimated noncancer risk for mercury from the refined assessment was 7 times lower than that predicted by the screening approach (79 FR 36936, June 30, 2014). Given that only an estimated 15-percent reduction in media concentrations for mercury are needed in a refined facility-specific risk assessment to lower the values to 1 (to one significant figure) compared to the Tier 3 screen, and given the fact that results from facility-specific assessments performed for other source categories always have significant trends down in risk, we conclude that a refined facility-specific assessment for the Ethylene Production source category would show a reduction of noncancer risk by at least 15-percent to result in a value of 1 or lower. For this reason and considering the conservative nature of the multipathway exposure screening scenario, further analyses were not performed.

4. Environmental Risk Screening Results

A screening-level evaluation of the potential adverse environmental risk

associated with emissions of arsenic, cadmium, hydrochloric acid, hydrofluoric acid, lead, mercury, and POMs indicated that no ecological benchmarks are exceeded.

5. Facility-Wide Risk Results

The results of the inhalation risk modeling using facility-wide emissions data indicate that the estimated cancer MIR is 2,000-in-1 million, with the major contributor to the risk being ethylene oxide emissions from sources outside the source category (non-ethylene production processes). The total estimated cancer incidence is 1 excess cancer case per year. Approximately 6.5 million people are estimated to have cancer risks above 1-in-1 million. The estimated maximum chronic noncancer TOSHI value is 4 (for the respiratory HI), driven by emissions of chlorine from non-category (non-ethylene production) processes. Approximately 200 people are estimated to be exposed to noncancer HI levels above 1.

6. What demographic groups might benefit from this regulation?

To examine the potential for any environmental justice issues that might be associated with the source category, we performed a demographic analysis, which is an assessment of risks to individual demographic groups of the populations living within 5 km and within 50 km of the facilities. In the analysis, we evaluated the distribution of HAP-related cancer and noncancer risks from the Ethylene Production source category across different demographic groups within the populations living near facilities.<sup>29</sup>

The results of the demographic analysis are summarized in Table 4 of this preamble. These results, for various demographic groups, are based on the estimated risk from actual emissions levels for the population living within 50 km of the facilities.

TABLE 4—ETHYLENE PRODUCTION DEMOGRAPHIC RISK ANALYSIS RESULTS

	Nationwide	Population with cancer risk at or above 1-in-1 million due to ethylene production	Population with chronic HI above 1 due to ethylene production
Total Population .....	317,746,049	2,780,122	0
<b>White and Minority by Percent</b>			
White .....	62	38	0
All Other Races .....	38	62	0

<sup>29</sup> Demographic groups included in the analysis are: White, African American, Native American, other races and multiracial, Hispanic or Latino,

children 17 years of age and under, adults 18 to 64 years of age, adults 65 years of age and over, adults without a high school diploma, people living below

the poverty level, people living two times the poverty level, and linguistically isolated people.

TABLE 4—ETHYLENE PRODUCTION DEMOGRAPHIC RISK ANALYSIS RESULTS—Continued

	Nationwide	Population with cancer risk at or above 1-in-1 million due to ethylene production	Population with chronic HI above 1 due to ethylene production
<b>Minority Detail by Percent</b>			
African American .....	12	21	0
Native American .....	0.8	0.2	0
Hispanic or Latino (includes white and nonwhite) .....	18	37	0
Other and Multiracial .....	7	4	0
<b>Income by Percent</b>			
Below Poverty Level .....	14	18	0
Above Poverty Level .....	86	82	0
<b>Education by Percent</b>			
Over 25 and without High School Diploma .....	14	23	0
Over 25 and with a High School Diploma .....	86	77	0

The results of the Ethylene Production source category demographic analysis indicate that emissions from the source category expose approximately 2.8 million people to a cancer risk at or above 1-in-1 million and no people to a chronic noncancer TOSHI greater than 1. The percentages of the at-risk population in the African American and the Hispanic or Latino demographic groups are higher than their respective nationwide percentages.

The methodology and the results of the demographic analysis are presented in a technical report, *Risk and Technology Review—Analysis of Demographic Factors For Populations Living Near Ethylene Production Source Category Operations*, available in the docket for this action.

*C. What are our proposed decisions regarding risk acceptability, ample margin of safety, and adverse environmental effect?*

#### 1. Risk Acceptability

As noted in section II.A of this preamble, the EPA sets standards under CAA section 112(f)(2) using “a two-step standard-setting approach, with an analytical first step to determine an ‘acceptable risk’ that 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.” 54 FR 38045, September 14, 1989. In this proposal, the EPA estimated risks based on actual and allowable emissions from ethylene production sources, and we considered these in determining acceptability.

The estimated inhalation cancer risk to the individual most exposed to actual emissions from the source category is 100-in-1 million. The estimated incidence of cancer due to inhalation exposures is 0.1 excess cancer cases per year, or one excess case every 10 years. Approximately 2.8 million people face an increased cancer risk greater than 1-in-1 million due to inhalation exposure to HAP emissions from this source category. The Agency estimates that the maximum chronic noncancer TOSHI from inhalation exposure for this source category is 1. Based on allowable emissions, the estimated inhalation cancer risk to the individual most exposed to actual emissions from the source category is also 100-in-1 million, but the estimated incidence of cancer due to inhalation exposures is 0.2 excess cancer cases per year, or one excess case every 5 years. Approximately 4.6 million people face an increased cancer risk greater than 1-in-1 million due to inhalation exposure to allowable HAP emissions from this source category. The maximum chronic noncancer TOSHI from inhalation exposure is 1 based on allowable emissions. The screening assessment of worst-case acute inhalation impacts indicates no facility is estimated to have an HQ greater than 1 based on the REL, AEGL-1 or ERPG-1.

Potential multipathway human health risks were estimated using a three-tier screening assessment of the PB-HAP emitted by facilities in this source category, where the highest exceedance of a Tier 2 screening value is by a factor of 30. For noncancer, the highest exceedance of a Tier 3 screening value is by a factor of 2 for mercury. In evaluating the potential for

multipathway effects from emissions of lead from the source category, we compared modeled maximum annual lead concentrations to the primary NAAQS for lead (0.15 µg/m<sup>3</sup>). Results of this analysis estimate that the NAAQS for lead would not be exceeded at any off-site locations.

For a summary of risk assessment report results for the source category and facility-wide emission impacts, refer to Table 3 of this preamble.

In determining whether risks are acceptable for this source category, the EPA considered all available health information and risk estimation uncertainty as described above. The risk results indicate that the inhalation cancer risks to the individual most exposed are no greater than approximately 100-in-1 million, which is at the presumptive limit of acceptability (see, for example, 54 FR 38045, September 14, 1989). There is only one facility at this risk level and only one person estimated to be exposed at this risk level based on actual emissions, and only one facility and 60 people estimated to be exposed at this risk level based on allowable emissions. The remaining facilities have much lower estimated cancer risks, 30-in-1 million or lower based on actual emissions and 80-in-1 million or lower based on allowable emissions. There are no facilities with an estimated maximum chronic noncancer HI greater than 1. There are no facilities with an acute HQ >1 based on the REL, AEGL-1 or ERPG-1.

Multipathway human health risks are also within limits of acceptability. For cancer, the highest exceedance of a Tier 2 screening value was by a factor of 30, which is well below the presumptive

limit of acceptability. For noncancer, there are two facilities that exceed a Tier 3 screening value by a factor of 2 for mercury. In other RTRs where we have exceeded either Tier 2 or Tier 3 screening values of 1 and performed refined facility-specific assessments, the refined estimates have always been at least 80 percent lower than those estimated by the Tier 2 or Tier 3 screening values. Given that only an estimated 15-percent reduction in media concentrations for mercury are needed in a refined facility-specific risk assessment to lower the values to 1 (to one significant figure) compared to the Tier 3 screen, and given the fact that results from facility-specific assessments performed for other source categories always have significant trends down in risk, we conclude that a refined facility-specific assessment for the Ethylene Production source category would show a reduction of noncancer risk by at least 15-percent to result in a value of 1 or lower. For this reason and considering the conservative nature of the multipathway exposure screening scenario, we conclude these levels are acceptable. The multipathway screening analysis indicates that emissions of lead do not result in concentrations that exceed the NAAQS value.

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 are acceptable because the cancer risks do not exceed the presumptive limit of acceptability and the noncancer results indicate there is minimal likelihood of adverse noncancer health effects due to HAP emissions from this source category.

## 2. Ample Margin of Safety Analysis

We next considered whether the existing MACT standards provide an ample margin of safety to protect public health. In addition to considering all of the health risks and other health information considered in the risk acceptability determination, in the ample margin of safety analysis we evaluated the cost and feasibility of available control technologies and other measures (including the controls, measures, and costs reviewed under the technology review) that could be applied to the source category to further reduce the risks due to emissions of HAP. For purposes of the ample margin of safety analysis, we evaluated the changes in risk that would occur through adoption of a specific technology by looking at the changes to the risk due to both actual and allowable emissions.

As noted in our discussion of the technology review in section IV.D of this preamble, we identified several developments in practices, processes, or control technologies for reducing HAP emissions from emission sources in the Ethylene Production source category. As part of the risk review, we evaluated these developments to determine if any of them could reduce risks and whether it is necessary to require any of these developments to provide an ample margin of safety to protect public health.

We evaluated the health information and control options for all of the emission sources located at ethylene production facilities, including: storage vessels, heat exchange systems, ethylene process vents, transfer racks, equipment leaks, waste operations, ethylene cracking furnaces, flares, decoking operations of ethylene cracking furnaces, and PRDs. For each of these sources, we considered chronic cancer and noncancer risk metrics as well as acute risk. Regarding chronic noncancer risk, we note that no facility in the source category has a baseline TOSHI exceeding 1. Therefore, we did not quantitatively evaluate reductions in the chronic noncancer TOSHI for any emission source in the ample margin of safety analysis. Regarding our assessment of potential acute effects, we note that baseline emissions are unlikely to result in acute health effects because no facility is estimated to have an HQ >1 based on the REL, AEGL-1 or ERPG-1. Accordingly, the following paragraphs focus on cancer risk in the determination of whether the standards provide an ample margin of safety to protect public health.

For storage vessels, as discussed in section IV.D of this preamble, we identified three options that represent developments in practices, processes or control technologies as part of our technology review under CAA section 112(d)(6). We determined that only one of the options, which we call option 1, is cost effective. We evaluated those same control options to determine whether any of them are needed to provide an ample margin of safety as part of our CAA section 112(f)(2) risk analysis. Option 1 would affect only about 4 percent of the storage vessel population in the Ethylene Production source category (*i.e.*, 12 storage vessels at six ethylene production facilities would require additional controls resulting in approximately 34.6 tpy reduction in HAP). Given that only one storage vessel at the facility that is the cancer risk driver would be impacted and that all storage vessels at that facility only contribute to an estimated cancer risk of 5-in-1 million (for both

actual emissions and allowable emissions), we estimate that option 1 would not change the cancer risk to the individual most exposed (rounded to one significant figure). Furthermore, given that all storage vessels account for only about 6 percent of the overall cancer incidence in the source category based on actual emissions (and 3 percent based on allowable emissions) and that option 1 will only impact a very small percentage of all storage vessels in the source category, we estimate option 1 would not change the cancer incidence and would have no discernible impact on the number of people with an estimated cancer risk greater than 1-in-1 million. For the same reasons mentioned above, we expect any reduction in cancer incidence and MIR that would result from options 2 or 3, and reduction in the number of people with a cancer risk greater than 1-in-1 million from implementation of options 2 or 3, would be minimal. Therefore, we are proposing that additional controls for storage vessels are not necessary to provide an ample margin of safety.

For heat exchange systems, as discussed in section IV.D of this preamble, we identified one control option that represents a development in practices, processes or control technologies as part of our technology review under CAA section 112(d)(6). We determined the control option is cost effective and would reduce HAP emissions by 25 tpy. We evaluated whether the control option would be needed to provide an ample margin of safety as part of our CAA section 112(f)(2) risk analysis. Given that heat exchange systems have a small contribution to cancer risk to the individual most exposed (*i.e.*, <1-in-1 million based on actual emissions and 6-in-1 million based on allowable emissions), we estimate that the control option would not change the cancer risk to the individual most exposed (rounded to one significant figure). In assessing the impacts of the control option on cancer incidence, given that heat exchange systems contribute only 3 percent to the overall cancer incidence based on actual emissions, and given that actual HAP emissions would be reduced by about 30 percent, we estimate that this reduction would not have a discernible impact on the cancer incidence or the number of people with an estimated cancer risk greater than 1-in-1 million. With respect to estimating the impacts of the control option on cancer incidence based on allowable emissions, heat exchange systems drive about half of the overall cancer

incidence, and we estimate that allowable emissions would be reduced by the control option evaluated, bringing the allowable cancer incidence down to a level approximately equal to that of the actual cancer incidence (within one significant figure). Thus, in considering all the health risks associated with emissions from heat exchange systems and the minimal risk impact of the control option based on actual emissions, we are proposing that additional controls for this emission source is not necessary to provide an ample margin of safety.

For ethylene process vents, we did not identify any additional control options. Therefore, we are proposing that additional controls for this emission source are not necessary to provide an ample margin of safety.

For transfer racks, we identified and evaluated one control option discussed in the technology review section of this preamble (section IV.D). We estimated that there would be no emission reductions associated with this change, and hence, no reduction in risk. Thus, we propose that this control option for transfer racks is not necessary to provide an ample margin of safety.

For equipment leaks and waste operations, we identified various control options discussed in the technology review section of this preamble (section IV.D). While we estimate that these control options would reduce emissions and that most options would reduce overall cancer risk, the control options evaluated for equipment leaks and waste operations are not cost effective. Thus, considering all of the health risks and other health information considered in the risk acceptability determination, and considering that no cost-effective options were identified for equipment leaks and waste operations, we propose that additional controls for these emissions sources are not necessary to provide an ample margin of safety.

For ethylene cracking furnaces, as previously explained, we requested under our CAA section 114 authority that ethylene production facilities stack test this emissions source. The results of these stack tests were then used to assess risk for the source category. We believe that there is already an inherent level of HAP emissions control realized for emissions generated from ethylene cracking furnaces given the operational characteristics needed for the steam cracking reaction to occur to produce ethylene and/or propylene. In particular, HAP emissions, which are generated because of fuel combustion activities in the ethylene cracking furnace firebox, are controlled as a

result of the high temperatures (*i.e.*, in excess of 2,000 degrees Fahrenheit) needed in the furnace firebox in order to provide process heat to the steam cracking reaction. Thus, ethylene cracking furnaces effectively function like a combustion APCD as a general result of the operating parameters needed for the reaction kinetics driving the commercial production of ethylene and/or propylene. Also, the fuels predominately used in the ethylene cracking furnaces (*e.g.*, natural gas, refinery fuel gas, and/or tail gas from the production process (tail gas from an ethylene production process primarily contains hydrogen, methane, acetylene, and/or other olefins) contain little to no HAP. In addition, emissions from this source are generally released at an elevated height with high flow and high temperature, leading to better dispersion such that impacts on nearby communities are minimized. In assessing the baseline risk impacts from ethylene cracking furnaces, we note that while ethylene cracking furnaces are the largest source of emissions in the source category, these sources have a very small contribution to cancer risk to the individual most exposed (*i.e.*, <1-in-1 million) and contribute to about 20 percent of the overall cancer incidence based on actual emissions and to about 10 percent based on allowable emissions. Thus, in considering all of the health risks associated with emissions from ethylene cracking furnaces and the minimal risk impact of this emissions source, we are proposing that additional controls for this emission source are not necessary to provide an ample margin of safety.

For flares, which are control devices that control emissions from multiple emission source types within the Ethylene Production source category, under CAA sections 112(d)(2) and (3), we are proposing operating and monitoring requirements to ensure flares achieve the 98-percent HAP destruction efficiency identified as the MACT floor in the initial MACT rulemaking in 2002. Flares are critical safety devices that effectively reduce emissions during startup, shutdown, and process upsets or malfunctions, and in many cases, flares are the only means by which emissions from PRDs can be controlled. Thus, we find that properly functioning flares act to reduce HAP emissions, and thereby risk, from this source category. The changes to the flare requirements that we are proposing under CAA sections 112(d)(2) and (3) will result in sources meeting the level required by the original standards. We did not identify any control options that

would further reduce the HAP emissions from flares. Therefore, we are proposing that additional controls for flares are not necessary to provide an ample margin of safety.

In summary, we propose that the existing EMACT standards provide an ample margin of safety to protect public health. We are also specifically requesting comment on whether there are additional control measures for emission sources subject to the EMACT standards that are necessary to provide an ample margin of safety to protect public health.

Further, we note that the decoking of ethylene cracking furnace radiant tubes and PRD releases are emission sources with respect to risk from ethylene production facilities. As described in section IV.A of this preamble, we are proposing requirements for the decoking of the ethylene cracking furnace radiant tube(s) and PRD releases. As part of our risk assessment for this source category, we also considered the risk reductions that would result from implementation of those standards. Because we anticipate some small level of unquantifiable emission reductions from decoking operations and PRD releases, these reductions would likely have no discernable impact on the cancer risk to the individual most exposed or cancer incidence. While our decisions on risk acceptability and ample margin of safety are supported even in the absence of these reductions, if we finalize the proposed requirements for decoking operations and PRD releases, these proposed requirements would further strengthen our conclusions that the standards provide an ample margin of safety to protect public health.

Lastly, regarding the facility-wide risks due to ethylene oxide (described above), which are due to emission sources that are not part of the Ethylene Production source category, we intend to evaluate those facility-wide estimated emissions and risks further and may address these in a separate future action, as appropriate. In particular, the EPA is addressing ethylene oxide based on the results of the latest NATA released in August 2018, which identified the chemical as a potential concern in several areas across the country (NATA is the Agency's nationwide air toxics screening tool, designed to help the EPA and state, local, and tribal air agencies identify areas, pollutants, or types of sources for further examination). The latest NATA estimates that ethylene oxide significantly contributes to potential elevated cancer risks in some census tracts across the U.S. (less than 1 percent of the total number of tracts).



These elevated risks are largely driven by an EPA risk value that was updated in late 2016. The EPA will work with industry and state, local, and tribal air agencies as the EPA takes a two-pronged approach to address ethylene oxide emissions: (1) Reviewing and, as appropriate, revising CAA regulations for facilities that emit ethylene oxide—starting with air toxics emissions standards for miscellaneous organic chemical manufacturing facilities and commercial sterilizers; and (2) conducting site-specific risk assessments and, as necessary, implementing emission control strategies for targeted high-risk facilities. The EPA will post updates on its work to address ethylene oxide on its website at: <https://www.epa.gov/ethylene-oxide>.

### 3. Adverse Environmental Effects

Based on the results of our environmental risk screening assessment, we are proposing that HAP emissions from the Ethylene Production source category do not present an adverse environmental effect. Thus, we are proposing that it is not necessary to set a more stringent standard to prevent, taking into consideration costs, safety, and other relevant factors, an adverse environmental effect.

#### *D. What are the results and proposed decisions based on our technology review?*

The ethylene production source category is composed of the following emission sources: Storage vessels, ethylene process vents, transfer racks, equipment leaks, waste streams, heat exchange systems, and ethylene cracking furnaces and associated decoking operations. To inform our technology reviews for these emissions sources, we reviewed the EPA's Reasonably Available Control Technology/Best Available Control Technology/Lowest Achievable Emission Rate (RACT/BACT/LAER) clearinghouse, subsequent regulatory development efforts, and facility responses to our CAA section 114 request. We then used information provided by facilities that responded to our CAA section 114 request to evaluate the impacts of requiring additional controls identified in the technology review for the Ethylene Production source category. For details about the information we requested under our CAA section 114 request from ethylene production facilities, see section II.C of this preamble. After reviewing information from the aforementioned sources, we have identified certain cost-effective developments in practices, processes, or control technologies to

reduce emissions from some of the sources of HAP emissions regulated by the EMACT standards. Therefore, we are proposing revisions to the EMACT standards for storage vessels and heat exchange systems pursuant to CAA section 112(d)(6).

#### 1. Storage Vessels

Storage vessels are used for storing liquid and gaseous feedstocks used in the ethylene production process, as well as to store liquid and gaseous products from the ethylene production process. Types of storage vessels used in the ethylene production process include atmospheric and high pressure storage vessels. Most storage vessels, which are used for storing process liquids and feedstocks, are designed for operation at atmospheric or near atmospheric pressures. High pressure vessels are used to store compressed gases and liquefied gases. Atmospheric storage vessels are typically cylindrical with a vertical orientation, and are constructed with either a fixed roof or a floating roof. Some, generally small, atmospheric storage vessels are oriented horizontally. High pressure vessels are either spherical or horizontal cylinders.

Under Table 7 to 40 CFR 63.1103(e)(3), the owner or operator of a storage vessel must reduce the organic HAP emissions by 98 weight-percent for storage vessels with a maximum true vapor pressure (MTVP) of total organic HAP of 76.6 kilopascals (kPa) or greater using a closed vent system routed to a flare, non-flare APCD, or fuel gas system or process meeting applicable requirements of 40 CFR part 63, subpart SS. Owners or operators of storage vessels with an MTVP of total organic HAP of 3.4 kPa or greater but less than 76.6 kPa and a capacity of 95 cubic meters (m<sup>3</sup>) or greater can elect to comply with this same control requirement or install either an internal floating roof (IFR) with proper seals or an external floating roof (EFR) with proper seals, and install enhanced fitting controls meeting applicable requirements of 40 CFR part 63, subpart WW. Owners or operators of smaller storage vessels (*i.e.*, those with an MTVP of total organic HAP of 3.4 kPa or greater but less than 76.6 kPa and a capacity of 4 m<sup>3</sup> or greater but less than 95 m<sup>3</sup>) must, at a minimum, fill the storage vessel through a submerged pipe.<sup>30</sup>

<sup>30</sup> These smaller storage vessels can also elect to comply with the more stringent control requirements of reducing organic HAP emissions by 98 weight-percent by routing emissions to closed vent system and APCD (or fuel gas system) meeting 40 CFR part 63, subpart SS or control emissions by

As part of our technology review for storage vessels, we identified the following emission reduction options: (1) Revising the capacity and MTVP thresholds of the EMACT standards to require storage vessels as small as 59 m<sup>3</sup> storing organic liquid with an MTVP of total organic HAP of 0.69 kPa or greater but less than 76.6 kPa to reduce organic HAP emissions by 98 weight-percent by routing emissions to closed vent system and APCD (or fuel gas system) meeting 40 CFR part 63, subpart SS, or controlling emissions through use of an EFR or IFR storage vessel according to the requirements of 40 CFR part 63, subpart WW. For storage vessels as small as 4 m<sup>3</sup> but less than 59 m<sup>3</sup> with an MTVP of total organic HAP of 0.69 kPa or greater but less than 76.6 kPa, they must either meet these same control requirements or fill the vessel through use of a submerged pipe; (2) in addition to requirements specified in option 1, requiring LDAR for fittings on fixed roof storage vessels (*e.g.*, access hatches) using EPA Method 21, and the use of liquid level overflow warning monitors and roof landing warning monitors on storage vessels with an IFR or EFR; and (3) in addition to requirements specified in option 1, the conversion of EFRs to IFRs through use of geodesic domes.

We identified option 1 as a development in practices, processes, and control technologies because it reflects requirements for similar storage vessels that are located at chemical manufacturing facilities subject to the new source Miscellaneous Organic Chemical Manufacturing NESHAP (MON). We believe that option 1 is technologically feasible for storage vessels used at ethylene production facilities. Option 2 is an improvement in practices because these monitoring methods have been required by other regulatory agencies since promulgation of the EMACT and are being used by some of the sources covered by the Ethylene Production source category. Finally, we consider option 3 to be a development in control technology because we found that some storage vessels with EFR have installed geodesic domes since promulgation of the 2002 EMACT standards. A VOC recovery credit for product not lost to the atmosphere from storage vessels was also considered for all three of the options presented.<sup>31</sup>

using an EFR or IFR storage vessel that meets the requirements of 40 CFR part 63, subpart WW.

<sup>31</sup> A VOC recovery credit for storage vessels of \$380 per ton (approximately \$1.20/gallon) was used and is based on an August 2016 market price for naphtha. For more details, see the technical memorandum titled *Clean Air Act Section 112(d)(6)*

Under option 1, we considered the impacts of tightening the capacity and MTVP thresholds of the EMACT standards to reflect the capacity and MTVP threshold of the new source MON standards. This would require tightening both the threshold for MTVP of total organic HAP (*i.e.*, decreasing it from 3.4 kPa or greater to 0.69 kPa or greater) and the threshold for storage vessel capacity (*i.e.*, decreasing it from 95 m<sup>3</sup> to 38 m<sup>3</sup>) specified in Table 7 at 40 CFR 63.1103(e)(3)(a)(1) and 40 CFR 63.1103(e)(3)(b)(1), respectively. However, upon further evaluation of our CAA section 114 Ethylene Production source category information specific to storage vessels, the smallest storage vessel that would be required to add additional controls is an infrequently used fixed roof storage vessel with a capacity of 58 m<sup>3</sup>. Based on the response from the CAA section 114 request, this storage vessel reported using a form of submerged fill to minimize emissions but did not operate in 2013. We determined that it would not be cost effective for this particular storage vessel to add additional controls due to its infrequent use. Thus, in lieu of evaluating impacts for option 1 at the new source MON capacity threshold of 38 m<sup>3</sup>, a threshold of 59 m<sup>3</sup> was chosen so that this storage vessel could continue to use submerged fill as a method of control. After reviewing the CAA section 114 request data, we identified only seven storage vessels that would be impacted by option 1. All of these storage vessels have capacities greater than or equal to 59 m<sup>3</sup> and store material with an MTVP of total organic HAP of 0.69 kPa or greater but less than 76.6 kPa. Therefore, these storage vessels would need to either install an IFR or EFR with proper seals and install enhanced fitting controls as required in 40 CFR part 63, subpart WW. In the alternative, they would need to reduce emissions of total organic HAP by 98

weight-percent by venting emissions through a closed vent system to any combination of APCDs that meet the requirements of 40 CFR 63.982(a)(1).

For option 2, we evaluated the impacts of requiring leak detection monitoring of fittings (*e.g.*, access hatches) on fixed roof storage vessels using EPA Method 21 (annually) and to repair a leak if it is detected. A leak would be defined as an instrument reading greater than 500 ppmv using EPA Method 21. We also evaluated the impacts of enhanced monitoring of the liquid level in the storage vessel (*i.e.*, requiring liquid level overflow warning monitors and roof landing warning monitors on EFRs and IFRs). Levels below a low set point would provide warning of a potential floating roof landing, and levels above a high set point would provide warning of potential overflow. Based on the CAA section 114 request data, we identified 78 storage vessels that would be subject to option 2, of which 14 have fixed roofs (although, in this analysis, seven of these are considered to have been converted to IFR due to option 1, and six of the other seven fixed roof storage vessels route emissions to a process or to a closed vent system and APCD) and the remaining 64 have either an IFR or EFR. In addition, two of the storage vessels with an IFR and one of the storage vessels with an EFR route emissions to a closed vent system and APCD. In order to determine costs for option 2, we added costs for enhanced monitoring requirements to costs determined for option 1.

Under option 3, we considered the impacts of converting storage vessels with EFRs to IFRs through the use of geodesic domes. We assumed for this option that only those storage vessels with EFRs with a capacity greater than or equal to 59 m<sup>3</sup> and that contain liquid with an MTVP of total organic HAP of 0.69 kPa or greater but less than 76.6

kPa would be required to retrofit their storage vessel with a geodesic dome. After reviewing the CAA section 114 request data, we identified 32 storage vessels with EFRs that would be subject to option 3. Therefore, we estimated costs and emissions reductions for 32 EFRs. The costs were added to the costs determined for option 1 to determine the cost of option 3.

Table 5 of this preamble presents the nationwide impacts for the three options considered. See the technical memorandum titled *Clean Air Act Section 112(d)(6) Technology Review for Storage Vessels Located in the Ethylene Production Source Category*, which is available in Docket ID No. EPA-HQ-OAR-2017-0357 for details on the assumptions and methodologies used in this analysis, including the calculations we used to account for additional ethylene production facilities that did not receive a CAA section 114 request, additional facilities that would be subject to the proposed control options and storage vessels from new ethylene production facilities that are either under construction or that started operation in 2017, and major expansions of currently operating facilities. The calculation of the incremental cost effectiveness allows us to assess the impacts of the incremental change between option 1 and the other options.

We determined that option 1 is cost effective and we are proposing to revise the EMACT standards to reflect the more stringent storage vessel capacity and MTVP thresholds of option 1 pursuant to CAA section 112(d)(6). Considering the emissions reductions and high incremental cost effectiveness, we determined that storage vessel options 2 and 3 are not cost effective and are not proposing to revise the EMACT standards to reflect the requirements of these options pursuant to CAA section 112(d)(6).

TABLE 5—NATIONWIDE EMISSIONS REDUCTION AND COST IMPACTS OF CONTROL OPTIONS CONSIDERED FOR STORAGE VESSELS AT ETHYLENE PRODUCTION UNITS

Control option	Total capital investment (\$)	Total annualized costs w/o VOC credit (\$/yr)	VOC emission reductions (tpy)	HAP emission reductions (tpy)	HAP cost effectiveness w/o credits (\$/ton)	Total annualized costs with VOC credit (\$/yr)	HAP cost effectiveness with credits (\$/ton)	HAP incremental cost effectiveness with credits (\$/ton)
1 .....	820,000	152,000	309	34.6	4,400	34,000	1,000	.....
2 .....	1,453,000	373,800	328	40.7	9,190	248,700	6,120	35,400
3 .....	19,909,000	2,723,000	383	58.3	46,700	2,547,000	44,100	107,100

Technology Review for Storage Vessels Located in the Ethylene Production Source Category, which is

available in Docket ID No. EPA-HQ-OAR-2017-0357.

## 2. Ethylene Process Vents

Ethylene production units generate gaseous streams containing HAP. These streams may be routed to other unit operations for additional processing (e.g., a gas stream from a reactor that is routed to a distillation unit for separation), may be sent to one or more recovery devices, a process vent header collection system (e.g., blowdown system) and APCD, and/or may be vented to the atmosphere. Ethylene process vents are gas streams with a flow rate greater than 0.005 standard m<sup>3</sup> per minute containing greater than 20 ppmv HAP that are continuously discharged during operation of an ethylene production unit.

Under Table 7 to 40 CFR 63.1103(e)(3), the owner or operator must reduce organic HAP emissions from ethylene process vents by 98 weight-percent or reduce organic HAP or total organic compounds to a concentration of 20 ppmv, whichever is less stringent, by venting emissions through a closed vent system to any combination of APCDs (e.g., a flare, thermal oxidizer, boiler, process heater, absorber, condenser, or carbon adsorber) that meet applicable requirements of 40 CFR part 63, subpart SS.

In the technology review for process vents, we did not identify any practices, processes, or control technologies beyond those already required by the EMACT standards for process vents. Therefore, we are proposing that it is not necessary to revise EMACT standards for ethylene process vents pursuant to CAA section 112(d)(6). For further details on the assumptions and methodologies used in this analysis, see the technical memorandum titled *Clean Air Act Section 112(d)(6) Technology Review for Ethylene Process Vents Located in the Ethylene Production Source Category*, which is available in Docket ID No. EPA-HQ-OAR-2017-0357.

## 3. Transfer Racks

Transfer racks at ethylene production units are equipment that are used to transfer materials (primarily liquid products) from the facility into either tank trucks or railcars. Emissions from transfer racks may be released when material loaded into tank trucks or railcars displaces vapors inside these transport vehicles.

The EMACT standards at Table 7 to 40 CFR 63.1103(e)(3) allow multiple options to control emissions from applicable transfer racks. These options include the use of APCDs or collecting emissions for use in the production process, a fuel gas system, or a vapor

balance system. To be subject to these requirements, the owner or operator must load materials that have a true vapor pressure of total organic HAP of 3.4 kPa or greater and must load 76 m<sup>3</sup> of HAP-containing material or greater per day (averaged over any consecutive 30-day period).

In our technology review for transfer racks, we identified one emission reduction option which would require changing the transfer rack applicability threshold (for volumetric throughput of liquid loaded) from 76 m<sup>3</sup> per day to 1.8 m<sup>3</sup> per day to reflect the more stringent applicability threshold of other chemical sector standards that regulate emissions from transfer rack operations (i.e., 40 CFR part 63, subparts F and G and 40 CFR part 63, subpart FFFF).

Upon review of the CAA section 114 request data, we identified only one transfer rack that would be subject to this revision. This transfer rack loads red oil material (containing benzene, ethyl benzene, toluene, and xylene) with a true vapor pressure of total organic HAP of 3.4 kPa or greater at a maximum 30-day average throughput of about 48 m<sup>3</sup> per day into tank trucks. We also found that emissions from this transfer rack are routed to a flare, and we, therefore, expect that the owner or operator of this transfer rack is already complying with the requirement to reduce emissions of organic HAP by 98 weight-percent as specified in Table 7 to 40 CFR 63.1103(e)(3). As such, we determined that none of the 21 facilities that responded to the CAA section 114 request would be impacted by changing the transfer rack applicability threshold (for volumetric throughput of liquid loaded) from 76 m<sup>3</sup> per day to 1.8 m<sup>3</sup> per day. We also estimated that there would be no emission reductions associated with this change. While this change would not have direct implementation costs, it would still impose a certain burden on facilities because they would need to read the rule, determine applicability, and meet additional recordkeeping and reporting requirements. Because there are no emissions reductions, and there would be a certain burden to industry, we do not consider this to be a cost-effective option. Therefore, we are proposing that it is not necessary to revise the EMACT standards for transfer racks pursuant to CAA section 112(d)(6). For further details on the assumptions and methodologies used in this analysis, see the technical memorandum titled *Clean Air Act Section 112(d)(6) Technology Review for Transfer Racks Located in the Ethylene Production Source Category*, which is available in Docket ID No. EPA-HQ-OAR-2017-0357.

## 4. Equipment Leaks

Emissions from equipment leaks occur in the form of gases or liquids that escape to the atmosphere through many types of connection points (e.g., threaded fittings) or through the moving parts of valves, pumps, compressors, PRDs, and certain types of process equipment.

The requirements of 40 CFR part 63, subpart UU (National Emission Standards for Equipment Leaks—Control Level 2 Standards), represent the MACT floor for equipment leaks at both new and existing ethylene production units. 40 CFR part 63, subpart UU, specifies LDAR requirements for applicable equipment. The applicable equipment includes: pumps, compressors, agitators, PRDs, sampling collection systems, open-ended valves or lines, valves, connectors, and instrumentation systems that contain or contact material that is 5 percent by weight or more of organic HAP, operate 300 hr/yr or more, and are not in vacuum service. The LDAR requirements vary by equipment (component) type but include EPA Method 21 monitoring at certain frequencies (e.g., monthly, quarterly, every two quarters, annually) and leak definitions (e.g., 500 ppm, 1,000 ppm, 10,000 ppm) if the component is in either gas and vapor service or in light liquid service. The LDAR requirements for components in heavy liquid service include sensory monitoring, and the use of EPA Method 21 monitoring if a leak is identified.

Our technology review for equipment leaks identified two developments in LDAR practices and processes: (1) Lowering the leak definition for valves in gas and vapor service or in light liquid service from 500 ppm to 100 ppm and (2) lowering the leak definition for pumps in light liquid service from 1,000 ppm to 500 ppm. The leak definition for option 1 was identified in the petroleum refinery sector technology review and, based on a recent air permit application, a new ethylene production facility will comply with this leak definition. The leak definition for option 2 was reported by seven ethylene production facilities in the CAA section 114 responses, and this leak definition is also applicable to certain facilities in Texas. We, therefore, considered both options as developments in technology given that they are either required by other regulatory agencies or are in use by some sources covered by the Ethylene Production source category.

Table 6 of this preamble presents the nationwide impacts for the two options considered. A VOC recovery credit for

product not lost to the atmosphere from equipment leaks was also considered for both options presented.<sup>32</sup> See the technical memorandum titled *Clean Air Act Section 112(d)(6) Technology Review for Equipment Leaks in the Ethylene Production Source Category*, which is available in Docket ID No. EPA-HQ-OAR-2017-0357 for details on the assumptions and methodologies

used in this analysis, including the calculations we used to account for additional ethylene production facilities that did not receive a CAA section 114 request, new ethylene production facilities that are either under construction or that started operation in 2017, and major expansions of currently operating facilities.

Based on the costs and emission reductions for each of the options, we consider none of these identified options as cost effective for reducing emissions from equipment leaks at ethylene production units. We are proposing that it is not necessary to revise the EACT standards for equipment leaks pursuant to CAA section 112(d)(6).

TABLE 6—NATIONWIDE EMISSIONS REDUCTION AND COST IMPACTS OF CONTROL OPTIONS CONSIDERED FOR EQUIPMENT LEAKS AT ETHYLENE PRODUCTION UNITS

Control option	Total capital investment (\$)	Total annualized costs w/o credits (\$/yr)	Total annualized costs with credits (\$/yr)	VOC emission reductions (tpy)	HAP emission reductions (tpy)	VOC cost effectiveness w/o credits (\$/ton)	VOC cost effectiveness with credits (\$/ton)	HAP cost effectiveness w/o credits (\$/ton)	HAP cost effectiveness with credits (\$/ton)
1 .....	1,628,500	713,600	575,500	178	19.6	4,000	3,200	36,500	29,400
2 .....	143,300	67,800	65,000	3.5	0.38	19,500	18,700	177,200	170,200

## 5. Waste Streams

Examples of waste streams at ethylene production units include process wastewater, product tank drawdown, sludge and slop oil removed from waste management units, and landfill leachate. Owners and operators of waste streams use wastewater collection systems (including drains, manholes, trenches, lift stations, sumps, and/or junction boxes) to combine waste streams prior to treatment. Wastewater treatment systems are divided into three categories: Primary treatment operations, which include oil-water separators and equalization basins; secondary treatment systems, such as biological treatment units or steam strippers; and tertiary treatment systems, which further treat or filter wastewater prior to discharge to a receiving body of water or reuse in a process. Emissions from these systems occur by volatilization of organic compounds at any water/air interface.

The EACT standards apply to waste streams that contain benzene and continuous butadiene waste streams and are dependent on a facility's total annual benzene (TAB) quantity. For a TAB quantity of 10 megagrams per year (Mg/yr) or greater, owners or operators of all waste streams that have flow rates of at least 0.02 liters per minute (lpm), wastewater quantities of at least 10 Mg/yr, and benzene concentrations of at least 10 parts per million by weight (ppmw), must either manage and treat

these waste streams according to any of the options in the Benzene Waste Operations NESHP (BWON), or transfer the waste off-site. For a TAB quantity of less than 10 Mg/yr, owners or operators of waste streams that contain benzene and are either spent caustic waste streams or dilution steam blowdown waste streams that have flow rates of at least 0.02 lpm and wastewater quantities of at least 10 Mg/yr, must manage and treat the waste streams according to the BWON, but are not allowed to use any of the 1, 2, or 6 Mg/yr compliance options.<sup>33</sup> For any facility TAB quantity, owners and operators of all waste streams that have flow rates of at least 0.02 lpm and 1–3-butadiene concentrations of at least 10 ppmw, must also manage and treat these waste streams according to the BWON (but the treatment and control efficiencies required for benzene in BWON for these waste streams are instead required for 1–3 butadiene, and owners and operators are also not allowed to use any of the 1, 2, or 6 Mg/yr compliance options).

The emission reduction options we identified in the waste stream technology review are: (1) Specific performance parameters for an enhanced biological unit (EBU) beyond those required in the BWON; and (2) treatment of wastewater streams with a VOC content of 750 ppmv or higher by steam stripping prior to any other treatment process for facilities with high organic loading rates (*i.e.*, facilities with

total annualized benzene quantity of 10 Mg/yr or more). Option 1 is intended to improve the performance of wastewater treatment systems that use an EBU, and thereby achieve additional emission reductions. The BWON, as it applies to sources covered under EACT, has limited operational requirements for an EBU. Available data suggest that these systems are generally effective for degrading benzene and other organic HAP; however, without specific performance or operational requirements, the effectiveness of the EBU to reduce emissions can be highly variable. Under option 1, more stringent operating requirements are considered for the EBU at ethylene production units. Option 2 considers segregated treatment of wastewater streams with a volatile organic content of greater than 750 ppmw, or high-strength wastewater streams, directly in a steam stripper (*i.e.*, not allowing these streams to be mixed and treated in the EBU).

Table 7 of this preamble presents the nationwide impacts for the two options considered. See the technical memorandum titled *Clean Air Act Section 112(d)(6) Technology Review for Waste Streams Located in the Ethylene Production Source Category*, in Docket ID No. EPA-HQ-OAR-2017-0357 for details on the assumptions and methodologies used in this analysis, including the calculations we used to account for additional ethylene production facilities that did not receive a CAA section 114 request, additional

<sup>32</sup> A VOC recovery credit of \$776 per ton was used and is based on a November 2016 market price for ethylene.

<sup>33</sup> The BWON requires removal of benzene from the waste stream to 10 ppmw or by 99 weight-percent. For each closed vent system and APCD used to comply with the BWON, a benzene reduction of 98 weight-percent must be achieved.

However, the BWON also includes three compliance options that allow a facility to choose which streams to manage and treat if certain conditions are met: either the TAB quantity for the untreated waste streams cannot exceed 2 Mg/yr, the facility TAB quantity for treated and untreated process wastewater streams is less than 1 Mg/yr, or the facility TAB quantity for all waste streams with

at least 10-percent water content is less than 6 Mg/yr. These options are referred to as the 1, 2, and 6 Mg/yr compliance options. The waste or wastewater streams that can be exempted from management and treatment vary with the different compliance options. Details of these compliance options are specified in 40 CFR 61.342(c) through (e) of the BWON.

impacted facilities from new ethylene production facilities under construction or that started operation in 2017, and major expansions of currently operating facilities. The costs and emissions impacts presented in Table 7 of this

preamble are not incremental between options, but rather incremental from the baseline of compliance with the BWON.

Based on the costs and emission reductions for each of the options, we consider none of the options identified to be cost effective for reducing

emissions from waste streams at ethylene production units. We are proposing that it is not necessary to revise the EMACT standards for waste streams pursuant to CAA section 112(d)(6).

TABLE 7—NATIONWIDE EMISSIONS REDUCTIONS AND COST IMPACTS OF CONTROL OPTIONS CONSIDERED FOR WASTE STREAMS AT ETHYLENE PRODUCTION UNITS

Control option	Total capital investment (\$)	Total annualized costs (\$/yr)	VOC emission reductions (tpy)	HAP emission reductions (tpy)	VOC cost effectiveness (\$/ton)	HAP cost effectiveness (\$/ton)
1 .....	224,050,000	24,727,000	1,986	529	12,450	46,700
2 .....	34,987,000	11,579,000	2,253	600	5,140	19,300

6. Heat Exchange Systems

Heat exchangers are devices or collections of devices used to transfer heat from process fluids to another process fluid (typically water) without intentional direct contact of the process fluid with the cooling fluid (*i.e.*, non-contact heat exchanger). The term “heat exchange system” is used in this preamble to refer collectively to water-cooled heat exchangers and the associated cooling water handling system. There are two types of heat exchange systems: Closed-loop recirculation systems and once-through systems. Closed-loop recirculation systems use a cooling tower to cool the heated water leaving the heat exchanger and then return the newly cooled water to the heat exchanger for reuse. Once-through systems typically use river water as the influent cooling fluid to the heat exchangers, and the heated water leaving the heat exchangers is then discharged from the facility. At times, the internal tubing material of a heat exchanger can corrode or crack, allowing some process fluids to mix or become entrained with the cooling water. Pollutants in the process fluids may subsequently be released from the cooling water into the atmosphere when the water is exposed to air (*e.g.*, in a cooling tower for closed-loop systems or trenches/ponds in a once-through system).

The EMACT standards include an LDAR program for owners or operators of certain heat exchange systems. The LDAR program specifies that heat exchange systems be monitored for leaks of process fluids into cooling water and that owners or operators take actions to repair detected leaks within 45 days. Owners or operators may delay the repair of leaks if they meet the applicable criteria in 40 CFR 63.1088. The current EMACT standards for heat exchange systems allow the use of any

method listed in 40 CFR part 136 for sampling cooling water for leaks for the HAP listed in Table 1 to 40 CFR part 63, subpart XX. Other representative substances such as total organic carbon or VOC that can indicate the presence of a leak can also be used. According to the EMACT standards, a leak in the heat exchange system is detected if the exit mean concentration of HAP (or other representative substance) in the cooling water is at least 10 percent greater than (using a one-sided statistical procedure at the 0.05 level of significance) the entrance mean concentration of HAP (or other representative substance) in the cooling water, and the leak is at least 3.06 kg/hr. Individual heat exchangers are considered leaking, according to the EMACT standards, if the cooling water in the heat exchanger has an exit mean concentration (of HAP or of another representative substance) that is at least 1 ppmw or 10 percent greater than the entrance mean concentration, whichever is greater. Furthermore, the EMACT standards allow owners or operators to monitor for leaks using a surrogate indicator of leaks (*e.g.*, ion specific electrode monitoring, pH, conductivity), provided that certain criteria in 40 CFR 63.1086(c) are met. The EMACT standards for monitoring heat exchange systems according to 40 CFR 63.1086(a) or for monitoring individual heat exchangers according to 40 CFR 63.1086(b) initially require 6 months of monthly monitoring for heat exchange systems at existing sources. If no leaks are detected, the frequency decreases to quarterly monitoring for heat exchange systems at existing sources, until a leak is detected. Once a leak is detected, the frequency changes to monthly monitoring until the leak is repaired and for the following 6 months, at which point the heat exchange system’s monitoring frequency can be reduced back to quarterly. The EMACT

standards initially require 6 months of weekly monitoring for heat exchange systems at new sources. If no leaks are detected, the frequency decreases to monthly monitoring for heat exchange systems at new sources, until a leak is detected. Once a leak is detected, the frequency changes to weekly monitoring until the leak is repaired and for the following 6 months, at which point the heat exchange system’s monitoring frequency can revert to monthly monitoring. Where surrogate monitoring is used for heat exchange systems according to 40 CFR 63.1086(c), heat exchange systems at existing sources must follow the same monitoring frequency as previously discussed in this section; however, heat exchange systems at new sources must always perform weekly monitoring.

Our technology review identified one development in LDAR practices and processes for heat exchange systems. Specifically, the use of the Modified El Paso Method<sup>34</sup> to monitor for leaks. The Modified El Paso Method, which is included in the Petroleum Refinery Sector MACT rule (*i.e.*, 40 CFR part 63, subpart CC), was identified in our review of the RACT/BACT/LAER clearinghouse database. It is also required by the TCEQ for facilities (including eight ethylene production facilities) complying with their HRVOC rule (*i.e.*, 30 TAC Chapter 115, Subchapter H, Division 3). For heat exchange system LDAR programs, the compliance monitoring option, leak

<sup>34</sup> The Modified El Paso Method uses a dynamic or flow-through system for air stripping a sample of the water and analyzing the resultant off-gases for VOC using a common flame ionization detector (FID) analyzer. The method is described in detail in Appendix P of the TCEQ’s Sampling Procedures Manual: *The Air Stripping Method (Modified El Paso Method) for Determination of Volatile Organic Compound (VOC) Emissions from Water Sources*. Appendix P is included in Docket ID No. EPA-HQ-OAR-2017-0357.

definition, and frequency of monitoring for leaks are all important considerations for being able to identify when there is a leak and when to take corrective actions to repair the leak. We, therefore, evaluated the Modified El Paso Method for use at ethylene production facilities, including an assessment of appropriate leak definitions and monitoring frequencies.

In order to identify an appropriate Modified El Paso Method leak definition for ethylene production facilities, we identified two rules, TCEQ's HRVOC rule and the Petroleum Refinery Sector MACT rule, that incorporate this monitoring method and have leak definitions corresponding to use of this methodology. We also reviewed data submitted from our CAA section 114 request, where ethylene production facilities performed sampling using the Modified El Paso Method. The Petroleum Refinery MACT rule and TCEQ's HRVOC rule have leak definitions of total strippable hydrocarbon concentration (as methane) in the stripping gas ranging from 3.1 ppmv to 6.2 ppmv. In addition, sources subject to the Petroleum Refinery Sector MACT rule may not delay the repair of leaks for more than 30 days where, during subsequent monitoring, a total strippable hydrocarbon concentration (as methane) in the stripping gas of 62 ppmv or higher is found. In reviewing the CAA section 114 data, a clear delineation in the hydrocarbon mass emissions data was noticed at 6.1 ppmv of total strippable hydrocarbon (as methane) in the stripping gas. In addition, given that both the leak concentration and water recirculation rate of the heat exchange system are key variables affecting the hydrocarbon mass emissions from heat exchange systems, the overall CAA section 114 data for all heat exchange systems sampled generally showed lower hydrocarbon mass emissions for leaks at or below 6.1 ppmv of total strippable hydrocarbon (as methane) in the stripping gas compared to leaks found above 6.1 ppmv of total strippable hydrocarbon (as methane) in the stripping gas. Taking into account the range of actionable leak definitions in use by other rules that require use of the Modified El Paso Method currently (*i.e.*, 3.1 ppmv–6.2 ppmv of total strippable hydrocarbon (as methane) in the stripping gas), and the magnitude of emissions for leaks of total strippable hydrocarbon (as methane) in the stripping gas above 6.1 ppmv compared to other leaks identified in the CAA section 114 sampling data, we chose to evaluate a leak definition at the upper

end of identified actionable leak definitions in our analysis. Thus, the Modified El Paso Method leak definition we evaluated was 6.2 ppmv of total strippable hydrocarbon concentration (as methane) in the stripping gas for both new and existing ethylene heat exchange systems, along with not allowing delay of repair of leaks for more than 30 days where, during subsequent monitoring, a total strippable hydrocarbon concentration (as methane) in the stripping gas of 62 ppmv or higher is found.

We determined an appropriate leak monitoring frequency by reviewing the current monitoring frequencies that ethylene production facilities are subject to, along with frequencies for the Petroleum Refinery Sector MACT rule and the TCEQ HRVOC rule. As a first step, we reviewed whether it was still reasonable to specify more frequent monitoring for a 6-month period after repair of leaks. Our review of the CAA section 114 data showed that no leaks were identified during the 6-month period for any of the ethylene production facilities that reported heat exchange system compliance data that had leaks. Thus, we find that re-monitoring once after repair of a leak, at the monitoring location where the leak was identified, is sufficient from a continuous compliance perspective to demonstrate a successful repair. The monitoring frequencies currently in 40 CFR part 63, subpart XX, for where no leaks are found were, thus, considered the base frequencies: *i.e.*, quarterly monitoring for existing heat exchange systems and monthly monitoring for new heat exchange systems. Once we determined the base frequencies, we next considered more stringent monitoring frequencies. Both the Petroleum Refinery Sector MACT rule, which includes monthly (or quarterly) monitoring for existing sources, and the TCEQ HRVOC rule, which includes continuous monitoring provisions for existing and new sources, have more stringent monitoring frequencies. However, analysis done for the Petroleum Refinery Sector MACT rule showed that the incremental HAP cost-effectiveness to change from quarterly to monthly monitoring and monthly to continuous monitoring was found to be \$40,000/ton and \$500,000/ton, respectively. Given that the assumed leak distributions used in the analysis to estimate emissions from heat exchange systems at ethylene production facilities are considerably smaller than those used in the Petroleum Refinery Sector MACT analysis (by over an order of magnitude), higher incremental HAP

cost effectiveness are expected for these options at ethylene production facilities compared to petroleum refineries, making them not cost-effective options. Thus, we chose to evaluate quarterly monitoring for heat exchange systems at existing sources and monthly monitoring for heat exchange systems at new sources (*i.e.*, the base monitoring frequency currently in the rule after the initial 6-months of more frequent monitoring is performed).

Based on this technology review, we identified the following control option as a development in practice for heat exchange systems: Quarterly monitoring for heat exchange systems at existing sources (after an initial 6 months of monthly monitoring) and monthly monitoring for heat exchange systems at new sources (after an initial 6 months of weekly monitoring) with the Modified El Paso Method, and using a leak definition of 6.2 ppmv of total strippable hydrocarbon concentration (as methane) in the stripping gas.

We then reviewed the CAA section 114 request data to determine the impacts of this control option. We identified 67 heat exchange systems at 31 ethylene production facilities that would be impacted by requiring the use of the Modified El Paso Method. As part of our analysis, we assumed owners or operators conducting monthly monitoring or quarterly monitoring for three or more of these heat exchange systems would elect to purchase a stripping column and FID analyzer and perform in-house Modified El Paso Method monitoring (because the total annualized costs for in-house Modified El Paso Method monitoring is less than the costs for contracted services for monthly monitoring and because of logistics with facilities having three or more heat exchange systems performing quarterly monitoring). In addition, because owners and operators of 20 of these heat exchange systems (at eight facilities) are required by TCEQ's HRVOC rule to conduct continuous Modified El Paso Method monitoring, we assumed these owners or operators would only incur an annualized repair cost (and no capital costs). Further, we assumed repairs could be performed by plugging a specific heat exchanger tube and, if a heat exchanger that is leaking to the extent that it needs to be replaced, then it is effectively at the end of its useful life. Therefore, we determined that the cost of replacing a heat exchanger is an operational cost that would be incurred by the facility as a result of routine maintenance and equipment replacement and it is not attributable to the control option.

Table 8 of this preamble presents the nationwide impacts for requiring owners or operators to use the Modified El Paso Method and repair leaks of total strippable hydrocarbon concentration (as methane) in the stripping gas of 6.2 ppmv or greater. A VOC recovery credit for product not lost to the atmosphere from leaks in heat exchange systems was also considered for the option presented.<sup>35</sup> See the technical memorandum titled *Clean Air Act Section 112(d)(6) Technology Review for Heat Exchange Systems in the Ethylene Production Source Category*, which is available in Docket ID No. EPA-HQ-OAR-2017-0357 for details on the assumptions and methodologies used in this analysis, including the calculations we used to account for additional ethylene production facilities that did not receive a CAA section 114 request,

new ethylene production facilities that are either under construction or that started operation in 2017, and major expansions of currently operating facilities.

Based on the costs and emission reductions for the identified control option, we are proposing to revise the EMACT standards for heat exchange systems pursuant to CAA section 112(d)(6). We are proposing at 40 CFR 63.1086(e)(4) to retain quarterly monitoring for heat exchange systems at existing sources (after an initial 6-months of monthly monitoring) and monthly monitoring for heat exchange systems at new sources (after an initial 6-months of weekly monitoring) using the Modified El Paso Method, and a leak definition of 6.2 ppmv of total strippable hydrocarbon concentration (as methane) in the stripping gas. We are

also proposing at 40 CFR 63.1088(d) a delay of repair action level of total strippable hydrocarbon concentration (as methane) in the stripping gas of 62 ppmv, that if exceeded during leak monitoring, would require immediate repair (*i.e.*, the leak found cannot be put on delay of repair and would be required to be repaired within 30 days of the monitoring event). This would apply to both monitoring heat exchange systems and individual heat exchangers by replacing the use of any 40 CFR part 136 water sampling method with the Modified El Paso Method and removing the option that allows for use of a surrogate indicator of leaks. We are also proposing re-monitoring at the monitoring location where a leak is identified to ensure that any leaks found are fixed.

TABLE 8—NATIONWIDE EMISSIONS REDUCTIONS AND COST IMPACT FOR REQUIRING THE MODIFIED EL PASO METHOD FOR HEAT EXCHANGE SYSTEMS AT ETHYLENE PRODUCTION UNITS

Control option	Total capital investment (\$)	Total annualized costs w/o VOC credit (\$/yr)	VOC emission reductions (tpy)	HAP emission reductions (tpy)	HAP cost effectiveness w/o credits (\$/ton)	Total annualized costs with VOC Credit (\$/yr)	HAP cost effectiveness with credits (\$/ton)
1 .....	136,000	26,400	227	25	1,060	(149,600)	(5,980)

*E. What other actions are we proposing?*

In addition to the proposed actions described above, we are proposing additional revisions to the NESHAP. We are proposing revisions to the SSM provisions of the MACT rule in order to ensure that they are consistent with the Court decision in *Sierra Club v. EPA*, 551 F.3d 1019 (D.C. Cir. 2008), which vacated portions of two provisions that exempted sources from the requirement to comply with otherwise applicable CAA section 112(d) emission standards during periods of SSM. We also are proposing revisions to require electronic reporting of performance test results and reports, performance evaluation reports, and NOCS reports, to remove certain exemptions for once-through heat exchange systems, to include overlap provisions for equipment at ethylene production facilities subject to both the EMACT standards and synthetic organic chemicals manufacturing equipment leak standards at 40 CFR part 60, subpart VVa, and to clarify text or correct typographical errors, grammatical errors, and cross-reference errors. Our analyses and proposed

changes related to these issues are discussed below.

1. SSM

In its 2008 decision in *Sierra Club v. EPA*, 551 F.3d 1019 (D.C. Cir. 2008), the Court vacated portions of two provisions in the EPA’s CAA section 112 regulations governing the emissions of HAP during periods of SSM. Specifically, the Court vacated the SSM exemption contained in 40 CFR 63.6(f)(1) and 40 CFR 63.6(h)(1), holding that under section 302(k) of the CAA, emissions standards or limitations must be continuous in nature and that the SSM exemption violates the CAA’s requirement that some CAA section 112 standards apply continuously.

a. Proposed Elimination of the SSM Exemption

We are proposing the elimination of the SSM exemption in this rule which appears at 40 CFR 63.1108(a). Consistent with *Sierra Club v. EPA*, we are proposing standards in this rule that apply at all times. We are also proposing several revisions to 40 CFR part 63, subpart YY as is explained in more detail below. For example, we are

proposing to eliminate the requirement that the source develop an SSM plan. We also are proposing to eliminate and revise certain recordkeeping and reporting requirements related to the SSM exemption as further described below.

The EPA has attempted to ensure that the provisions we are proposing to eliminate are inappropriate, unnecessary, or redundant in the absence of the SSM exemption. We are specifically seeking comment on whether we have successfully done so.

We are proposing that startups and shutdowns are normal operation for the Ethylene Production source category. We, therefore, believe that emissions from startup and shutdown activities should be included when determining if all the standards are being attained. As currently proposed in 40 CFR 63.1108(a)(4)(i), compliance with the emission limitations (including operating limits) in this subpart is required “at all times,” except during periods of nonoperation of the affected source (or specific portion thereof) resulting in cessation of the emissions to which this subpart applies. Based on the information for APCD operation

<sup>35</sup> A VOC recovery credit of \$776 per ton was used and is based on a November 2016 market price for ethylene.



received in the CAA section 114 survey issued to the Ethylene Production source category, we conclude that ethylene production facilities will generally be able to comply with the standards during periods of startup and shutdown for the reasons discussed below. Where appropriate, we have also proposed in this preamble alternative standards for certain emission points during periods of SSM to ensure a standard applies “at all times.” Emission reductions for process vents and transfer rack operations are typically achieved by routing vapors to an APCD such as a flare, thermal oxidizer, or carbon adsorber. It is common practice in this source category to start an APCD prior to startup of the emissions source it is controlling, so the APCD would be operating before emissions are routed to it. We expect APCDs would be operating during startup and shutdown events in a manner consistent with normal operating periods, and that these APCDs will be operated to maintain and meet the monitoring parameter operating limits set during the performance test. We do not expect startup and shutdown events to affect emissions from storage vessels, equipment leaks, waste sources (e.g., surface impoundments, oil-water separators, organic-water separators), or heat exchange systems. Working and breathing losses from storage vessels are the same regardless of whether the process is operating under normal operating conditions or if it is in a startup or shutdown event. Leak detection programs associated with equipment leaks and heat exchange systems are in place to detect leaks, and, therefore, it is inconsequential whether the process is operating under normal operating conditions or is in startup or shutdown. Waste emissions are also not expected to be significantly affected by startup or shutdown events.

Periods of startup, normal operations, and shutdown are all predictable and routine aspects of a source’s operations. Malfunctions, in contrast, are neither predictable nor routine. Instead, they are, by definition sudden, infrequent, and not reasonably preventable failures of emissions control, process, or monitoring equipment. (40 CFR 63.2) (Definition of malfunction). The EPA interprets CAA section 112 as not requiring emissions that occur during periods of malfunction to be factored into development of CAA section 112 standards and this reading has been upheld as reasonable by the Court in *U.S. Sugar Corp. v. EPA*, 830 F.3d 579, 606–610 (D.C. Cir. 2016). Under CAA section 112, emissions standards for

new sources must be no less stringent than the level “achieved” by the best controlled similar source and for existing sources generally must be no less stringent than the average emission limitation “achieved” by the best performing 12 percent of sources in the category. There is nothing in CAA section 112 that directs the Agency to consider malfunctions in determining the level “achieved” by the best performing sources when setting emission standards. As the Court has recognized, the phrase “average emissions limitation achieved by the best performing 12 percent of” sources “says nothing about how the performance of the best units is to be calculated.” *Nat’l Ass’n of Clean Water Agencies v. EPA*, 734 F.3d 1115, 1141 (D.C. Cir. 2013). While the EPA accounts for variability in setting emissions standards, nothing in CAA section 112 requires the Agency to consider malfunctions as part of that analysis. The EPA is not required to treat a malfunction in the same manner as the type of variation in performance that occurs during routine operations of a source.

As the Court recognized in *U.S. Sugar Corp.*, accounting for malfunctions in setting standards would be difficult, if not impossible, given the myriad different types of malfunctions that can occur across all sources in the category and given the difficulties associated with predicting or accounting for the frequency, degree, and duration of various malfunctions that might occur. *Id.* at 608 (“the EPA would have to conceive of a standard that could apply equally to the wide range of possible boiler malfunctions, ranging from an explosion to minor mechanical defects. Any possible standard is likely to be hopelessly generic to govern such a wide array of circumstances.”) As such, the performance of units that are malfunctioning is not “reasonably” foreseeable. *See, e.g., Sierra Club v. EPA*, 167 F.3d 658, 662 (D.C. Cir. 1999) (“The EPA typically has wide latitude in determining the extent of data-gathering necessary to solve a problem. We generally defer to an agency’s decision to proceed on the basis of imperfect scientific information, rather than to ‘invest the resources to conduct the perfect study’”). *See also Weyerhaeuser v. Costle*, 590 F.2d 1011, 1058 (D.C. Cir. 1978) (“In the nature of things, no general limit, individual permit, or even any upset provision can anticipate all upset situations. After a certain point, the transgression of regulatory limits caused by ‘uncontrollable acts of third parties,’

such as strikes, sabotage, operator intoxication or insanity, and a variety of other eventualities, must be a matter for the administrative exercise of case-by-case enforcement discretion, not for specification in advance by regulation.”). In addition, emissions during a malfunction event can be significantly higher than emissions at any other time of source operation. For example, if an APCD with 99-percent removal goes off-line as a result of a malfunction (as might happen if, for example, the bags in a baghouse catch fire) and the emission unit is a steady state type unit that would take days to shut down, the source would go from 99-percent control to zero control until the APCD was repaired. The source’s emissions during the malfunction would be 100 times higher than during normal operations. As such, the emissions over a 4-day malfunction period would exceed the annual emissions of the source during normal operations. As this example illustrates, accounting for malfunctions could lead to standards that are not reflective of (and significantly less stringent than) levels that are achieved by a well-performing non-malfunctioning source. It is reasonable to interpret CAA section 112 to avoid such a result. The EPA’s approach to malfunctions is consistent with CAA section 112 and is a reasonable interpretation of the statute.

Although no statutory language compels the EPA to set standards for malfunctions, the EPA has the discretion to do so where feasible. For example, in the Petroleum Refinery Sector RTR, the EPA established a work practice standard for unique types of malfunction that result in releases from PRDs or emergency flaring events because we had information to determine that such work practices reflected the level of control that applies to the best performing sources. 80 FR 75178, 75211–14 (December 1, 2015). The EPA will consider whether circumstances warrant setting standards for a particular type of malfunction and, if so, whether the EPA has sufficient information to identify the relevant best performing sources and establish a standard for such malfunctions. As discussed in sections IV.A.1 and IV.A.2.a of this preamble, we are proposing work practice standards that will apply to PRD releases and flares, respectively, due to their similarities to PRD releases and flares used in the Petroleum Refinery Sector source category. As also previously explained, many parent companies that own and operate facilities subject to the EMAX standards also own and operate

petroleum refineries that are subject to the Petroleum Refinery Sector Rule.

In the event that a source fails to comply with the applicable CAA section 112(d) standards as a result of a malfunction event, the EPA would determine an appropriate response based on, among other things, the good faith efforts of the source to minimize emissions during malfunction periods, including preventative and corrective actions, as well as root cause analyses to ascertain and rectify excess emissions.

Finally, in keeping with the elimination of the SSM exemption, we are proposing in the EMAXT standards at 40 CFR 63.1103(e)(11) to remove the following SSM exemption provisions from the subparts referenced by the EMAXT standards.

- The second sentence of 40 CFR 63.181(d)(5)(i) of subpart H.
- 40 CFR 63.983(a)(5) of subpart SS.
- The phrase “except during periods of start-up, shutdown and malfunction as specified in the referencing subpart” in 40 CFR 63.984(a) of subpart SS.
- The phrase “except during periods of start-up, shutdown and malfunction as specified in the referencing subpart” in 40 CFR 63.985(a) of subpart SS.
- The phrase “other than start-ups, shutdowns, or malfunctions” in 40 CFR 63.994(c)(1)(ii)(D) of subpart SS.
- 40 CFR 63.996(c)(2)(ii) of subpart SS.
- 40 CFR 63.997(e)(1)(i) of subpart SS.
- The term “breakdowns” from 40 CFR 63.998(b)(2)(i) of subpart SS.
- 40 CFR 63.998(b)(2)(iii) of subpart SS.
- The phrase “other than periods of startups, shutdowns, and malfunctions” from 40 CFR 63.998(b)(5)(i)(A) of subpart SS.
- The phrase “other than periods of startups, shutdowns, and malfunctions” from 40 CFR 63.998(b)(5)(i)(C) of subpart SS.
- The phrase “except as provided in paragraphs (b)(6)(i)(A) and (B) of this section” from 40 CFR 63.998(b)(6)(i) of subpart SS.
- The second sentence of 40 CFR 63.998(b)(6)(ii) of subpart SS.
- 40 CFR 63.998(c)(1)(ii)(D), (E), (F), and (G) of subpart SS.
- 40 CFR 63.998(d)(1)(ii) of subpart SS.
- 40 CFR 63.998(d)(3)(i) and (ii) of subpart SS.
- The phrase “(except periods of startup, shutdown, or malfunction)” from 40 CFR 63.1026(e)(1)(ii)(A) of subpart UU.
- The phrase “(except periods of startup, shutdown, or malfunction)”

from 40 CFR 63.1028(e)(1)(i)(A) of subpart UU.

- The phrase “(except periods of startup, shutdown, or malfunction)” from 40 CFR 63.1031(b)(1) of subpart UU.

#### b. General Duty

We are proposing to remove the requirements at 40 CFR 63.1108(a)(5) and 40 CFR 63.1111(a)(2) and are proposing instead to add general duty regulatory text at 40 CFR 63.1108(a)(4)(ii) that reflects the general duty to minimize emissions “at all times,” while eliminating the reference to periods covered by an SSM exemption. The current language in 40 CFR 63.1108(a)(5) and 40 CFR 63.1111(a)(2) characterizes what the general duty entails during periods of SSM. With the elimination of the SSM exemption, there is no need to differentiate between normal operations, startup and shutdown, and malfunction events in describing the general duty. Therefore, the language the EPA is proposing for 40 CFR 63.1108(a)(4)(ii) does not include that language from 40 CFR 63.1108(a)(5) and 40 CFR 63.1111(a)(2).

#### c. SSM Plan

We are proposing to remove certain language at 40 CFR 63.1103(e)(3) and 40 CFR 63.1111(a) requiring owners or operators to develop an SSM plan and specify SSM recordkeeping and reporting requirements related to the SSM plan. As noted, the EPA is proposing to remove the SSM exemptions. Therefore, affected units will be subject to an emission standard during such events. The applicability of a standard during such events will ensure that sources have ample incentive to plan for and achieve compliance and, thus, the SSM plan requirements are no longer necessary.

#### d. Compliance With Standards

We are proposing to remove the current language of 40 CFR 63.1108(a)(1) and (2) which exempts sources from non-opacity standards during periods of SSM. As discussed above, the Court in *Sierra Club* vacated the exemptions contained in this provision and held that the CAA requires that some CAA section 112 standard apply continuously. Consistent with *Sierra Club*, the EPA is proposing to revise standards in this rule to apply at all times.

#### e. Performance Testing

We are proposing to add a performance testing requirement at 40 CFR 63.1108(b)(4)(ii)(B) intended to

replace the performance testing requirements of 40 CFR 63.997(e)(1) (as referenced in 40 CFR 63.1108(b)(4)(ii)(A)). The proposal does not include the language that precludes startup and shutdown periods from being considered “representative” for purposes of performance testing, and instead allows performance testing during periods of startup or shutdown if specified by the Administrator. As in 40 CFR 63.997(e)(1), performance tests conducted under this subpart should not be conducted during malfunctions because conditions during malfunctions are often not representative of normal operating conditions. The EPA is also proposing to add language at 40 CFR 63.1108(b)(4)(ii)(B) that requires the owner or operator maintain records of process information that is necessary to document operating conditions during the test and include in such record an explanation to support that such conditions represent normal operation. Finally, the EPA is proposing to add language clarifying that the owner or operator make such records available to the Administrator upon request.

#### f. Recordkeeping

We are not proposing to change the language at 40 CFR 63.1109(a) requiring owners or operators of each affected source to keep copies of reports. However, we are proposing to completely remove 40 CFR 63.1111(b), which eliminates periodic SSM reports, consequently eliminating the requirement to keep a copy of this report. These requirements are no longer appropriate for startup and shutdown because SSM plans will no longer be required and the EPA is proposing that recordkeeping and reporting applicable to normal operations will apply to startup and shutdown. In the absence of special provisions applicable to startup and shutdown, such as a startup and shutdown plan, there is no reason to retain additional recordkeeping for startup and shutdown periods. See section IV.E.1.a of this preamble for further discussion of this proposed language removal.

Furthermore, in lieu of the requirements applicable to malfunctions in 40 CFR 63.1111(b), we are proposing new recordkeeping requirements at 40 CFR 63.1111(c)(1). The regulatory text we are proposing to add at 40 CFR 63.1111(c)(1)(i) differs from 40 CFR 63.1111(b) in that 40 CFR 63.1111(b) requires the creation and retention of a record for each malfunction during which excess emissions occurred, including total duration of all malfunctions for a reporting period. The EPA is proposing that this requirement

apply to any failure to meet an applicable standard and is requiring that the source record the date, time, and duration of the failure rather than the total duration of all malfunctions with which excess emissions occurred. For each failure to meet an applicable standard, the EPA is also proposing to add to 40 CFR 63.1111(c)(1)(ii) a provision that sources keep records that include a list of the affected source or equipment, an estimate of the quantity of each regulated pollutant emitted over the standard for which the source failed to meet the standard, and a description of the method used to estimate the emissions. Examples of such methods would include product-loss calculations, mass balance calculations, measurements when available, or engineering judgment based on known process parameters. Furthermore, the EPA is proposing to add 40 CFR 63.1111(c)(1)(iii) requiring sources keep records of any corrective actions taken to return the affected unit to its normal or usual manner of operations, and actions taken to minimize emissions in accordance with the general duty regulatory text at 40 CFR 63.1108(a)(4)(ii). The EPA is proposing to require that sources keep records of this information to ensure that there is adequate information to allow the EPA to determine the severity of any failure to meet a standard, and to provide data that may document how the source met the general duty to minimize emissions when the source has failed to meet an applicable standard.

#### g. Reporting

We are proposing to completely remove 40 CFR 63.1111(b) which describes the reporting requirements for SSM. When applicable, 40 CFR 63.1111(b)(1) requires sources to report actions taken during SSM events to show that actions taken were consistent with their SSM plan. When applicable, 40 CFR 63.1111(b)(2) requires sources to report actions taken during SSM events when actions were inconsistent with their SSM plan. To replace the 40 CFR 63.1111(b) reporting requirement, the EPA is proposing to add reporting requirements to 40 CFR 63.1111(c)(2). The replacement language differs from the 40 CFR 63.1111(b) language in that it eliminates periodic SSM reports as a stand-alone report. We are proposing language that requires sources that fail to meet an applicable standard at any time to report the information concerning such events in the periodic report already required under this rule. We are proposing that the report contain the number, date, time, and duration of such events (including unknown cause,

if applicable), a list of the affected source or equipment, an estimate of the quantity of each regulated pollutant emitted over any emission limit, and a description of the method used to estimate the emissions.

Regarding the proposed new requirement, discussed above, to estimate the quantity of each regulated pollutant emitted over any emission limit for which the source failed to meet the standard, and a description of the method used to estimate the emissions, examples of such methods would include product-loss calculations, mass balance calculations, measurements when available, or engineering judgment based on known process parameters (e.g., ethylene production rates and control efficiencies). The EPA is proposing this provision to ensure that there is adequate information to determine compliance, to allow the EPA to determine the severity of the failure to meet an applicable standard, and to provide data that may document how the source met the general duty to minimize emissions during a failure to meet an applicable standard.

We will no longer require owners or operators to determine whether actions taken to correct a malfunction are consistent with an SSM plan, because plans would no longer be required. The proposed amendments, therefore, eliminate 40 CFR 63.1111(b)(2) that requires reporting of whether the source deviated from its SSM plan, including required actions to communicate with the Administrator, and the cross-reference to 40 CFR 63.1111(b)(1) that contains the description of the previously required SSM report format and submittal schedule from this section. These specifications are no longer necessary because the events will be reported in otherwise required reports with similar format and submittal requirements.

We are proposing to completely remove 40 CFR 63.1111(b)(2) for reasons discussed above and because 40 CFR 63.1111(b)(2) describes an immediate report for startups, shutdown, and malfunctions when a source failed to meet an applicable standard but did not follow the SSM plan. We will no longer require owners and operators to report when actions taken during a startup, shutdown, or malfunction were not consistent with an SSM plan, because plans would no longer be required.

#### h. Waste

The BWON provisions that are applicable to waste generated by sources in the Ethylene Production source category are set forth in 40 CFR part 63, subpart XX, and are cross-referenced in

Table 7 to 40 CFR 63.1103(e)(3). With the elimination of the SSM exemption, we are proposing to remove the exemption language at 40 CFR 63.1095(a)(3) and (b)(1) that exempts an owner or operator of continuous butadiene waste streams and waste streams that contain benzene at a facility with a TAB less than 10 Mg/yr from the BWON requirements during periods of SSM. (For more information on how BWON applies to these streams, refer to section IV.D.5 of this preamble.) This exemption does not apply to facilities with a TAB of 10 Mg/yr or greater. An owner or operator of a facility with a TAB less than 10 Mg/yr would be required to comply with BWON at all times, including during periods of SSM for continuous butadiene waste streams and waste streams that contain benzene. As part of these proposed revisions, we are also proposing to remove language from the definitions of “dilution steam blowdown waste stream” and “spent caustic waste stream” at 40 CFR 63.1082(b) such that the definitions no longer exclude streams generated from sampling, maintenance activities, or shutdown purges.

We estimate that there would be no impact on any facility for making these changes. In reviewing the data submitted to us from the facilities who responded to our CAA section 114 survey, we determined that there was only one facility with a TAB less than 10 Mg/yr; however, this facility recently went through an expansion and we believe their TAB has likely changed to 10 Mg/yr or greater such that they are already complying with the BWON requirements at all times for continuous butadiene waste streams and waste streams that contain benzene. We solicit comment on whether there are any ethylene production facilities that operate with a TAB less than 10 Mg/yr; and if so, how this proposed change would impact them.

#### 2. Electronic Reporting Requirements

Through this proposal, the EPA is proposing that owners and operators of ethylene production facilities submit electronic copies of required performance test results and reports and NOCS 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 Docket ID No. EPA–HQ–OAR–2017–0357. The proposed rule requires that performance test results collected using test methods that are supported by the EPA’s Electronic Reporting Tool (ERT) as listed on the ERT website<sup>36</sup> at the time of the test be submitted in the format generated through the use of the ERT and that other performance test results be submitted in portable document format (PDF) using the attachment module of the ERT. The proposed rule requires that NOCS reports be submitted as a PDF upload in CEDRI.

Additionally, the EPA has identified two broad circumstances in which electronic reporting extensions may be provided. In both circumstances, the decision to accept the claim of needing additional time to report is within the discretion of the Administrator, and reporting should occur as soon as possible. The EPA is providing these potential extensions to protect owners and operators from noncompliance in cases where they cannot successfully submit a report by the reporting deadline for reasons outside of their control. The situation where an extension may be warranted due to outages of the EPA’s CDX or CEDRI which precludes an owner or operator from accessing the system and submitting required reports is addressed in 40 CFR 63.1110(a)(10)(iv). The situation where an extension may be warranted due to a force majeure event, which is defined as an event that will be or has been caused by circumstances beyond the control of the affected facility, its contractors, or any entity controlled by the affected facility that prevents an owner or operator from complying with the requirement to submit a report electronically as required by this rule is addressed in 40 CFR 63.1110(a)(10)(v). Examples of such events are acts of nature, acts of war or terrorism, or equipment failure or safety hazards beyond the control of the facility.

The electronic submittal of the reports addressed in this proposed rulemaking will increase the usefulness of the data contained in those reports, is in keeping with current trends in data availability and transparency, will further assist in the protection of public health and the environment, will 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 will 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. Moreover, electronic reporting is consistent with the EPA’s plan<sup>37</sup> to implement Executive Order 13563 and is in keeping with the EPA’s Agency-wide policy<sup>38</sup> developed in response to the White House’s Digital Government Strategy.<sup>39</sup> 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*, available in Docket ID No. EPA–HQ–OAR–2017–0357.

### 3. Exemptions for Heat Exchange Systems

Heat exchange systems that meet any one of the criteria specified in 40 CFR 63.1084 are exempt from the LDAR requirements in the EMACT standards. We have also reviewed these criteria to see if the exemptions were still reasonable to maintain. In addition, we compared these exemptions to those requirements for heat exchangers that are subject to the Petroleum Refinery Sector Rule given that this MACT standard was more recently promulgated in 2009, relative to the EMACT standard promulgated in 2002.<sup>40</sup> Based upon this review, we are proposing to remove the exemptions at 40 CFR 63.1084(c) and (d) for once-through heat exchange systems and instead, proposing that facilities comply with 40 CFR 63.1085 and 40 CFR 63.1086.

We identified two criteria in 40 CFR 63.1084 that are applicable to once-

through heat exchange systems meeting certain National Pollutant Discharge Elimination System (NPDES) permit conditions (*i.e.*, 40 CFR 63.1084(c) and (d)) that warranted further assessment. As discussed in section IV.D.6 of this preamble, once-through heat exchange systems at a petrochemical plant have systems open to the air (*e.g.*, open sewer lines, trenches, and ponds) that are utilized to transport used cooling water to a discharge point (*e.g.*, an outfall) of a facility. This cooling water can also be mixed with other sources of water (*e.g.*, cooling water used in once-through heat exchange systems in non-ethylene source categories, stormwater, treated wastewater, etc.) in sewers, trenches, and ponds prior to discharge from the plant. If this point of discharge from the plant is into a “water of the United States,” then the facility is required to have a NPDES permit and to meet certain pollutant discharge limits. In reviewing the requirements of 40 CFR 63.1084(c), we find that there is a disconnect between having a NPDES permit that meets certain allowable discharge limits (*i.e.*, 1 ppmv) or less above influent concentration, or 10 percent or less above influent concentration, whichever is greater) at the discharge point of a facility (*e.g.*, outfall) as compared to being able to adequately identify a leak from a once-through heat exchange system given that these systems are open to the atmosphere prior to this discharge point and, therefore, any volatile HAP leaking from a once-through heat exchange system would likely be emitted to the atmosphere prior to the NPDES outfall. Similarly, while the requirements of 40 CFR 63.1084(d) allow facilities with once-through heat exchange systems that have certain requirements (*i.e.*, the requirements of 40 CFR 63.1084(d)(1) through (4)) incorporated into their NPDES permit not to comply with the EMACT standards for heat exchange systems, we find this exemption to be problematic. Specifically, the NPDES requirements at 40 CFR 63.1084(d) lack the specificity of where a sample must be taken to adequately find and quantify a leak from a once-through heat exchange system. These include, for example, just prior to the outfall from the plant versus from the exit of the once-through heat exchange system prior to being open to atmosphere, what concentration and/or mass emissions rate constitutes a leak that must be fixed, how quickly a leak must be fixed, what pollutants must be adequately accounted for, and what test method(s)/ surrogate(s) facilities can use to demonstrate compliance. As such, we

<sup>37</sup> The EPA’s *Final Plan for Periodic Retrospective Reviews*, August 2011. Available at: <https://www.regulations.gov/document?D=EPA-HQ-OA-2011-0156-0154>.

<sup>38</sup> *E-Reporting Policy Statement for EPA Regulations*, September 2013. Available at: <https://www.epa.gov/sites/production/files/2016-03/documents/epa-ereporting-policy-statement-2013-09-30.pdf>.

<sup>39</sup> *Digital Government: Building a 21st Century Platform to Better Serve the American People*, May 2012. Available at: <https://obamawhitehouse.archives.gov/sites/default/files/omb/egov/digital-government/digital-government.html>.

<sup>40</sup> The Refinery MACT standards for heat exchange systems were promulgated on October 28, 2009 (see 74 FR 55685) and further amended on June 30, 2010 (see 75 FR 37731) and June 20, 2013 (see 78 FR 37146).

<sup>36</sup> <https://www.epa.gov/electronic-reporting-air-emissions/electronic-reporting-tool-ert>.

find 40 CFR 63.1084(d) to be inadequate for purposes of LDAR for leaks that are at least as equivalent to those that would be identified if once-through heat exchange systems were complying with 40 CFR 63.1085 and 40 CFR 63.1086 instead.

Further, in reviewing the data submitted to us from the facilities who responded to our CAA section 114 survey, we determined that there are no facilities with once-through heat exchange systems complying with the NPDES compliance options at 40 CFR 63.1084(c) and (d). Accordingly, we are removing the exemption for once-through exchange systems that are specified in 40 CFR 63.1084(c) and (d) and are proposing that facilities that previously used either of these exemptions comply with 40 CFR 63.1085 and 40 CFR 63.1086. Therefore, we estimate that there would be no cumulative nationwide costs or emission reductions associated with this change. We solicit comment on our proposed decision.

4. Equipment Leak Overlap Provisions With Subpart VVa

When an emission point is subject to multiple regulations, the EMACT standards include overlap provisions at 40 CFR 63.1100(g) that specify which regulations owners or operators must comply with. For equipment leaks, overlap provisions are specified for 40 CFR part 60, subpart VV; 40 CFR part 61, subpart J or subpart V; and 40 CFR part 63, subpart H. However, since the promulgation of the EMACT standards in 2002, equipment leak regulations were finalized at 40 CFR part 60, subpart VVa, in 2007 and did not address overlap with the EMACT standards (or 40 CFR part 63, subpart UU, generally). As such, certain equipment at newly constructed ethylene production facilities must currently comply with both the EMACT standards and subpart VVa. Except for calibration drift assessments required by subpart VVa, we are proposing at 40 CFR 63.1100(g)(4)(iii) that equipment controlled according to the EMACT standards and subpart VVa are required

only to comply with the EMACT standards. We believe this compliance option will provide flexibility and reduce the burden on ethylene production facilities. We are proposing that where equipment at ethylene production facilities is subject to both the EMACT standards and subpart VVa, an owner or operator that chooses to comply with the EMACT standards only (instead of complying with both standards), must also still comply with the calibration drift assessment provisions at 40 CFR 60.485a(b)(2). The calibration drift assessment helps ensure that the EPA Method 21 monitoring results are accurate when demonstrating compliance.

5. Other Corrections

There are several additional revisions that we are proposing to 40 CFR part 63, subpart YY to clarify text or correct typographical errors, grammatical errors, and cross-reference errors. These proposed editorial corrections and clarifications are summarized in Table 9 of this preamble.

TABLE 9—SUMMARY OF PROPOSED EDITORIAL AND MINOR CORRECTIONS TO 40 CFR PART 63, SUBPART YY

Provision	Proposed revision
Table 1 to 40 CFR 63.1100(a) .....	Format footnote “a”; remove unnecessary periods; and correct reference to definition of heat exchange systems in footnote “c.”
40 CFR 63.1100(b) .....	Clarify applicability of General Provisions for ethylene production affected sources.
40 CFR 63.1100(g)(5) .....	Correct spelling of the word “collocated.”
40 CFR 63.1100(g)(7) .....	Add paragraph to clarify flares that are subject to the provisions of 40 CFR 60.18 or 40 CFR 63.11 and used as a control device for an emission point subject to the requirements in Table 7 to 40 CFR 63.1103(e) are only required to comply with the provisions specified in 40 CFR 63.1103(e)(4).
40 CFR 63.1101 .....	Clarify that the definition of “pressure relief device or valve” does not apply to ethylene production affected sources (see section IV.A.2.a of this preamble for further details). Change “ethylene production unit furnaces” to “ethylene cracking furnaces” in the definition of “shutdown” for consistency.
40 CFR 63.1103(b)(2) .....	Change the word “contracts” to “contacts” in definition of “in organic hazardous air pollutant or in organic HAP service.”
40 CFR 63.1103(e)(1)(F) and Table 7 at 40 CFR 63.1103(e)(3)(h).	Correct the reference to the definition of “heat exchange systems.”
Table 7 at 40 CFR 63.1103(e)(3)(a)(1).	Correct typo by changing “≤” to “<”.
Table 7 at 40 CFR 63.1103(e)(3)(d)(1).	Clarify concentration applicability for ethylene process vents is on a dry basis based on original MACT floor determination.
Table 7 at 40 CFR 63.1103(e)(3)(d)(1)(i) and (ii), and (e)(1)(i) and (ii).	Clarify concentration emission limitation for ethylene process vents and transfer racks is on a dry basis corrected to 3.0-percent oxygen based on original MACT floor determination.
40 CFR 63.1107(a) .....	Clarify how EPA Method 18 can be used when determining the percent organic HAP content of the process fluid that is contained in or contacts equipment for the ethylene production affected sources.
40 CFR 63.1108(a)(4)(ii) .....	Change “which” to “that” and clarify inspection of the “affected” source when determining whether a source is operating in compliance with operation and maintenance requirements.
40 CFR 63.1108(b)(4)(i) .....	Correct reference to paragraphs (b)(4)(i)(A) through (D).

F. What compliance dates are we proposing?

Amendments to the EMACT standards proposed in this rulemaking for adoption under CAA section 112(d)(2) and (3) and CAA section 112(d)(6) are subject to the compliance deadlines outlined in the CAA under CAA section 112(i). For all of the

requirements we are proposing under CAA sections 112(d)(2) and (3), and CAA section 112 (d)(6), we are proposing that all existing affected sources, and all new affected source that commence construction or reconstruction after December 6, 2000 and on or before October 9, 2019, must comply with all of the amendments no later than 3 years after the effective date

of the final rule, or upon startup, whichever is later. For existing sources, CAA section 112(i) provides that the compliance date shall provide for compliance as expeditiously as practicable, but no later than 3 years after the effective date of the standard. (“Section 112(i)(3)’s three-year maximum compliance period applies generally to any emission standard . . .

promulgated under [section 112].” *Association of Battery Recyclers v. EPA*, 716 F.3d 667, 672 (D.C. Cir. 2013).) In determining what compliance period is as expeditious as practicable, we consider the amount of time needed to plan and construct projects and change operating procedures by affected sources. As provided in CAA section 112(i), all ethylene production new affected sources that commenced construction or reconstruction after October 9, 2019 would be required to comply with these requirements by the effective date of the final amendments to the EMAX standards or startup, whichever is later.

We are proposing new operating and monitoring requirements for flares under CAA section 112(d)(2) and (3). We anticipate that these requirements would require the installation of new flare monitoring equipment and we project that most ethylene production units would install new control systems to monitor and adjust assist gas (air or steam) addition rates. Similar to the addition of new control equipment, these new monitoring requirements for flares would require engineering evaluations, solicitation and review of vendor quotes, contracting and installation of the equipment, and operator training. Installation of new monitoring and control equipment on flares will require the flare to be taken out of service. Depending on the configuration of the flares and flare header system, taking the flare out of service may also require a significant portion of the ethylene production unit to be shutdown. Therefore, for all existing affected sources, and all new affected source that commence construction or reconstruction after December 6, 2000 and on or before October 9, 2019, we are proposing that it is necessary to provide 3 years after the effective date of the final rule (or upon startup, whichever is later) for owners or operators to comply with the new operating and monitoring requirements for flares. For all ethylene production new affected sources that commenced construction or reconstruction after October 9, 2019, we are proposing owners or operators comply with the new operating and monitoring requirements for flares by the effective date of the final rule (or upon startup, whichever is later).

Under CAA section 112(d)(2) and (3), we are proposing new vent control requirements for bypasses. These requirements would typically require the addition of piping and potentially new control requirements. As these vent controls would most likely be routed to the flare, we are proposing to provide 3

years after the effective date of the final rule for owners or operators to install additional piping, monitoring, and/or controls to correct any vent control bypasses. For atmospheric PRDs in organic HAP service, we are establishing a work practice standard that requires a process hazard analysis and implementation of a minimum of three redundant measures to prevent atmospheric releases. Alternately, owners or operators may elect to install closed vent systems to route these PRDs to a flare, drain (for liquid thermal relief valves) or other control system. We anticipate that sources will need to identify the most appropriate preventive measures or control approach; design, install, and test the system; install necessary process instrumentation and safety systems; and may need to time installations with equipment shutdown or maintenance outages. Therefore, all existing affected sources, and all new affected source that commence construction or reconstruction after December 6, 2000 and on or before October 9, 2019, we are proposing a compliance date of 3 years from the effective date of the final rule (or upon startup, whichever is later) for owners or operators to comply with the work practice standards for atmospheric PRD releases. For all ethylene production new affected sources that commenced construction or reconstruction after October 9, 2019, we are proposing owners or operators comply with the work practice standards for atmospheric PRD releases by the effective date of the final rule (or upon startup, whichever is later).

Under CAA section 112(d)(2) and (3), we are also proposing work practice standards for decoking operations that would require owners and operators to institute procedures to reduce coke formation and coke combustion emissions, and prevent non-coke combustion HAP emissions from escaping to the atmosphere due to leaks in the transfer line and decoking valves. We anticipate that most, if not all owners and operators already have procedures in place that meet the proposed criteria; however, the EPA recognizes the confusion that multiple different compliance dates for individual requirements would create and the additional burden such an assortment of dates would impose. Also, facilities will still need some time to read and understand the amended rule requirements, update standard operating procedures, and install monitoring equipment; therefore, we are proposing that all existing affected sources, and all new affected source that commence

construction or reconstruction after December 6, 2000 and on or before October 9, 2019 must comply with the decoking work practice standards no later than 3 years after the effective date of the final rule, or upon startup, whichever is later. For all ethylene production new affected sources that commenced construction or reconstruction after October 9, 2019, we are proposing owners or operators comply with the decoking work practice standards by the effective date of the final rule (or upon startup, whichever is later).

Under our technology review for storage vessels under CAA section 112(d)(6), we are revising the EMAX standards to reflect more stringent storage vessel capacity and MTVP thresholds. We project that some owners and operators will need to install new control equipment on certain storage vessels because of the proposed applicability revisions. The addition of new control equipment would require engineering design, solicitation, and review of vendor quotes, and contracting and installation of the equipment, which would need to be timed with process unit outage and operator training. Therefore, we are proposing a compliance date of 3 years after the effective date of the final rule, or upon startup, whichever is later for all existing affected sources, and all new affected source that commence construction or reconstruction after December 6, 2000 and on or before October 9, 2019 to comply with the proposed storage vessel requirements. For all ethylene production new affected sources that commenced construction or reconstruction after October 9, 2019, we are proposing owners or operators comply with the proposed storage vessel requirements by the effective date of the final rule (or upon startup, whichever is later).

As a result of our technology review for heat exchange systems, we are proposing to replace the existing leak definition and monitoring method with a new leak definition and monitoring method. We project some owners and operators would require engineering evaluations, solicitation, and review of vendor quotes, contracting and installation of monitoring equipment, and operator training. In addition, facilities will need time to read and understand the amended rule requirements and update standard operating procedures. Therefore, we are proposing that all existing affected sources, and all new affected source that commence construction or reconstruction after December 6, 2000 and on or before October 9, 2019 must

comply with the new monitoring requirements for heat exchange systems no later than 3 years after the effective date of the final rule, or upon startup, whichever is later. For all ethylene production new affected sources that commenced construction or reconstruction after October 9, 2019, we are proposing owners or operators comply with the new monitoring requirements for heat exchange systems by the effective date of the final rule (or upon startup, whichever is later).

Finally, we are proposing to change the requirements for SSM by removing both the exemption from the requirements to meet the standard during SSM periods and the requirement to develop and implement an SSM plan. We are also proposing electronic reporting requirements. We are positing that facilities would need some time to successfully accomplish these revisions, including time to read and understand the amended rule requirements, to evaluate their operations to ensure that they can meet the standards during periods of startup and shutdown, as defined in the rule, and make any necessary adjustments, including making adjustments to standard operating procedures, and to convert reporting mechanisms to install necessary hardware and software. The EPA recognizes the confusion that multiple different compliance dates for individual requirements would create and the additional burden such an assortment of dates would impose. From our assessment of the timeframe needed for compliance with the entirety of the revised requirements, the EPA considers a period of 3 years after the effective date of the final rule to be the most expeditious compliance period practicable and, thus, is proposing at 40 CFR 63.1102(c) and 40 CFR 63.1081 that all affected sources should be in compliance with all of this regulation's revised requirements upon initial startup or within 3 years of the effective date of the final rule, whichever is later.

## V. Summary of Cost, Environmental, and Economic Impacts

### A. What are the affected sources?

As of January 1, 2017, there were 26 ethylene production facilities currently operating that are major sources of HAP, and the EPA is aware of five ethylene production facilities under construction. As such, 31 ethylene production facilities will be subject to the proposed amendments. A complete list of facilities that are currently subject, or will be subject, to the EMAX standards is available in Appendix A of the memorandum titled *Review of the*

*RACT/BACT/LAER Clearinghouse Database for the Ethylene Production Source Category*, in Docket ID No. EPA-HQ-OAR-2017-0357.

### B. What are the air quality impacts?

At the current level of control, estimated HAP emissions were approximately 4,040 tpy. We estimated HAP emissions reductions of 62 tpy and VOC emissions reductions of 540 tpy as a result of the proposed amendments for storage vessels, heat exchange systems, and decoking operations for ethylene cracking furnaces. We note that these emissions reductions do not consider the potential excess emissions reductions from flares that could result from the proposed monitoring requirements; we estimated flare excess emissions reductions of 1,430 tpy HAP and 13,020 tpy VOC. When considering the flare excess emissions, the total emissions reductions as a result of the proposed amendments were estimated at 1,492 tpy HAP and 13,560 tpy VOC. These emissions reductions are documented in the following memoranda, which are available in Docket ID No. EPA-HQ-OAR-2017-0357: *Assessment of Work Practice Standards for Ethylene Cracking Furnace Decoking Operations Located in the Ethylene Production Source Category*, *Clean Air Act Section 112(d)(6) Technology Review for Storage Vessels Located in the Ethylene Production Source Category*, *Clean Air Act Section 112(d)(6) Technology Review for Heat Exchange Systems in the Ethylene Production Source Category*, and *Control Option Impacts for Flares Located in the Ethylene Production Source Category*.

### C. What are the cost impacts?

We estimated the total capital costs of the proposed amendments to be \$48.0 million and the total annualized costs to be about \$10.3 million in 2016 dollars (annualized costs include annual recovery credits of \$290,000). The present value in 2016 of the costs is \$87.2 million at a discount rate of 3 percent and \$ 71.8 million at 7 percent. Calculated as an equivalent annualized value, which is consistent with the present value of costs in 2016, the costs are \$12.0 million at a discount rate of 7 percent and \$12.4 million at a discount rate of 3 percent. The costs are associated with the proposed amendments for flares, pressure relief devices, maintenance (equipment openings), storage vessels, heat exchange systems, and decoking operations for ethylene cracking furnaces. Costs for flares include purchasing analyzers, monitors, natural

gas and steam, developing a flare management plan, and performing root cause analysis and corrective action (details are available in section IV.A.1.h of this preamble and the memorandum titled *Control Option Impacts for Flares Located in the Ethylene Production Source Category*, in Docket ID No. EPA-HQ-OAR-2017-0357). Costs for pressure relief devices were developed based on compliance with the proposed work practice standard and include implementation of three prevention measures, performing root cause analysis and corrective action, and purchasing pressure relief device monitors (details are available in section IV.A.2.a of this preamble and the memorandum titled *Review of Regulatory Alternatives for Certain Vent Streams in the Ethylene Production Source Category*, in Docket ID No. EPA-HQ-OAR-2017-0357). Maintenance costs were estimated to document equipment opening procedures and to document circumstances under which the alternative maintenance vent limit is used (details are available in section IV.A.2.d of this preamble and the memorandum titled *Review of Regulatory Alternatives for Certain Vent Streams in the Ethylene Production Source Category*, in Docket ID No. EPA-HQ-OAR-2017-0357). Costs for storage vessels include installing IFRs and upgrading deck fittings (details are available in section IV.D.1 of this preamble and the memorandum titled *Clean Air Act Section 112(d)(6) Technology Review for Storage Vessels Located in the Ethylene Production Source Category*, in Docket ID No. EPA-HQ-OAR-2017-0357). Heat exchange systems costs include the use of the Modified El Paso Method to monitor for leaks (details are available in section IV.D.6 of this preamble and the memorandum titled *Clean Air Act Section 112(d)(6) Technology Review for Heat Exchange Systems in the Ethylene Production Source Category*, in Docket ID No. EPA-HQ-OAR-2017-0357). The costs associated with decoking operations for ethylene cracking furnaces include conducting isolation valve inspections and conducting flame impingement firebox inspections (details are available in section IV.A.3 of this preamble and the memorandum titled *Assessment of Work Practice Standards for Ethylene Cracking Furnace Decoking Operations Located in the Ethylene Production Source Category*, in Docket ID No. EPA-HQ-OAR-2017-0357).

### D. What are the economic impacts?

The EPA conducted economic impact analyses for this proposal, as detailed in



the memorandum titled *Economic Impact Analysis for the Proposed Ethylene Production Risk and Technology Review (RTR) NESHAP*, which is available in the docket for this action. The economic impacts of the proposal are calculated as the percentage of total annualized costs incurred by affected parent owners to their annual revenues. This ratio of total annualized costs to annual revenues provides a measure of the direct economic impact to parent owners of ethylene production facilities while presuming no passthrough of costs to ethylene consumers. We estimate that none of the 16 parent owners affected by this proposal will incur total annualized costs of 0.02 percent or greater of their revenues. Product recovery, which is estimated as an impact of the proposed rule, is included in the estimate of total annualized costs that is an input to the economic impact analysis. Thus, these economic impacts are quite low for affected companies and the ethylene production industry, and consumers of ethylene should experience minimal price changes.

## 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.

## VII. Submitting Data Corrections

The site-specific emissions profiles used in the source category risk and demographic analyses and instructions are available for download on the RTR website at <https://www3.epa.gov/ttn/atw/rrisk/rtrpg.html>. 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. Fill in the commenter information fields for each suggested revision (*i.e.*, commenter name, commenter organization, commenter email address, commenter phone number, and revision comments).
3. Gather documentation for any suggested emissions revisions (*e.g.*, performance test reports, material balance calculations).
4. Send the entire downloaded file with suggested revisions in Microsoft® Access format and all accompanying documentation to Docket ID No. EPA-HQ-OAR-2017-0357 (through the method described in the **ADDRESSES** section of this preamble).

5. 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). We request that all data revision comments be submitted in the form of updated Microsoft® Excel files that are generated by the Microsoft® Access file. These files are provided on the RTR website at <https://www3.epa.gov/ttn/atw/rrisk/rtrpg.html>.

## 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 a significant regulatory action that was submitted to OMB for review because it raises novel legal or policy issues. Any changes made in response to OMB recommendations have been documented in the docket. The EPA prepared an analysis of the potential costs and benefits associated with this action. This analysis, *Economic Impact Analysis for the Proposed Ethylene Production Risk and Technology Review (RTR) NESHAP*, is available in the docket for this rule.

### B. Executive Order 13771: Reducing Regulations and Controlling Regulatory Costs

This action is expected to be an Executive Order 13771 regulatory action. Details on the estimated costs of this proposed rule can be found in section V of this preamble.

### C. Paperwork Reduction Act (PRA)

The information collection activities in this proposed rule have been submitted for approval to OMB under the PRA. The Information Collection Request (ICR) document that the EPA prepared has been assigned EPA ICR number 1983.09. You can find a copy of the ICR in the docket for this rule, and it is briefly summarized here.

We are proposing amendments that change the reporting and recordkeeping requirements for several emission sources at ethylene production facilities (*e.g.*, flares, decoking operations for ethylene cracking furnaces, heat exchangers, PRDs, storage vessels). The proposed amendments also require electronic reporting, remove the malfunction exemption, and impose other revisions that affect reporting and recordkeeping. This information would be collected to assure compliance with 40 CFR part 63, subparts XX and YY.

*Respondents/affected entities:* Owners or operators of ethylene production facilities.

*Respondent's obligation to respond:* Mandatory (40 CFR part 63, subparts XX and YY).

*Estimated number of respondents:* 31 facilities.

*Frequency of response:* Semiannual or annual. Responses include performance evaluation notifications and reports, NOCS, and semiannual compliance reports.

*Total estimated burden:* 8,500 hours (per year). Burden is defined at 5 CFR 1320.3(b).

*Total estimated cost:* \$4,410,000 (per year), which includes \$3,660,000 annualized capital and operation and maintenance costs for the responding facilities.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information 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 rule. You may also send your ICR-related comments to OMB's Office of Information and Regulatory Affairs via email to [OIRA\\_submission@omb.eop.gov](mailto:OIRA_submission@omb.eop.gov), Attention: Desk Officer for EPA. Because OMB is required to make a decision concerning the ICR between 30 and 60 days after receipt, OMB must receive comments no later than November 8, 2019. The EPA

will respond to any ICR-related comments in the final rule.

#### *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 as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA). This action will not impose any requirements on small entities. This action is projected to affect 31 facilities, and none of these facilities is owned by a small entity. Details of the associated analysis are presented in the memorandum, *Economic Impact Analysis for the Proposed Ethylene Production Risk and Technology Review (RTR) NESHAP*, which is available in the docket for this action.

#### *E. Unfunded Mandates 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. The action imposes no enforceable duty on any state, local, or tribal governments.

#### *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. None of the ethylene production facilities that have been identified as being affected by this action are owned or operated by tribal governments or located within tribal lands. Thus, Executive Order 13175 does not apply to this action.

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

This action is not subject to Executive Order 13045 because it is not economically significant as defined in Executive Order 12866, and because the EPA does not believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. This action's health and risk assessments are contained in sections III.A and C and sections IV.B and C 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 likely to have a significant adverse effect on the supply, distribution, or use of energy. The overall economic impact of this proposed rule should be minimal for ethylene production facilities and their parent companies (which are engaged in the energy sector).

#### *J. National Technology Transfer and Advancement Act (NTTAA) and 1 CFR Part 51*

This action involves technical standards. Therefore, the EPA conducted searches for the Ethylene Production NESHAP through the Enhanced National Standards Systems Network (NSSN) Database managed by the American National Standards Institute (ANSI). We also contacted voluntary consensus standards (VCS) organizations and accessed and searched their databases. We conducted searches for EPA Methods 1, 1A, 2, 2A, 2C, 2D, 2F, 2G, 3B, 4, 5, 18, 21, 22, 25, 25A, 27, and 29 of 40 CFR part 60, appendix A, 301, 316, and 320 of 40 CFR part 63, appendix A, and 602 and 624 of 40 CFR part 136, appendix A. During the EPA's VCS search, if the title or abstract (if provided) of the VCS described technical sampling and analytical procedures that are similar to the EPA's reference method, the EPA ordered a copy of the standard and reviewed it as a potential equivalent method. We reviewed all potential standards to determine the practicality of the VCS for this rule. This review requires significant method validation data that meet the requirements of EPA Method 301 for accepting alternative methods or scientific, engineering, and policy equivalence to procedures in the EPA reference methods. The EPA may reconsider determinations of impracticality when additional information is available for particular VCS.

No applicable voluntary consensus standards were identified for EPA Methods 1A, 2A, 2D, 2F, 2G, 21, 22, 27, 316, 602, and 624. The following VCS were identified as acceptable alternatives to the EPA test methods for the purpose of this rule.

The EPA proposes to use the VCS ANSI/ASME PTC 19–10–1981—Part 10, “Flue and Exhaust Gas Analyses” as an acceptable alternative to EPA Methods 3A and 3B for the manual procedures only and not the instrumental procedures. The ANSI/ASME PTC 19–

10–1981—Part 10 method incorporates both manual and instrumental methodologies for the determination of oxygen content. The manual method segment of the oxygen determination is performed through the absorption of oxygen. This method is available at the American National Standards Institute (ANSI), 1899 L Street NW, 11th Floor, Washington, DC 20036 and the American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016–5990. See <https://www.ansi.org> and <https://www.asme.org>.

Also, the EPA proposes to use the VCS ASTM D6420–18, “Standard Test Method for Determination of Gaseous Organic Compounds by Direct Interface Gas Chromatography-Mass Spectrometry” as an acceptable alternative to EPA Method 18 with the following caveats. This ASTM procedure has been approved by the EPA as an alternative to EPA Method 18 only when the target compounds are all known and the target compounds are all listed in ASTM D6420 as measurable. We are proposing that ASTM D6420–18 should not be used for methane and ethane because the atomic mass is less than 35; and ASTM D6420 should never be specified as a total VOC method. The ASTM D6420–18 test method employs a direct interface gas chromatograph/mass spectrometer to measure 36 VOC. The test method provides on-site analysis of extracted, unconditioned, and unsaturated (at the instrument) gas samples from stationary sources.

In addition, the EPA proposes to use the VCS ASTM D6348–12e1, “Determination of Gaseous Compounds by Extractive Direct Interface Fourier Transform (FTIR) Spectroscopy” as an acceptable alternative to EPA Method 320 with caveats requiring inclusion of selected annexes to the standard as mandatory. The ASTM D6348–12e1 method is an extractive FTIR Spectroscopy-based field test method and is used to quantify gas phase concentrations of multiple target compounds in emission streams from stationary sources. We are proposing the test plan preparation and implementation in the Annexes to ASTM D 6348–03, Sections A1 through A8 are mandatory; and in ASTM D6348–03 Annex A5 (Analyte Spiking Technique), the percent (%) R must be determined for each target analyte (Equation A5.5). We are proposing that in order for the test data to be acceptable for a compound, %R must be  $70\% \geq R \leq 130\%$ . If the %R value does not meet this criterion for a target compound, the test data is not acceptable for that compound and the test must be repeated

for that analyte (*i.e.*, the sampling and/or analytical procedure should be adjusted before a retest). We are proposing that the %R value for each compound must be reported in the test report, and all field measurements must be corrected with the calculated %R value for that compound by using the following equation:

$$\text{Reported Results} = (\text{Measured Concentration in the Stack} \times 100) / \% \text{ R.}$$

The two ASTM methods (ASTM D6420–18 and ASTM D6348–12e1) are available at ASTM International, 1850 M Street NW, Suite 1030, Washington, DC 20036. See <https://www.astm.org/>.

The search identified 17 other VCS that were potentially applicable for this rule in lieu of the EPA reference methods. After reviewing the available standards, the EPA determined that 17 candidate VCS identified for measuring emissions of pollutants or their surrogates subject to emission standards in the rule would not be practical due to lack of equivalency, documentation, validation data and other important technical and policy considerations. Additional information for the VCS search and determinations can be found in the memorandum, *Voluntary Consensus Standard Results for National Emission Standards for Hazardous Air Pollutants for Ethylene Production RTR*, which is available in the docket for this action.

Finally, we are proposing at 40 CFR 63.1107(a) to incorporate by reference SW–846–8260B, Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Revision 2, December 1996, in EPA Publication No. SW–846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition; and SW–846–8270D, Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Revision 4, February 2007, in EPA Publication No. SW–846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition. Method SW–846–8260B is used to determine VOC in a variety of solid waste matrices with gas chromatography/mass spectrometry. Method SW–846–8260 can be used to quantitate most VOC that have boiling points below 200 degrees Celsius, including low molecular weight halogenated hydrocarbons, aromatics, ketones, nitriles, acetates, acrylates, ethers, and sulfides. Method SW–846–8270D is used to determine the concentration of semivolatile organic compounds in a variety of solid waste matrices with gas chromatography/mass

spectrometry. Method SW–846–8270D can be used to quantitate semivolatile compounds such as polyaromatic hydrocarbons, chlorinated hydrocarbons, pesticides, phthalate esters, organophosphate esters, nitrosamines, haloethers, aldehydes, ethers, ketones, anilines, pyridines, quinolines, aromatic nitro compounds, and phenols, including nitrophenols. The two SW–846 methods (Method SW–846–8260B and Method SW–846–8270D) are available in the docket for this rulemaking and on EPA's website. See <https://www.epa.gov/hw-sw846>.

The EPA welcomes comments on this aspect of the proposed rulemaking given that these proposed changes are being made in 40 CFR part 63, subpart SS, and, specifically, invites the public to identify potentially applicable VCS, and to explain why the EPA should use such standards in this regulation.

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

The EPA believes that this action does not have disproportionately high and adverse human health or environmental effects on minority populations, low-income populations, and/or indigenous peoples, as specified in Executive Order 12898 (58 FR 7629, February 16, 1994). Our analysis of the demographics of the population with estimated risks greater than 1-in-1 million indicates potential disparities in risks between demographic groups, including the African American, Hispanic or Latino, Over 25 Without a High School Diploma, and Below the Poverty Level groups. In addition, the population living within 50 km of the ethylene production facilities has a higher percentage of minority, lower income, and lower education people when compared to the nationwide percentages of those groups. However, acknowledging these potential disparities, the risks for the source category were determined to be acceptable, and emissions reductions from the proposed revisions will benefit these groups the most.

The documentation for this decision is contained in section IV.B and C of this preamble, and the technical report, *Risk and Technology Review—Analysis of Demographic Factors for Populations Living Near Ethylene Production Source Category Operations*, which is available in the docket for this action.

**List of Subjects in 40 CFR Part 63**

Environmental protection, Air pollution control, Hazardous substances, Incorporation by reference,

Reporting and recordkeeping requirements.

Dated: September 5, 2019.

**Andrew R. Wheeler,**  
Administrator.

For the reasons set forth in the preamble, the EPA proposes to amend 40 CFR part 63 as follows:

**PART 63—NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES**

■ 1. The authority citation for part 63 continues to read as follows:

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

**Subpart A—[Amended]**

■ 2. Section 63.14 is amended by:

- a. Revising paragraphs (e)(1) and (h)(18) and (85);
- b. Redesignating paragraphs (h)(92) through (111) as paragraphs (h)(93) through (112);
- c. Adding new paragraph (h)(92);
- d. Revising paragraphs (n)(12) and (13); and
- e. Revising paragraph (t)(1).

The revisions and addition read as follows:

**§ 63.14 Incorporations by reference.**

\* \* \* \* \*

(e) \* \* \*

(1) ANSI/ASME PTC 19.10–1981, Flue and Exhaust Gas Analyses [Part 10, Instruments and Apparatus], issued August 31, 1981, IBR approved for §§ 63.309(k), 63.457(k), 63.772(e) and (h), 63.865(b), 63.997(e), 63.1282(d) and (g), 63.1625(b), 63.3166(a), 63.3360(e), 63.3545(a), 63.3555(a), 63.4166(a), 63.4362(a), 63.4766(a), 63.4965(a), 63.5160(d), table 4 to subpart UUUU, 63.9307(c), 63.9323(a), 63.11148(e), 63.11155(e), 63.11162(f), 63.11163(g), 63.11410(j), 63.11551(a), 63.11646(a), and 63.11945, table 5 to subpart DDDDD, table 4 to subpart JJJJJ, table 4 to subpart KKKKK, tables 4 and 5 of subpart UUUUU, table 1 to subpart ZZZZZ, and table 4 to subpart JJJJJ.

\* \* \* \* \*

(h) \* \* \*

(18) ASTM D1946–90 (Reapproved 1994), Standard Method for Analysis of Reformed Gas by Gas Chromatography, IBR approved for §§ 63.11(b), 63.987(b), and 63.1412.

\* \* \* \* \*

(85) ASTM D6348–12e1, Standard Test Method for Determination of Gaseous Compounds by Extractive Direct Interface Fourier Transform Infrared (FTIR) Spectroscopy, Approved

February 1, 2012, IBR approved for §§ 63.997(e) and 63.1571(a).

\* \* \* \* \*

(92) ASTM D6420–18, Standard Test Method for Determination of Gaseous Organic Compounds by Direct Interface Gas Chromatography-Mass Spectrometry, IBR approved for § 63.987(b) and § 63.997(e).

\* \* \* \* \*

(n) \* \* \*

(12) SW–846–8260B, Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Revision 2, December 1996, in EPA Publication No. SW–846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition, IBR approved for §§ 63.1107(a), 63.11960, 63.11980, and table 10 to subpart HHHHHHH.

(13) SW–846–8270D, Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Revision 4, February 2007, in EPA Publication No. SW–846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition, IBR approved for §§ 63.1107(a), 63.11960, 63.11980, and table 10 to subpart HHHHHHH.

\* \* \* \* \*

(t) \* \* \*

(1) “Air Stripping Method (Modified El Paso Method) for Determination of Volatile Organic Compound Emissions from Water Sources,” Revision Number One, dated January 2003, Sampling Procedures Manual, Appendix P: Cooling Tower Monitoring, January 31, 2003, IBR approved for §§ 63.654(c) and (g), 63.655(i), 63.1086(e), 63.1089(d), and 63.11920.

\* \* \* \* \*

**Subpart SS—[Amended]**

■ 3. Section 63.987 is amended by revising parameter “Dj” of Equation 1 in paragraph (b)(3)(ii) to read as follows:

**§ 63.987 Flare requirements.**

\* \* \* \* \*

(b) \* \* \*

(3) \* \* \*

(ii) \* \* \*

\* \* \* \* \*

Dj = Concentration of sample component j, in parts per million by volume on a wet basis, as measured for organics by Method 18 of 40 CFR part 60, appendix A, or by American Society for Testing and Materials (ASTM) D6420–18 (Incorporated by reference in § 63.14) under the conditions specified in § 63.997(e)(2)(iii)(D)(1) through (3). Hydrogen and carbon monoxide are measured by ASTM D1946–90

(Incorporated by reference, see § 63.14); and

\* \* \* \* \*

■ 4. Section 63.997 is amended by revising paragraphs (e)(2)(iii) introductory text, (e)(2)(iii)(C)(1), (e)(2)(iii)(D), (e)(2)(iv) introductory text, (e)(2)(iv)(F) and (I) to read as follows:

**§ 63.997 Performance test and compliance assessment requirements for control devices.**

\* \* \* \* \*

(e) \* \* \*

(2) \* \* \*

(iii) To determine compliance with a parts per million by volume total organic regulated material or TOC limit, the owner or operator shall use Method 18 or 25A of 40 CFR part 60, appendix A, as applicable. The ASTM D6420–18 (Incorporated by reference, see § 63.14) may be used in lieu of Method 18 of 40 CFR part 60, appendix A, under the conditions specified in paragraphs (e)(2)(iii)(D)(1) through (3) of this section. Alternatively, any other method or data that have been validated according to the applicable procedures in Method 301 of appendix A of 40 CFR part 63 may be used. The procedures specified in paragraphs (e)(2)(iii)(A), (B), (D), and (E) of this section shall be used to calculate parts per million by volume concentration. The calculated concentration shall be corrected to 3 percent oxygen using the procedures specified in paragraph (e)(2)(iii)(C) of this section if a combustion device is the control device and supplemental combustion air is used to combust the emissions.

\* \* \* \* \*

(C) \* \* \*

(1) The emission rate correction factor (or excess air), integrated sampling and analysis procedures of Method 3B of 40 CFR part 60, appendix A, or the manual method in ANSI/ASME PTC 19–10–1981—Part 10 (Incorporated by reference, see § 63.14)), shall be used to determine the oxygen concentration. The sampling site shall be the same as that of the organic regulated material or organic compound samples, and the samples shall be taken during the same time that the organic regulated material or organic compound samples are taken.

\* \* \* \* \*

(D) To measure the total organic regulated material concentration at the outlet of a control device, use Method 18 of 40 CFR part 60, appendix A, or ASTM D6420–18. If you have a combustion control device, you must first determine which regulated material compounds are present in the inlet gas stream using process knowledge or the

screening procedure described in Method 18. In conducting the performance test, analyze samples collected at the outlet of the combustion control device as specified in Method 18 or ASTM D6420–18 for the regulated material compounds present at the inlet of the control device. The method ASTM D6420–18 may be used only under the conditions specified in paragraphs (e)(2)(iii)(D)(1) through (3) of this section.

(1) If the target compounds are all known and are all listed in Section 1.1 of ASTM D6420–18 as measurable.

(2) ASTM D6420–18 may not be used for methane and ethane.

(3) ASTM D6420–18 may not be used as a total VOC method.

\* \* \* \* \*

(iv) *Percent reduction calculation.* To determine compliance with a percent reduction requirement, the owner or operator shall use Method 18, 25, or 25A of 40 CFR part 60, appendix A, as applicable. The method ASTM D6420–18 may be used in lieu of Method 18 of 40 CFR part 60, appendix A, under the conditions specified in paragraphs (e)(2)(iii)(D)(1) through (3) of this section. Alternatively, any other method or data that have been validated according to the applicable procedures in Method 301 of appendix A of 40 CFR part 63 may be used. The procedures specified in paragraphs (e)(2)(iv)(A) through (I) of this section shall be used to calculate percent reduction efficiency.

\* \* \* \* \*

(F) To measure inlet and outlet concentrations of total organic regulated material, use Method 18 of 40 CFR part 60, appendix A, or ASTM D6420–18, under the conditions specified in paragraphs (e)(2)(iii)(D)(1) through (3) of this section. In conducting the performance test, collect and analyze samples as specified in Method 18 or ASTM D6420–18. You must collect samples simultaneously at the inlet and outlet of the control device. If the performance test is for a combustion control device, you must first determine which regulated material compounds are present in the inlet gas stream (*i.e.*, uncontrolled emissions) using process knowledge or the screening procedure described in Method 18. Quantify the emissions for the regulated material compounds present in the inlet gas stream for both the inlet and outlet gas streams for the combustion device.

\* \* \* \* \*

(I) If the uncontrolled or inlet gas stream to the control device contains formaldehyde, you must conduct emissions testing according to

paragraphs (e)(2)(iv)(I)(1) through (3) of this section.

(1) Except as specified in paragraph (e)(2)(iv)(I)(3) of this section, if you elect to comply with a percent reduction requirement and formaldehyde is the principal regulated material compound (i.e., greater than 50 percent of the regulated material compounds in the stream by volume), you must use Method 316 or 320 of 40 CFR part 63, appendix A, to measure formaldehyde at the inlet and outlet of the control device. Use the percent reduction in formaldehyde as a surrogate for the percent reduction in total regulated material emissions.

(2) Except as specified in paragraph (e)(2)(iv)(I)(3) of this section, if you elect to comply with an outlet total organic regulated material concentration or TOC concentration limit, and the uncontrolled or inlet gas stream to the control device contains greater than 10 percent (by volume) formaldehyde, you must use Method 316 or 320 of 40 CFR part 63, appendix A, to separately determine the formaldehyde concentration. Calculate the total organic regulated material concentration or TOC concentration by totaling the formaldehyde emissions measured using Method 316 or 320 and the other regulated material compound emissions measured using Method 18 or 25/25A.

(3) You may elect to use ASTM D6348–12e1 (Incorporated by reference, § 63.14) in lieu of Method 316 or 320 of 40 CFR part 63, appendix A as specified in paragraph (e)(2)(iv)(I)(1) or (2) of this section. To comply with this paragraph, the test plan preparation and implementation in the Annexes to ASTM D 6348–03 (Incorporated by reference, see § 63.14) Sections A1 through A8 are mandatory; the percent (%) R must be determined for each target analyte using Equation A5.5 of ASTM D6348–03 Annex A5 (Analyte Spiking Technique); and in order for the test data to be acceptable for a compound, the %R must be  $70\% \leq R \leq 130\%$ . If the %R value does not meet this criterion for a target compound, then the test data is not acceptable for that compound and the test must be repeated for that analyte (i.e., the sampling and/or analytical procedure should be adjusted before a retest). The %R value for each compound must be reported in the test report, and all field measurements must be corrected with the calculated %R value for that compound by using the following equation:

Reported Results = (Measured Concentration in the Stack × 100)/%R.

**Subpart XX—[Amended]**

■ 5. Section 63.1081 is revised to read as follows:

**§ 63.1081 When must I comply with the requirements of this subpart?**

Except as specified in paragraphs (a) and (b) of this section, you must comply with the requirements of this subpart according to the schedule specified in § 63.1102(a).

(a) Each heat exchange system at an ethylene production affected source that commenced construction or reconstruction on or before October 9, 2019, must be in compliance with the heat exchange system requirements specified in § 63.1084(f), § 63.1085(e) and (f), § 63.1086(e), § 63.1087(c) and (d), § 63.1088(d), and § 63.1089(d) and (e) upon initial startup or [date 3 years after date of publication of final rule in the **Federal Register**], whichever is later. Each heat exchange system at an ethylene production affected source that commences construction or reconstruction after October 9, 2019, must be in compliance with the heat exchange system requirements specified in §§ 63.1084(f), 63.1085(e) and (f), 63.1086(e), 63.1087(c) and (d), 63.1088(d), and 63.1089(d) and (e) upon initial startup, or [date of publication of final rule in the **Federal Register**], whichever is later.

(b) Each waste stream at an ethylene production affected source that commenced construction or reconstruction on or before October 9, 2019, must be in compliance with the flare requirements specified in § 63.1095(a)(1)(vi) and (b)(3) upon initial startup or [date 3 years after date of publication of final rule in the **Federal Register**], whichever is later. Each waste stream at an ethylene production affected source that commences construction or reconstruction after October 9, 2019, must be in compliance with the flare requirements specified in § 63.1095(a)(1)(vi) and (b)(3) upon initial startup, or [date of publication of final rule in the **Federal Register**], whichever is later.

■ 6. Section 63.1082 is amended by revising definitions for “Dilution steam blowdown waste stream,” and “Spent caustic waste stream” to read as follows:

**§ 63.1082 What definitions do I need to know?**

\* \* \* \* \*

*Dilution steam blowdown waste stream* means any continuously flowing process wastewater stream resulting from the quench and compression of cracked gas (the cracking furnace effluent) at an ethylene production unit

and is discharged from the unit. This stream typically includes the aqueous or oily-water stream that results from condensation of dilution steam (in the cracking furnace quench system), blowdown from dilution steam generation systems, and aqueous streams separated from the process between the cracking furnace and the cracked gas dehydrators. Before [date 3 years after date of publication of final rule in the **Federal Register**], the dilution steam blowdown waste stream does not include dilution steam blowdown streams generated from sampling, maintenance activities, or shutdown purges. Beginning on [date 3 years after date of publication of final rule in the **Federal Register**], the dilution steam blowdown streams generated from sampling, maintenance activities, or shutdown purges are included in the definition of dilution steam blowdown waste stream. The dilution steam blowdown waste stream also does not include blowdown that has not contacted HAP-containing process materials.

\* \* \* \* \*

*Spent caustic waste stream* means the continuously flowing process wastewater stream that results from the use of a caustic wash system in an ethylene production unit. A caustic wash system is commonly used at ethylene production units to remove acid gases and sulfur compounds from process streams, typically cracked gas. Before [date 3 years after date of publication of final rule in the **Federal Register**], the spent caustic waste stream does not include spent caustic streams generated from sampling, maintenance activities, or shutdown purges. Beginning on [date 3 years after date of publication of final rule in the **Federal Register**], the spent caustic streams generated from sampling, maintenance activities, or shutdown purges are included in the definition of spent caustic waste stream.

\* \* \* \* \*

■ 7. Section 63.1084 is amended by revising the introductory text and adding paragraph (f) to read as follows:

**§ 63.1084 What heat exchange systems are exempt from the requirements of this subpart?**

Except as specified in paragraph (f) of this section, your heat exchange system is exempt from the requirements in §§ 63.1085 and 63.1086 if it meets any one of the criteria in paragraphs (a) through (e) of this section.

\* \* \* \* \*

(f) Beginning no later than the compliance dates specified in

§ 63.1081(a), your heat exchange system is no longer exempt from the requirements in §§ 63.1085 and 63.1086 if it meets the criteria in paragraphs (c) or (d) of this section; instead, your heat exchange system is exempt from the requirements in §§ 63.1085 and 63.1086 if it meets any one of the criteria in paragraphs (a), (b), or (e) of this section.

■ 8. Section 63.1085 is amended by revising the introductory text and paragraphs (a) and (b), and by adding paragraphs (e) and (f) to read as follows:

**§ 63.1085 What are the general requirements for heat exchange systems?**

Unless you meet one of the requirements for exemptions in § 63.1084, you must meet the requirements in paragraphs (a) through (f) of this section.

(a) Except as specified in paragraph (e) of this section, you must monitor the cooling water for the presence of substances that indicate a leak according to § 63.1086(a) through (d).

(b) Except as specified in paragraph (f) of this section, if you detect a leak, then you must repair it according to § 63.1087(a) and (b) unless repair is delayed according to § 63.1088(a) through (c).

\* \* \* \* \*

(e) Beginning no later than the compliance dates specified in § 63.1081(a), the requirements specified in § 63.1086(a) through (d) no longer apply; instead, you must monitor the cooling water for the presence of total strippable hydrocarbon concentration (as methane) that indicate a leak according to § 63.1086(e). At any time before the compliance dates specified in § 63.1081(a), you may choose to comply with the requirements in this paragraph in lieu of the requirements in paragraph (a) of this section.

(f) Beginning no later than the compliance dates specified in § 63.1081(a), the requirements specified in § 63.1087(a) and (b), and § 63.1088(a) through (c), no longer apply; instead, if you detect a leak, then you must repair it according to § 63.1087(c) and (d), unless repair is delayed according to § 63.1088(d). At any time before the compliance dates specified in § 63.1081(a), you may choose to comply with the requirements in this paragraph in lieu of the requirements in paragraph (b) of this section.

■ 9. Section 63.1086 is amended by revising the introductory text and by adding paragraph (e) to read as follows:

**§ 63.1086 How must I monitor for leaks to cooling water?**

Except as specified in § 63.1085(e) and paragraph (e) of this section, you

must monitor for leaks to cooling water by monitoring each heat exchange system according to the requirements of paragraph (a) of this section, monitoring each heat exchanger according to the requirements of paragraph (b) of this section, or monitoring a surrogate parameter according to the requirements of paragraph (c) of this section. Except as specified in § 63.1085(e) and paragraph (e) of this section, if you elect to comply with the requirements of paragraph (a) or (b) of this section, you may use alternatives in paragraph (d)(1) or (2) of this section for determining the mean entrance concentration.

\* \* \* \* \*

(e) Beginning no later than the compliance dates specified in § 63.1081(a), you must perform monitoring to identify leaks of total strippable hydrocarbon concentration (as methane) from each heat exchange system subject to the requirements of this subpart according to the procedures in paragraphs (e)(1) through (5) of this section.

(1) *Monitoring locations for closed-loop recirculation heat exchange systems.* For each closed loop recirculating heat exchange system, you must collect and analyze a sample from the location(s) described in either paragraph (e)(1)(i) or (ii) of this section.

(i) Each cooling tower return line or any representative riser within the cooling tower prior to exposure to air for each heat exchange system.

(ii) Selected heat exchanger exit line(s), so that each heat exchanger or group of heat exchangers within a heat exchange system is covered by the selected monitoring location(s).

(2) *Monitoring locations for once-through heat exchange systems.* For each once-through heat exchange system, you must collect and analyze a sample from the location(s) described in paragraph (e)(2)(i) of this section. You may also elect to collect and analyze an additional sample from the location(s) described in paragraph (e)(2)(ii) of this section.

(i) Selected heat exchanger exit line(s), so that each heat exchanger or group of heat exchangers within a heat exchange system is covered by the selected monitoring location(s). The selected monitoring location may be at a point where discharges from multiple heat exchange systems are combined provided that the combined cooling water flow rate at the monitoring location does not exceed 40,000 gallons per minute.

(ii) The inlet water feed line for a once-through heat exchange system prior to any heat exchanger. If multiple

heat exchange systems use the same water feed (*i.e.*, inlet water from the same primary water source), you may monitor at one representative location and use the monitoring results for that sampling location for all heat exchange systems that use that same water feed.

(3) *Monitoring method.* You must determine the total strippable hydrocarbon concentration (in parts per million by volume (ppmv) as methane) at each monitoring location using the “Air Stripping Method (Modified El Paso Method) for Determination of Volatile Organic Compound Emissions from Water Sources” (incorporated by reference, see § 63.14) using a flame ionization detector (FID) analyzer for on-site determination as described in Section 6.1 of the Modified El Paso Method.

(4) *Monitoring frequency and leak action level.* For each heat exchange system, you must comply with the applicable monitoring frequency and leak action level, as defined in paragraphs (e)(4)(i) through (iii) of this section. The monitoring frequencies specified in paragraphs (e)(4)(i) through (iii) of this section also apply to the inlet water feed line for a once-through heat exchange system, if you elect to monitor the inlet water feed as provided in paragraph (e)(2)(ii) of this section.

(i) For each heat exchange system at an ethylene production affected source that commenced construction or reconstruction on or before December 6, 2000, you must monitor quarterly using a leak action level defined as a total strippable hydrocarbon concentration (as methane) in the stripping gas of 6.2 ppmv. If a leak is detected as specified in paragraph (e)(5) of this section, then you must monitor monthly until the leak has been repaired according to the requirements in § 63.1087(c) or (d). Once the leak has been repaired according to the requirements in § 63.1087(c) or (d), quarterly monitoring for the heat exchange system may resume.

(ii) For each heat exchange system at an ethylene production affected source that commences construction or reconstruction after December 6, 2000 and on or before October 9, 2019, you must monitor at the applicable frequency specified in paragraph (e)(4)(ii)(A) or (B) of this section using a leak action level defined as a total strippable hydrocarbon concentration (as methane) in the stripping gas of 6.2 ppmv.

(A) If you have completed the initial weekly monitoring for 6-months of the heat exchange system as specified in § 63.1086(a)(2)(ii) or (b)(1)(ii) then you must monitor monthly. If a leak is

detected as specified in paragraph (e)(5) of this section, then you must monitor weekly until the leak has been repaired according to the requirements in § 63.1087(c) or (d). Once the leak has been repaired according to the requirements in § 63.1087(c) or (d), monthly monitoring for the heat exchange system may resume.

(B) If you have not completed the initial weekly monitoring for 6-months of the heat exchange system as specified in § 63.1086(a)(2)(ii) or (b)(1)(ii), or if you elect to comply with paragraph (e) of this section rather than paragraphs (a) through (d) of this section upon startup, then you must initially monitor weekly for 6-months beginning upon startup and monitor monthly thereafter. If a leak is detected as specified in paragraph (e)(5) of this section, then you must monitor weekly until the leak has been repaired according to the requirements in § 63.1087(c) or (d). Once the leak has been repaired according to the requirements in § 63.1087(c) or (d), monthly monitoring for the heat exchange system may resume.

(iii) For each heat exchange system at an ethylene production affected source that commences construction or reconstruction after October 9, 2019, you must initially monitor weekly for 6-months beginning upon startup and monitor monthly thereafter using a leak action level defined as a total strippable hydrocarbon concentration (as methane) in the stripping gas of 6.2 ppmv. If a leak is detected as specified in paragraph (e)(5) of this section, then you must monitor weekly until the leak has been repaired according to the requirements in § 63.1087(c) or (d). Once the leak has been repaired according to the requirements in § 63.1087(c) or (d), monthly monitoring for the heat exchange system may resume.

(5) *Leak definition.* A leak is defined as described in paragraph (e)(5)(i) or (ii) of this section, as applicable.

(i) For once-through heat exchange systems for which the inlet water feed is monitored as described in paragraph (e)(2)(ii) of this section, a leak is detected if the difference in the measurement value of the sample taken from a location specified in paragraph (e)(2)(i) of this section and the measurement value of the corresponding sample taken from the location specified in paragraph (e)(2)(ii) of this section equals or exceeds the leak action level.

(ii) For all other heat exchange systems, a leak is detected if a measurement value of the sample taken from a location specified in paragraph

(e)(1)(i), (ii), or (e)(2)(i) of this section equals or exceeds the leak action level.

■ 10. Section 63.1087 is amended by revising the introductory text and by adding paragraphs (c) and (d) to read as follows:

**§ 63.1087 What actions must I take if a leak is detected?**

Except as specified in § 63.1085(f) and paragraphs (c) and (d) of this section, if a leak is detected, you must comply with the requirements in paragraphs (a) and (b) of this section unless repair is delayed according to § 63.1088.

\* \* \* \* \*

(c) Beginning no later than the compliance dates specified in § 63.1081(a), if a leak is detected using the methods described in § 63.1086(e), you must repair the leak to reduce the measured concentration to below the applicable leak action level as soon as practicable, but no later than 45 days after identifying the leak, except as specified in § 63.1088(d). Repair must include re-monitoring at the monitoring location where the leak was identified according to the method specified in § 63.1086(e)(3) to verify that the measured total strippable hydrocarbon concentration is below the applicable leak action level. Repair may also include performing the additional monitoring in paragraph (d) of this section to verify that the total strippable hydrocarbon concentration is below the applicable leak action level. Actions that can be taken to achieve repair include but are not limited to:

(1) Physical modifications to the leaking heat exchanger, such as welding the leak or replacing a tube;

(2) Blocking the leaking tube within the heat exchanger;

(3) Changing the pressure so that water flows into the process fluid;

(4) Replacing the heat exchanger or heat exchanger bundle; or

(5) Isolating, bypassing, or otherwise removing the leaking heat exchanger from service until it is otherwise repaired.

(d) Beginning no later than the compliance dates specified in § 63.1081(a), if you detect a leak when monitoring a cooling tower return line according to § 63.1086(e)(1)(i), you may conduct additional monitoring of each heat exchanger or group of heat exchangers associated with the heat exchange system for which the leak was detected, as provided in § 63.1086(e)(1)(ii). If no leaks are detected when monitoring according to the requirements of § 63.1086(e)(1)(ii), the heat exchange system is considered to have met the repair requirements through re-monitoring of the heat

exchange system, as provided in paragraph (c) of this section.

■ 11. Section 63.1088 is amended by revising the introductory text and by adding paragraph (d) to read as follows:

**§ 63.1088 In what situations may I delay leak repair, and what actions must I take for delay of repair?**

You may delay the repair of heat exchange systems if the leaking equipment is isolated from the process. At any time before the compliance dates specified in § 63.1081(a), you may also delay repair if repair is technically infeasible without a shutdown, and you meet one of the conditions in paragraphs (a) through (c) of this section. Beginning no later than the compliance dates specified in § 63.1081(a), paragraphs (a) through (c) of this section no longer apply; instead, you may delay repair if the conditions in paragraph (d) of this section are met.

\* \* \* \* \*

(d) Beginning no later than the compliance dates specified in § 63.1081(a), you may delay repair when one of the conditions in paragraph (d)(1) or (2) of this section is met and the leak is less than the delay of repair action level specified in paragraph (d)(3) of this section. You must determine if a delay of repair is necessary as soon as practicable, but no later than 45 days after first identifying the leak.

(1) If the repair is technically infeasible without a shutdown and the total strippable hydrocarbon concentration is initially and remains less than the delay of repair action level for all monitoring periods during the delay of repair, then you may delay repair until the next scheduled shutdown of the heat exchange system. If, during subsequent monitoring, the delay of repair action level is exceeded, then you must repair the leak within 30 days of the monitoring event in which the leak was equal to or exceeded the delay of repair action level.

(2) If the necessary equipment, parts, or personnel are not available and the total strippable hydrocarbon concentration is initially and remains less than the delay of repair action level for all monitoring periods during the delay of repair, then you may delay the repair for a maximum of 120 calendar days. You must demonstrate that the necessary equipment, parts, or personnel were not available. If, during subsequent monitoring, the delay of repair action level is exceeded, then you must repair the leak within 30 days of the monitoring event in which the leak was equal to or exceeded the delay of repair action level.



(3) The delay of repair action level is a total strippable hydrocarbon concentration (as methane) in the stripping gas of 62 ppmv. The delay of repair action level is assessed as described in paragraph (d)(3)(i) or (ii) of this section, as applicable.

(i) For once-through heat exchange systems for which the inlet water feed is monitored as described in § 63.1086(e)(2)(ii), the delay of repair action level is exceeded if the difference in the measurement value of the sample taken from a location specified in § 63.1086(e)(2)(i) and the measurement value of the corresponding sample taken from the location specified in § 63.1086(e)(2)(ii) equals or exceeds the delay of repair action level.

(ii) For all other heat exchange systems, the delay of repair action level is exceeded if a measurement value of the sample taken from a location specified in § 63.1086(e)(1)(i) and (ii) or § 63.1086(e)(2)(i) equals or exceeds the delay of repair action level.

■ 12. Section 63.1089 is amended by revising paragraphs (d) and (e) to read as follows:

**§ 63.1089 What records must I keep?**

\* \* \* \* \*

(d) At any time before the compliance dates specified in § 63.1081(a), you must keep documentation of delay of repair as specified in § 63.1088(a) through (c). Beginning no later than the compliance dates specified in § 63.1081(a), the requirement to keep documentation of delay of repair as specified in § 63.1088(a) through (c) no longer applies; instead, you must keep documentation of delay of repair as specified in paragraphs (d)(1) through (4) of this section.

(1) The reason(s) for delaying repair.

(2) A schedule for completing the repair as soon as practical.

(3) The date and concentration of the leak as first identified and the results of all subsequent monitoring events during the delay of repair.

(4) An estimate of the potential strippable hydrocarbon emissions from the leaking heat exchange system or heat exchanger for each required delay of repair monitoring interval following the procedures in paragraphs (d)(4)(i) through (iv) of this section.

(i) Determine the leak concentration as specified in § 63.1086(e) and convert the stripping gas leak concentration (in ppmv as methane) to an equivalent liquid concentration, in parts per million by weight (ppmw), using equation 7-1 from "Air Stripping Method (Modified El Paso Method) for Determination of Volatile Organic Compound Emissions from Water

Sources" (incorporated by reference—see § 63.14) and the molecular weight of 16 grams per mole (g/mol) for methane.

(ii) Determine the mass flow rate of the cooling water at the monitoring location where the leak was detected. If the monitoring location is an individual cooling tower riser, determine the total cooling water mass flow rate to the cooling tower. Cooling water mass flow rates may be determined using direct measurement, pump curves, heat balance calculations, or other engineering methods. Volumetric flow measurements may be used and converted to mass flow rates using the density of water at the specific monitoring location temperature or using the default density of water at 25 degrees Celsius, which is 997 kilograms per cubic meter or 8.32 pounds per gallon.

(iii) For delay of repair monitoring intervals prior to repair of the leak, calculate the potential strippable hydrocarbon emissions for the leaking heat exchange system or heat exchanger for the monitoring interval by multiplying the leak concentration in the cooling water, ppmw, determined in (d)(4)(i) of this section, by the mass flow rate of the cooling water determined in (d)(4)(ii) of this section and by the duration of the delay of repair monitoring interval. The duration of the delay of repair monitoring interval is the time period starting at midnight on the day of the previous monitoring event or at midnight on the day the repair would have been completed if the repair had not been delayed, whichever is later, and ending at midnight of the day the of the current monitoring event.

(iv) For delay of repair monitoring intervals ending with a repaired leak, calculate the potential strippable hydrocarbon emissions for the leaking heat exchange system or heat exchanger for the final delay of repair monitoring interval by multiplying the duration of the final delay of repair monitoring interval by the leak concentration and cooling water flow rates determined for the last monitoring event prior to the re-monitoring event used to verify the leak was repaired. The duration of the final delay of repair monitoring interval is the time period starting at midnight of the day of the last monitoring event prior to re-monitoring to verify the leak was repaired and ending at the time of the re-monitoring event that verified that the leak was repaired.

(e) At any time before the compliance dates specified in § 63.1081(a), if you validate a 40 CFR part 136 method for the HAP listed in Table 1 to this subpart according to the procedures in appendix D to this part, then you must keep a

record of the test data and calculations used in the validation. On the compliance dates specified in § 63.1081(a), this requirement no longer applies.

■ 13. Section 63.1090 is amended by revising the introductory text and by adding paragraph (f) to read as follows:

**§ 63.1090 What reports must I submit?**

If you delay repair for your heat exchange system, you must report the delay of repair in the semiannual report required by § 63.1110(e). If the leak remains unrepaired, you must continue to report the delay of repair in semiannual reports until you repair the leak. Except as provided in paragraph (f) of this section, you must include the information in paragraphs (a) through (e) of this section in the semiannual report.

\* \* \* \* \*

(f) For heat exchange systems subject to § 63.1085(e) and (f), Periodic Reports must include the information specified in paragraphs (f)(1) through (5) of this section, in lieu of the information specified in paragraphs (a) through (e) of this section.

(1) The number of heat exchange systems at the plant site subject to the monitoring requirements in § 63.1085(e) and (f).

(2) The number of heat exchange systems at the plant site found to be leaking.

(3) For each monitoring location where the total strippable hydrocarbon concentration was determined to be equal to or greater than the applicable leak definitions specified in § 63.1086(e)(5), identification of the monitoring location (e.g., unique monitoring location or heat exchange system ID number), the measured total strippable hydrocarbon concentration, the date the leak was first identified, and, if applicable, the date the source of the leak was identified;

(4) For leaks that were repaired during the reporting period (including delayed repairs), identification of the monitoring location associated with the repaired leak, the total strippable hydrocarbon concentration measured during re-monitoring to verify repair, and the re-monitoring date (i.e., the effective date of repair); and

(5) For each delayed repair, identification of the monitoring location associated with the leak for which repair is delayed, the date when the delay of repair began, the date the repair is expected to be completed (if the leak is not repaired during the reporting period), the total strippable hydrocarbon concentration and date of each monitoring event conducted on the

delayed repair during the reporting period, and an estimate of the potential strippable hydrocarbon emissions over the reporting period associated with the delayed repair.

- 14. Section 63.1095 is amended by:
  - a. Revising paragraphs (a)(1) introductory text;
  - b. Adding paragraph (a)(1)(vi);
  - c. Revising paragraphs (a)(3), (b) introductory text, and (b)(1); and
  - d. Adding paragraph (b)(3).

The revisions and additions read as follows:

**§ 63.1095 What specific requirements must I comply with?**

\* \* \* \* \*

(a) \* \* \*

(1) Route the continuous butadiene stream to a treatment process or wastewater treatment system used to treat benzene waste streams that complies with the standards specified in 40 CFR 61.348. Comply with the requirements of 40 CFR part 61, subpart FF; with the changes in Table 2 to this subpart, and as specified in paragraphs (a)(1)(i) through (vi) of this section.

\* \* \* \* \*

(vi) Beginning no later than the compliance dates specified in § 63.1081(b), if you use a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare to comply with 40 CFR part 61, subpart FF, then you must comply with the requirements of 40 CFR 63.1103(e)(4) in lieu of 40 CFR 61.349(a)(2)(iii) and (d), 40 CFR 61.354(c)(3), 40 CFR 61.356(f)(2)(i)(D)

and (j)(7), and 40 CFR 61.357(d)(7)(iv)(F).

\* \* \* \* \*

(3) Before [date 3 years after date of publication of final rule in the **Federal Register**], if the total annual benzene quantity from waste at your facility is less than 10 Mg/yr, as determined according to 40 CFR 61.342(a), comply with the requirements of this section at all times except during periods of startup, shutdown, and malfunction, if the startup, shutdown, or malfunction precludes the ability of the affected source to comply with the requirements of this section and the owner or operator follows the provisions for periods of startup, shutdown, and malfunction, as specified in § 63.1111. Beginning on [date 3 years after date of publication of final rule in the **Federal Register**], if the total annual benzene quantity from waste at your facility is less than 10 Mg/yr, as determined according to 40 CFR 61.342(a), you must comply with the requirements of this section at all times.

(b) *Waste streams that contain benzene.* For waste streams that contain benzene, you must comply with the requirements of 40 CFR part 61, subpart FF, except as specified in Table 2 to this subpart and paragraph (b)(3) of this section. You must manage and treat waste streams that contain benzene as specified in either paragraph (b)(1) or (2) of this section.

(1) If the total annual benzene quantity from waste at your facility is less than 10 Mg/yr, as determined according to 40 CFR 61.342(a), manage

and treat spent caustic waste streams and dilution steam blowdown waste streams according to 40 CFR

61.342(c)(1) through (c)(3)(i). Before [date 3 years after date of publication of final rule in the **Federal Register**], the requirements of this paragraph (b)(1) shall apply at all times except during periods of startup, shutdown, and malfunction, if the startup, shutdown, or malfunction precludes the ability of the affected source to comply with the requirements of this section and the owner or operator follows the provisions for periods of startup, shutdown, and malfunction, as specified in § 63.1111. Beginning on [date 3 years after date of publication of final rule in the **Federal Register**], the requirements of this paragraph (b)(1) shall apply at all times.

\* \* \* \* \*

(3) Beginning no later than the compliance dates specified in § 63.1081(b), if you use a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare to comply with 40 CFR part 61, subpart FF, then you must comply with the requirements of 40 CFR 63.1103(e)(4) in lieu of 40 CFR 61.349(a)(2)(iii) and (d), 40 CFR 61.354(c)(3), 40 CFR 61.356(f)(2)(i)(D) and (j)(7), and 40 CFR 61.357(d)(7)(iv)(F).

■ 15. Table 2 to subpart XX of part 63 is amended by revising the first column heading, third entry to row 1, and the first two entries to row 2 to read as follows:

TABLE 2 TO SUBPART XX OF PART 63—REQUIREMENTS OF 40 CFR PART 61, SUBPART FF, NOT INCLUDED IN THE REQUIREMENTS FOR THIS SUBPART AND ALTERNATE REQUIREMENTS

If the total annual benzene quantity for waste from your facility is * * *	Do not comply with:	Instead, comply with:
1. Less than 10 Mg/yr .....	40 CFR 61.340 ..... 40 CFR 61.342(c)(3)(ii), (d), and (e) ..... 40 CFR 61.342(f) .....	§ 63.1093. There is no equivalent requirement. § 63.1096.
* * *	* * *	* * *
2. Greater than or equal to 10 Mg/yr .....	40 CFR 61.340 ..... 40 CFR 61.342(f) .....	§ 63.1093. § 63.1096.
* * *	* * *	* * *

- 16. Section 63.1100 is amended by:
  - a. Revising the heading to Table 1 to § 63.1100(a);
  - b. Revising the rows “Carbon Black Production,” “Cyanide Chemicals Manufacturing,” “Ethylene Production,” and “Spandex

Production”; and revising footnote c to Table 1 to § 63.1100(a);

- c. Revising paragraphs (b), (g) introductory text, and (g)(4)(ii);
- d. Adding paragraph (g)(4)(iii);
- e. Revising paragraph (g)(5); and

- f. Adding paragraph (g)(7).

The revisions and additions read as follows:

**§ 63.1100 Applicability.**

(a) \* \* \*

TABLE 1 TO § 63.1100(a)—SOURCE CATEGORY MACT<sup>a</sup> APPLICABILITY

Source category	Storage vessels	Process vents	Transfer racks	Equipment leaks	Wastewater streams	Other	Source category MACT requirements
* Carbon Black Production .....	No .....	* Yes .....	* No .....	* No .....	* No .....	* No .....	* § 63.1103(f).
* Cyanide Chemicals Manufac- turing.	Yes .....	Yes .....	Yes .....	Yes .....	Yes .....	No .....	§ 63.1103(g).
* Ethylene Production .....	Yes .....	Yes .....	Yes .....	Yes .....	Yes .....	Yes <sup>c</sup> .....	§ 63.1103(e).
* Spandex Production .....	Yes .....	Yes .....	No .....	No .....	No .....	Yes <sup>d</sup> .....	§ 63.1103(h).

<sup>a</sup> Maximum achievable control technology.  
<sup>b</sup> Fiber spinning lines using spinning solution or suspension containing acrylonitrile.  
<sup>c</sup> Heat exchange systems as defined in § 63.1082(b).  
<sup>d</sup> Fiber spinning lines.

(b) *Subpart A requirements.* The following provisions of subpart A of this part (General Provisions), §§ 63.1 through 63.5, and §§ 63.12 through 63.15, apply to owners or operators of affected sources subject to this subpart. Beginning no later than the compliance dates specified in § 63.1102(c), for ethylene production affected sources, §§ 63.7, 63.8, 63.10(c), and 63.10(e) also apply, except for § 63.8(c)(1)(iii).

(g) *Overlap with other regulations.* Paragraphs (g)(1) through (7) of this section specify the applicability of this subpart YY emission point requirements when other rules may apply. Where subpart YY of this part allows an owner or operator an option to comply with one or another regulation to comply with subpart YY of this part, an owner or operator must report which regulation they choose to comply with in the Notification of Compliance Status report required by § 63.1110(a)(4).

(4) \* \* \*  
 (ii) After the compliance dates specified in § 63.1102, equipment that must be controlled according to this subpart and subpart H of this part is in compliance with the equipment leak requirements of this subpart if it complies with either set of requirements. For ethylene production affected sources, the requirement in § 63.1103(e)(9)(i) also applies. The owner or operator must specify the rule with which they will comply in the Notification of Compliance Status report required by § 63.1110(a)(4).

(iii) Beginning no later than the compliance dates specified in § 63.1102(c), for ethylene production affected sources, equipment that must be controlled according to this subpart and subpart VVa of 40 CFR part 60 is required only to comply with the equipment leak requirements of this subpart, except the owner or operator must also comply with the calibration

drift assessment requirements specified at § 60.485a(b)(2). When complying with the calibration drift assessment requirements at § 60.485a(b)(2), the requirement at § 60.486a(e)(8)(v) to record the instrument reading for each scale used applies.

(5) *Overlap of subpart YY with other regulations for wastewater for source categories other than ethylene production.* (i) After the compliance dates specified in § 63.1102 for an affected source subject to this subpart, a wastewater stream that is subject to the wastewater requirements of this subpart and the wastewater requirements of subparts F, G, and H of this part (collectively known as the “HON”) shall be deemed to be in compliance with the requirements of this subpart if it complies with either set of requirements. In any instance where a source subject to this subpart is collocated with a Synthetic Organic Chemical Manufacturing Industry (SOCMI) source, and a single wastewater treatment facility treats both Group 1 wastewaters and wastewater residuals from the source subject to this subpart and wastewaters from the SOCMI source, a certification by the treatment facility that they will manage and treat the waste in conformity with the specific control requirements set forth in 40 CFR 63.133 through 63.147 will also be deemed sufficient to satisfy the certification requirements for wastewater treatment under this subpart.

(7) *Overlap of subpart YY with other regulations for flares for the ethylene production source category.* (i) Beginning no later than the compliance dates specified in § 63.1102(c), flares that are subject to the provisions of 40 CFR 60.18 or 63.11 and used as a control device for an emission point subject to the requirements in Table 7 to § 63.1103(e) are required to comply only

with the provisions specified in § 63.1103(e)(4). At any time before the compliance dates specified in § 63.1102(c), flares that are subject to the provisions of 40 CFR 60.18 or 63.11 and elect to comply with the requirements in § 63.1103(e)(4) are required to comply only with the provisions specified in this subpart.

■ 17. Section 63.1101 is amended by revising the definitions of “Pressure relief device or valve” and “Shutdown” to read as follows:

**§ 63.1101 Definitions.**

*Pressure relief device or valve* means a safety device used to prevent operating pressures from exceeding the maximum allowable working pressure of the process equipment. A common pressure relief device is a spring-loaded pressure relief valve. Devices that are actuated either by a pressure of less than or equal to 2.5 pounds per square inch gauge or by a vacuum are not pressure relief devices. This definition does not apply to ethylene production affected sources.

*Shutdown* means the cessation of operation of an affected source or equipment that is used to comply with this subpart, or the emptying and degassing of a storage vessel. For the purposes of this subpart, shutdown includes, but is not limited to, periodic maintenance, replacement of equipment, or repair. Shutdown does not include the routine rinsing or washing of equipment in batch operation between batches. Shutdown includes the decoking of ethylene cracking furnaces.

■ 18. Section 63.1102 is amended by revising paragraph (a) introductory text and adding paragraph (c) to read as follows:

§ 63.1102 Compliance schedule.

(a) General requirements. Affected sources, as defined in § 63.1103(a)(1)(i) for acetyl resins production, § 63.1103(b)(1)(i) for acrylic and modacrylic fiber production, § 63.1103(c)(1)(i) for hydrogen fluoride production, § 63.1103(d)(1)(i) for polycarbonate production, § 63.1103(e)(1)(i) for ethylene production, § 63.1103(f)(1)(i) for carbon black production, § 63.1103(g)(1)(i) for cyanide chemicals manufacturing, or § 63.1103(h)(1)(i) for spandex production shall comply with the appropriate provisions of this subpart and the subparts referenced by this subpart according to the schedule in paragraphs (a)(1) or (2) of this section, as appropriate, except as provided in paragraphs (b) and (c) of this section. Proposal and effective dates are specified in Table 1 to this section.

\* \* \* \* \*

(c) All ethylene production affected sources that commenced construction or reconstruction on or before October 9, 2019, must be in compliance with the requirements listed in paragraphs (c)(1) through (13) of this section upon initial startup or [date 3 years after date of publication of final rule in the Federal Register], whichever is later. All ethylene production affected sources that commenced construction or reconstruction after October 9, 2019, must be in compliance with the requirements listed in paragraphs (c)(1) through (13) of this section upon initial startup, or [date of publication of final rule in the Federal Register], whichever is later.

(1) Overlap requirements specified in § 63.1100(g)(4)(iii) and (7), if applicable.

(2) The storage vessel requirements specified in paragraphs (a)(2), (b)(2), and (c)(1)(ii) of Table 7 to § 63.1103(e).

(3) The ethylene process vent requirements specified in paragraph (d)(1)(ii) of Table 7 to § 63.1103(e).

(4) The transfer rack requirements specified in § 63.1105(a)(5).

(5) The equipment requirements specified in paragraph (f)(1)(ii) of Table 7 to § 63.1103(e), and § 63.1107(h).

(6) The bypass line requirements specified in paragraph (i) of Table 7 to § 63.1103(e), and § 63.1103(e)(6).

(7) The decoking requirements for ethylene cracking furnaces specified in paragraph (j) of Table 7 to § 63.1103(e), and § 63.1103(e)(7) and (8).

(8) The flare requirements specified in § 63.1103(e)(4).

(9) The maintenance vent requirements specified in § 63.1103(e)(5).

(10) The requirements specified in § 63.1103(e)(9).

(11) The requirements in § 63.1108(a)(4)(i), (b)(1)(ii), (b)(2), and (b)(4)(ii)(B).

(12) The recordkeeping requirements specified in § 63.1109(e) through (i).

(13) The reporting requirements specified in § 63.1110(a)(10), (d)(1)(iv) and (v), and (e)(4) through (8).

\* \* \* \* \*

■ 19. Section 63.1103 is amended:

■ a. By revising the definition of “Inorganic hazardous air pollutant or inorganic HAP service” in paragraph (b)(2);

■ b. By revising paragraphs (e)(1)(i) introductory text, (e)(1)(i)(F), and (e)(1)(ii)(J);

■ c. In paragraph (e)(2) by:

■ i. Adding in alphabetical order a definition for “Decoking operation”;

■ ii. Revising the definition of “Ethylene process vent”;

■ iii. Adding in alphabetical order a definition for “Force majeure event”;

■ iv. Removing the definition of “Heat exchange system”;

■ v. Adding in alphabetical order, a definition for “Periodically discharged,” “Pressure-assisted multi-point flare,” “Pressure relief device,” “Radiant tube(s),” and “Relief valve”;

■ d. By revising paragraph (e)(3);

■ e. By revising Table 7 to § 63.1103(e); and

■ f. By adding paragraphs (e)(4) through (9).

§ 63.1103 Source category-specific applicability, definitions, and requirements.

\* \* \* \* \*

(b) \* \* \*

(2) \* \* \*

\* \* \* \* \*

In organic hazardous air pollutant or inorganic HAP service means, for acrylic and modacrylic fiber production affected sources, that a piece of equipment either contains or contacts a fluid (liquid or gas) that is at least 10 percent by weight of total organic HAP as determined according to the provisions of § 63.180(d). The provisions of § 63.180(d) also specify how to determine that a piece of equipment is not in organic HAP service.

\* \* \* \* \*

(e) Ethylene production applicability, definitions, and requirements—(1) Applicability—(i) Affected source.

For the ethylene production (as defined in paragraph (e)(2) of this section) source category, the affected source comprises all emission points listed in paragraphs (e)(1)(i)(A) through (G) of this section that are associated with an ethylene

production unit that is located at a major source, as defined in section 112(a) of the Act.

\* \* \* \* \*

(F) All heat exchange systems (as defined in § 63.1082(b)) associated with an ethylene production unit.

\* \* \* \* \*

(ii) \* \* \*

(J) Air emissions from all ethylene cracking furnaces.

\* \* \* \* \*

(2) Definitions.

Decoking operation means the coke combustion activity that occurs inside the radiant tube(s) in the ethylene cracking furnace firebox.

Ethylene process vent means a gas stream with a flow rate greater than 0.005 standard cubic meters per minute containing greater than 20 parts per million by volume HAP that is continuously discharged, or periodically discharged on and after [date 3 years after date of publication of final rule in the Federal Register], during operation of an ethylene production unit. Ethylene process vents are gas streams that are discharged to the atmosphere (or the point of entry into a control device, if any) either directly or after passing through one or more recovery devices. Ethylene process vents do not include:

(A) Pressure relief device discharges;

(B) Gaseous streams routed to a fuel gas system, including any flares using fuel gas, of which less than 50 percent of the fuel gas is derived from an ethylene production unit;

(C) Gaseous streams routed to a fuel gas system whereby any flares using fuel gas, of which 50 percent or more of the fuel gas is derived from an ethylene production unit, comply with § 63.1103(e)(4) beginning no later than the compliance dates specified in § 63.1102(c);

(D) Leaks from equipment regulated under this subpart;

(E) Episodic or nonroutine releases such as those associated with startup, shutdown, and malfunction until [date 3 years after date of publication of final rule in the Federal Register]; and

(F) In situ sampling systems (online analyzers) until [date 3 years after date of publication of final rule in the Federal Register].

\* \* \* \* \*

Force majeure event means a release of HAP, either directly to the atmosphere from a pressure relief device or discharged via a flare, that is demonstrated to the satisfaction of the Administrator to result from an event beyond the owner or operator’s control, such as natural disasters; acts of war or terrorism; loss of a utility external to the

ethylene production unit (e.g., external power curtailment), excluding power curtailment due to an interruptible service agreement; and fire or explosion originating at a near or adjoining facility outside of the ethylene production unit that impacts the ethylene production unit's ability to operate.

\* \* \* \* \*

*Periodically discharged* means gas stream discharges that are intermittent for which the total organic HAP concentration is greater than 20 parts per million by volume and total volatile organic compound emissions are 50 pounds per day or more. These intermittent discharges are associated with routine operations, maintenance activities, startups, shutdowns, malfunctions, or process upsets and do not include pressure relief device discharges or discharges classified as maintenance vents.

*Pressure-assisted multi-point flare* means a flare system consisting of multiple flare burners in staged arrays whereby the vent stream pressure is used to promote mixing and smokeless operation at the flare burner tips. Pressure-assisted multi-point flares are designed for smokeless operation at velocities up to Mach = 1 conditions (i.e., sonic conditions), can be elevated or at ground level, and typically use cross-lighting for flame propagation to combust any flare vent gases sent to a particular stage of flare burners.

*Pressure relief device* means a valve, rupture disk, or similar device used only to release an unplanned, nonroutine discharge of gas from process equipment in order to avoid safety hazards or equipment damage. A pressure relief device discharge can result from an operator error, a malfunction such as a power failure or equipment failure, or other unexpected cause. Such devices include conventional, spring-actuated relief valves, balanced bellows relief valves, pilot-operated relief valves, rupture disks, and breaking, buckling, or shearing pin devices.

*Radiant tube(s)* means any portion of the tube coil assembly located within the ethylene cracking furnace firebox whereby a thermal cracking reaction of hydrocarbons (in the presence of steam) occurs. Hydrocarbons and steam pass through the radiant tube(s) of the ethylene cracking furnace during normal operation and coke is removed from the inside of the radiant tube(s) during decoking operation.

*Relief valve* means a type of pressure relief device that is designed to re-close after the pressure relief.

\* \* \* \* \*

(3) *Requirements.* The owner or operator must control organic HAP emissions from each affected source emission point by meeting the applicable requirements specified in Table 7 to this section. An owner or

operator must perform the applicability assessment procedures and methods for process vents specified in § 63.1104, except for paragraphs (d), (g), (h) through (j), (l)(1), and (n). An owner or operator must perform the applicability assessment procedures and methods for equipment leaks specified in § 63.1107. General compliance, recordkeeping, and reporting requirements are specified in §§ 63.1108 through 63.1112. Before [date 3 years after date of publication of final rule in the **Federal Register**], minimization of emissions from startup, shutdown, and malfunctions must be addressed in the startup, shutdown, and malfunction plan required by § 63.1111; the plan must also establish reporting and recordkeeping of such events. A startup, shutdown, and malfunction plan is not required on and after [date 3 years after date of publication of final rule in the **Federal Register**] and the requirements specified in § 63.1111 no longer apply; however, for historical compliance purposes, a copy of the plan must be retained and available on-site for five years after [date 3 years after date of publication of final rule in the **Federal Register**]. Except as specified in paragraph (e)(4)(i) of this section, procedures for approval of alternate means of emission limitations are specified in § 63.1113.

TABLE 7 TO § 63.1103(e)—WHAT ARE MY REQUIREMENTS IF I OWN OR OPERATE AN ETHYLENE PRODUCTION EXISTING OR NEW AFFECTED SOURCE?

If you own or operate . . .	And if . . .	Then you must . . .
(a) A storage vessel (as defined in § 63.1101) that stores liquid containing organic HAP.	(1) Except as specified in paragraph (a)(2) of this table, the maximum true vapor pressure of total organic HAP is $\geq 3.4$ kilopascals but $< 76.6$ kilopascals; and the capacity of the vessel is $\geq 4$ cubic meters but $< 95$ cubic meters. (2) Beginning no later than the compliance dates specified in § 63.1102(c), the maximum true vapor pressure of total organic HAP is $\geq 0.69$ kilopascals but $< 76.6$ kilopascals; and the capacity of the vessel is $\geq 4$ cubic meters but $< 59$ cubic meters.	(i) Fill the vessel through a submerged pipe; or (ii) Comply with the requirements in paragraph (b)(1)(i) or (ii) of this table.  (i) Fill the vessel through a submerged pipe; or (ii) Comply with the requirements in paragraph (b)(2)(i) or (ii) of this table.
(b) A storage vessel (as defined in § 63.1101) that stores liquid containing organic HAP.	(1) Except as specified in paragraph (b)(2) of this table, the maximum true vapor pressure of total organic HAP is $\geq 3.4$ kilopascals but $< 76.6$ kilopascals; and the capacity of the vessel is $\geq 95$ cubic meters.	(i) Comply with the requirements of subpart WW of this part; or (ii) Reduce emissions of total organic HAP by 98 weight-percent by venting emissions through a closed vent system to any combination of control devices and meet the requirements of § 63.982(a)(1).

TABLE 7 TO § 63.1103(e)—WHAT ARE MY REQUIREMENTS IF I OWN OR OPERATE AN ETHYLENE PRODUCTION EXISTING OR NEW AFFECTED SOURCE?—Continued

If you own or operate . . .	And if . . .	Then you must . . .
(c) A storage vessel (as defined in § 63.1101) that stores liquid containing organic HAP.	<p>(2) Beginning no later than the compliance dates specified in § 63.1102(c), the maximum true vapor pressure of total organic HAP is <math>\geq 0.69</math> kilopascals but <math>&lt; 76.6</math> kilopascals; and the capacity of the vessel is <math>\geq 59</math> cubic meters.</p> <p>(1) The maximum true vapor pressure of total organic HAP is <math>\geq 76.6</math> kilopascals.</p>	<p>(i) Comply with the requirements of subpart WW of this part;<sup>a</sup> or (ii) Reduce emissions of total organic HAP by 98 weight-percent by venting emissions through a closed vent system to a flare and meet the requirements of § 63.983 and paragraphs (e)(4) and (9) of this section; or (iii) Reduce emissions of total organic HAP by 98 weight-percent by venting emissions through a closed vent system to any combination of non-flare control devices and meet the requirements specified in § 63.982(c)(1) and (e)(9) of this section; or (iv) Reduce emissions of total organic HAP by 98 weight-percent by routing emissions to a fuel gas system<sup>b</sup> or process and meet the requirements specified in § 63.982(d) and (e)(9) of this section.</p> <p>(i) Except as specified in paragraph (c)(1)(ii) of this table, reduce emissions of total organic HAP by 98 weight-percent by venting emissions through a closed vent system to any combination of control devices and meet the requirements of § 63.982(a)(1). (ii) Beginning no later than the compliance dates specified in § 63.1102(c), comply with paragraph (c)(1)(ii)(A), (B), or (C) of this section. (A) Reduce emissions of total organic HAP by 98 weight-percent by venting emissions through a closed vent system to a flare and meet the requirements of § 63.983 and paragraphs (e)(4) and (9) of this section; or (B) Reduce emissions of total organic HAP by 98 weight-percent by venting emissions through a closed vent system to any combination of non-flare control devices and meet the requirements specified in § 63.982(c)(1) and (e)(9) of this section; or (C) Reduce emissions of total organic HAP by 98 weight-percent by routing emissions to a fuel gas system<sup>b</sup> or process and meet the requirements specified in § 63.982(d) and (e)(9) of this section.</p>
(d) An ethylene process vent (as defined in paragraph (e)(2) of this section).	(1) The process vent is at an existing source and the vent stream has a flow rate $\geq 0.011$ scmm and a total organic HAP concentration $\geq 50$ parts per million by volume on a dry basis; or the process vent is at a new source and the vent stream has a flow rate $\geq 0.008$ scmm and a total organic HAP concentration $\geq 30$ parts per million by volume on a dry basis.	<p>(i) Except as specified in paragraph (d)(1)(ii) of this table, reduce emissions of organic HAP by 98 weight-percent; or reduce organic HAP or TOC to a concentration of 20 parts per million by volume on a dry basis corrected to 3% oxygen; whichever is less stringent, by venting emissions through a closed vent system to any combination of control devices and meet the requirements specified in § 63.982(b) and (c)(2). (ii) Beginning no later than the compliance dates specified in § 63.1102(c), comply with the maintenance vent requirements specified in paragraph (e)(5) of this section and either paragraph (d)(1)(ii)(A) or (B) of this table. (A) Reduce emissions of organic HAP by 98 weight-percent; or reduce organic HAP or TOC to a concentration of 20 parts per million by volume on a dry basis corrected to 3% oxygen; whichever is less stringent, by venting emissions through a closed vent system to a flare and meet the requirements of § 63.983 and paragraphs (e)(4) and (9) of this section; or (B) Reduce emissions of organic HAP by 98 weight-percent; or reduce organic HAP or TOC to a concentration of 20 parts per million by volume on a dry basis corrected to 3% oxygen; whichever is less stringent, by venting emissions through a closed vent system to any combination of non-flare control devices and meet the requirements specified in § 63.982(c)(2) and (e)(9) of this section.</p>

TABLE 7 TO § 63.1103(e)—WHAT ARE MY REQUIREMENTS IF I OWN OR OPERATE AN ETHYLENE PRODUCTION EXISTING OR NEW AFFECTED SOURCE?—Continued

If you own or operate . . .	And if . . .	Then you must . . .
(e) A transfer rack (as defined in paragraph (e)(2) of this section).	(1) Materials loaded have a true vapor pressure of total organic HAP $\geq 3.4$ kilopascals and $\geq 76$ cubic meters per day (averaged over any consecutive 30-day period) of HAP-containing material is loaded.	(i) Reduce emissions of organic HAP by 98 weight-percent; or reduce organic HAP or TOC to a concentration of 20 parts per million by volume on a dry basis corrected to 3% oxygen; whichever is less stringent, by venting emissions through a closed vent system to any combination of control devices as specified in § 63.1105 and meet the requirements specified in paragraph (e)(9) of this section.; or (ii) Install process piping designed to collect the HAP-containing vapors displaced from tank trucks or railcars during loading and to route it to a process, a fuel gas system, or a vapor balance system, as specified in § 63.1105 and meet the requirements specified in paragraph (e)(9) of this section. <sup>b</sup>
(f) Equipment (as defined in § 63.1101) that contains or contacts organic HAP.	(1) The equipment contains or contacts $\geq 5$ weight-percent organic HAP; and the equipment is not in vacuum service.	(i) Except as specified in paragraph (f)(1)(ii) of this table, comply with the requirements of subpart UU of this part. (ii) Beginning no later than the compliance dates specified in § 63.1102(c), comply with the requirements of paragraph (e)(9) of this section and subpart UU of this part, except instead of complying with the pressure relief device requirements of § 63.1030 of subpart UU, meet the requirements of § 63.1107(h), and in lieu of the flare requirement of § 63.1034(b)(2)(iii), comply with the requirements specified in paragraph (e)(4) of this section. <sup>b</sup>
(g) Processes that generate waste (as defined in paragraph (e)(2) of this section).	(1) The waste stream contains any of the following HAP: Benzene, cumene, ethyl benzene, hexane, naphthalene, styrene, toluene, o-xylene, m-xylene, p-xylene, or 1,3-butadiene.	(i) Comply with the waste requirements of subpart XX of this part. For ethylene production unit waste stream requirements, terms have the meanings specified in subpart XX.
(h) A heat exchange system (as defined in § 63.1082(b)).	.....	Comply with the heat exchange system requirements of subpart XX of this part.
(i) A closed vent system that contains one or more bypass lines.	(1) The bypass line could divert a vent stream directly to the atmosphere or to a control device not meeting the requirements in this table.	(i) Beginning no later than the compliance dates specified in § 63.1102(c), comply with the requirements specified in paragraphs (e)(6) and (9) of this section.
(j) A decoking operation associated with an ethylene cracking furnace.	.....	Beginning no later than the compliance dates specified in § 63.1102(c), comply with the requirements specified in paragraphs (e)(7) and (8) of this section.

<sup>a</sup>For owners or operators that choose to comply with the requirements of subpart WW of this part for storage vessels with a capacity  $\geq 59$  cubic meters, the timing for installation of the required controls is specified within subpart WW of this part. All references to “promulgation of the referencing subpart” and “the promulgation date of the referencing subpart” in subpart WW of this part means [date of publication of final rule in the **Federal Register**].

<sup>b</sup>Beginning no later than the compliance dates specified in § 63.1102(c), any flare using fuel gas from a fuel gas system, of which 50 percent or more of the fuel gas is derived from an ethylene production unit, must be in compliance with paragraph (e)(4) of this section.

(4) *Flares*. Beginning no later than the compliance dates specified in § 63.1102(c), if a steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point flare is used as a control device for an emission point subject to the requirements in Table 7 to this section, then the owner or operator must meet the applicable requirements for flares as specified in §§ 63.670 and 63.671 of subpart CC, including the provisions in Tables 12 and 13 to subpart CC of this part, except as specified in paragraphs (e)(4)(i) through (xi) of this section. This requirement also applies to any flare using fuel gas from a fuel gas system, of which 50

percent or more of the fuel gas is derived from an ethylene production unit, being used to control an emission point subject to the requirements in Table 7 of this section. For purposes of compliance with this paragraph, the following terms are defined in § 63.641 of subpart CC: Assist air, assist steam, center steam, combustion zone, combustion zone gas, flare, flare purge gas, flare supplemental gas, flare sweep gas, flare vent gas, lower steam, net heating value, perimeter assist air, pilot gas, premix assist air, total steam, and upper steam.

(i) The owner or operator may elect to comply with the alternative means of

emissions limitation requirements specified in of § 63.670(r) of subpart CC in lieu of the requirements in § 63.670(d) through (f) of subpart CC, as applicable. However, instead of complying with § 63.670(r)(3) of subpart CC, the owner or operator must submit the alternative means of emissions limitation request following the requirements in § 63.1113.

(ii) Instead of complying with § 63.670(o)(2)(i) of subpart CC, the owner or operator must develop and implement the flare management plan no later than the compliance dates specified in § 63.1102(c).



(iii) Instead of complying with § 63.670(o)(2)(iii) of subpart CC, if required to develop a flare management plan and submit it to the Administrator, then the owner or operator must also submit all versions of the plan in portable document format (PDF) to the EPA via the Compliance and Emissions Data Reporting Interface (CEDRI), which can be accessed through the EPA's Central Data Exchange (CDX) (<https://cdx.epa.gov/>). If you claim some of the information in your flare management plan is confidential business information (CBI), submit a version with the CBI omitted via CEDRI. A complete plan, including information claimed to be CBI and clearly marked as CBI, must be mailed to the following address: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Sector Policies and Programs Division, U.S. EPA Mailroom (E143-01), Attention: Ethylene Production Sector Lead, 109 T.W. Alexander Drive, Research Triangle Park, NC 27711.

(iv) Substitute "ethylene production unit" for each occurrence of "petroleum refinery."

(v) Each occurrence of "refinery" does not apply.

(vi) If a pressure-assisted multi-point flare is used as a control device for an emission point subject to the requirements in Table 7 to this section, then the following conditions apply:

(A) The owner or operator is not required to comply with the flare tip velocity requirements in § 63.670(d) and (k) of subpart CC;

(B) The owner or operator must substitute "800" for each occurrence of "270" in § 63.670(e) of subpart CC;

(C) The owner or operator must determine the 15-minute block average  $NHV_{vg}$  using only the direct calculation method specified in § 63.670(l)(5)(ii) of subpart CC;

(D) Instead of complying with § 63.670(b) and (g) of subpart CC, if a pressure-assisted multi-point flare uses cross-lighting on a stage of burners rather than having an individual pilot flame on each burner, the owner or operator must operate each stage of the pressure-assisted multi-point flare with a flame present at all times when regulated material is routed to that stage of burners. Each stage of burners that cross-lights in the pressure-assisted multi-point flare must have at least two pilots with a continuously lit pilot flame capable of igniting all regulated material

that is routed to that stage of burners. Each 15-minute block during which there is at least one minute where no pilot flame is present on a stage of burners when regulated material is routed to the flare is a deviation of the standard. Deviations in different 15-minute blocks from the same event are considered separate deviations. The pilot flame(s) on each stage of burners that use cross-lighting must be continuously monitored by a thermocouple or any other equivalent device used to detect the presence of a flame;

(E) The owner or operator of a pressure-assisted multi-point flare must ensure that if a stage of burners on the flare uses cross-lighting, that the distance between any two burners in series on that stage is no more than 6 feet; and

(F) The owner or operator of a pressure-assisted multi-point flare must install and operate pressure monitor(s) on the main flare header, as well as a valve position indicator monitoring system for each staging valve to ensure that the flare operates within the proper range of conditions as specified by the manufacturer. The pressure monitor must meet the requirements in Table 13 of subpart CC of this part.

(vii) If an owner or operator chooses to determine compositional analysis for net heating value with a continuous process mass spectrometer, the owner or operator must comply with the requirements specified in paragraphs (e)(4)(vii)(A) through (G) of this section.

(A) The owner or operator must meet the requirements in § 63.671(e)(2). The owner or operator may augment the minimum list of calibration gas components found in § 63.671(e)(2) with compounds found during a pre-survey or known to be in the gas through process knowledge.

(B) Calibration gas cylinders must be certified to an accuracy of 2 percent and traceable to National Institute of Standards and Technology (NIST) standards.

(C) For unknown gas components that have similar analytical mass fragments to calibration compounds, the owner or operator may report the unknowns as an increase in the overlapped calibration gas compound. For unknown compounds that produce mass fragments that do not overlap calibration compounds, the owner or operator may use the response factor for

the nearest molecular weight hydrocarbon in the calibration mix to quantify the unknown component's  $NHV_{vg}$ .

(D) The owner or operator may use the response factor for n-pentane to quantify any unknown components detected with a higher molecular weight than n-pentane.

(E) The owner or operator must perform an initial calibration to identify mass fragment overlap and response factors for the target compounds.

(F) The owner or operator must meet applicable requirements in Performance Specification 9 of 40 CFR part 60, appendix B, for continuous monitoring system acceptance including, but not limited to, performing an initial multi-point calibration check at three concentrations following the procedure in Section 10.1 and performing the periodic calibration requirements listed for gas chromatographs in Table 13 of 40 CFR part 63, subpart CC, for the process mass spectrometer. The owner or operator may use the alternative sampling line temperature allowed under Net Heating Value by Gas Chromatograph in Table 13 of 40 CFR part 63, subpart CC.

(G) The average instrument calibration error (CE) for each calibration compound at any calibration concentration must not differ by more than 10 percent from the certified cylinder gas value. The CE for each component in the calibration blend must be calculated using the following equation:

$$CE = \frac{C_m - C_a}{C_a} \times 100$$

Where:

$C_m$  = Average instrument response (ppm)

$C_a$  = Certified cylinder gas value (ppm)

(viii) An owner or operator using a gas chromatograph or mass spectrometer for compositional analysis for net heating value may choose to use the CE of  $NHV_{measured}$  versus the cylinder tag value  $NHV$  as the measure of agreement for daily calibration and quarterly audits in lieu of determining the compound-specific CE. The CE for  $NHV$  at any calibration level must not differ by more than 10 percent from the certified cylinder gas value. The CE for must be calculated using the following equation:

$$CE = \frac{NHV_{measured} - NHV_a}{NHV_a} \times 100$$

Where:

NHV<sub>measured</sub> = Average instrument response (Btu/scf)

NHV<sub>a</sub> = Certified cylinder gas value (Btu/scf)

(ix) Instead of complying with § 63.670(p) of subpart CC, the owner or operator must keep the flare monitoring records specified in § 63.1109(e).

(x) Instead of complying with § 63.670(q) of subpart CC, the owner or operator must comply with the reporting requirements specified in § 63.1110(d) and (e)(4).

(xi) When determining compliance with the flare tip velocity and combustion zone operating limits specified in § 63.670(d) and (e), the initial 15-minute block period starts with the 15-minute block that includes a full 15 minutes of the flaring event.

(5) *Maintenance vents.* Beginning no later than the compliance dates specified in § 63.1102(c), an owner or operator may designate a process vent as a maintenance vent if the vent is only used as a result of startup, shutdown, maintenance, or inspection of equipment where equipment is emptied, depressurized, degassed, or placed into service. The owner or operator must comply with the applicable requirements in paragraphs (e)(5)(i) through (iii) of this section for each maintenance vent, unless an extension is requested in accordance with the provisions in § 63.6(i) of subpart A.

(i) Prior to venting to the atmosphere, remove process liquids from the equipment as much as practical and depressurize the equipment to either: A flare meeting the requirements specified in paragraph (e)(4) of this section, or a non-flare control device meeting the requirements specified in § 63.982(c)(2) of subpart SS, until one of the following conditions, as applicable, is met.

(A) The vapor in the equipment served by the maintenance vent has a lower explosive limit (LEL) of less than 10 percent.

(B) If there is no ability to measure the LEL of the vapor in the equipment based on the design of the equipment, the pressure in the equipment served by the maintenance vent is reduced to 5 pounds per square inch gauge (psig) or less. Upon opening the maintenance vent, active purging of the equipment cannot be used until the LEL of the vapors in the maintenance vent (or inside the equipment if the maintenance is a hatch or similar type of opening) is less than 10 percent.

(C) The equipment served by the maintenance vent contains less than 50 pounds of total volatile organic compounds (VOC).

(D) If, after applying best practices to isolate and purge equipment served by

a maintenance vent, none of the applicable criterion in paragraphs (e)(5)(i)(A) through (C) of this section can be met prior to installing or removing a blind flange or similar equipment blind, then the pressure in the equipment served by the maintenance vent must be reduced to 2 psig or less before installing or removing the equipment blind. During installation or removal of the equipment blind, active purging of the equipment may be used provided the equipment pressure at the location where purge gas is introduced remains at 2 psig or less.

(ii) Except for maintenance vents complying with the alternative in paragraph (e)(5)(i)(C) of this section, the owner or operator must determine the LEL or, if applicable, equipment pressure using process instrumentation or portable measurement devices and follow procedures for calibration and maintenance according to manufacturer's specifications.

(iii) For maintenance vents complying with the alternative in paragraph (e)(5)(i)(C) of this section, the owner or operator must determine mass of VOC in the equipment served by the maintenance vent based on the equipment size and contents after considering any contents drained or purged from the equipment. Equipment size may be determined from equipment design specifications. Equipment contents may be determined using process knowledge.

(6) *Bypass lines.* Beginning on the compliance dates specified in § 63.1102(c), the use of a bypass line at any time on a closed vent system to divert a vent stream to the atmosphere or to a control device not meeting the requirements specified in Table 7 of this subpart is an emissions standards violation. Equipment such as low leg drains and equipment subject to the requirements specified in paragraph (f) of Table 7 to § 63.1103(e) are not subject to this paragraph (e)(6). Open-ended valves or lines that use a cap, blind flange, plug, or second valve and follow the requirements specified in § 60.482–6(a)(2), (b), and (c) are also not subject to this paragraph (e)(6). If the owner or operator is subject to the bypass monitoring requirements of § 63.983(a)(3) of subpart SS, then the owner or operator must continue to comply with the requirements in § 63.983(a)(3) of subpart SS and the recordkeeping and reporting requirements in §§ 63.998(d)(1)(ii) and 63.999(c)(2) of subpart SS, in addition to paragraph (e)(9) of this section, the recordkeeping requirements specified in § 63.1109(g), and the reporting

requirements specified in § 63.1110(e)(6).

(7) *Decoking operation standards for ethylene cracking furnaces.* Beginning no later than the compliance dates specified in § 63.1102(c), the owner or operator must comply with paragraph (e)(7)(i) of this section and also use at least two of the control measures specified in paragraphs (e)(7)(ii) through (v) of this section to minimize coke combustion emissions from the decoking of the radiant tube(s) in each ethylene cracking furnace.

(i) During normal operations, conduct daily inspections of the firebox burners and repair all burners that are impinging on the radiant tube(s) as soon as practical, but not later than 1 calendar day after the flame impingement is found. An inspection may include, but is not limited to: Visual inspection of the radiant tube(s) for localized bright spots (this may be confirmed with a temperature gun), use of luminescent powders injected into the burner to illuminate the flame pattern, or identifying continued localized coke build-up that causes short runtimes between decoking cycles. A repair may include, but is not limited to: Taking the burner out of service, replacing the burner, adjusting the alignment of the burner, adjusting burner configuration, making burner air corrections, repairing a malfunction of the fuel liquid removal equipment, or adding insulation around the radiant tube(s).

(ii) During decoking operations, continuously monitor (or use a gas detection tube every hour to monitor) the CO<sub>2</sub> concentration at the radiant tube(s) outlet for indication that the coke combustion in the ethylene cracking furnace radiant tube(s) is complete. The owner or operator must immediately initiate procedures to stop the decoking cycle once the CO<sub>2</sub> concentration at the radiant tube(s) outlet consistently reaches a level that indicates combustion of coke inside the radiant tube(s) is slowing or stopping.

(iii) During decoking operations, continuously monitor the temperature at the radiant tube(s) outlet to ensure the coke combustion occurring inside the radiant tube(s) is not so aggressive (*i.e.*, too hot) that it damages either the radiant tube(s) or ethylene cracking furnace isolation valve(s). The owner or operator must immediately initiate procedures to reduce the temperature at the radiant tube(s) outlet once the temperature reaches a level that indicates combustion of coke inside the radiant tube(s) is too aggressive.

(iv) After decoking, but before returning the ethylene cracking furnace back to normal operations, purge the

radiant tube(s) with steam and verify that all air is removed.

(v) After decoking, but before returning the ethylene cracking furnace back to normal operations, apply a coating material to the interior of the radiant tube(s) to protect against coke formation inside the radiant tube during normal operation.

(8) *Ethylene cracking furnace isolation valve inspections.* Beginning no later than the compliance dates specified in § 63.1102(c), the owner or operator must conduct ethylene cracking furnace isolation valve inspections as specified in paragraphs (e)(8)(i) and (ii) of this section.

(i) Prior to decoking operation, inspect the applicable ethylene cracking furnace isolation valve(s) to confirm that the radiant tube(s) being decoked is completely isolated from the ethylene production process so that no emissions generated from decoking operations are sent to the ethylene production process. If poor isolation is identified, then the owner or operator must rectify the isolation issue prior to continuing decoking operations to prevent leaks into the ethylene production process.

(ii) Prior to returning the ethylene cracking furnace to normal operations after a decoking operation, inspect the applicable ethylene cracking furnace isolation valve(s) to confirm that the radiant tube(s) that was decoked is completely isolated from the decoking pot or furnace firebox such that no emissions are sent from the radiant tube(s) to the decoking pot or furnace firebox once the ethylene cracking furnace returns to normal operation. If poor isolation is identified, then the owner or operator must rectify the isolation issue prior to continuing normal operations to prevent product from escaping to the atmosphere through the decoking pot or furnace firebox.

(9) *Startup, shutdown, and malfunction referenced provisions.* Beginning no later than the compliance dates specified in § 63.1102(c), the referenced provisions specified in paragraphs (e)(9)(i) through (xv) of this section do not apply when demonstrating compliance with paragraph (e)(3) of this section.

(i) The second sentence of § 63.181(d)(5)(i) of subpart H.

(ii) Section 63.983(a)(5) of subpart SS.

(iii) The phrase “except during periods of start-up, shutdown and malfunction as specified in the referencing subpart” in § 63.984(a) of subpart SS.

(iv) The phrase “except during periods of start-up, shutdown and malfunction as specified in the

referencing subpart” in § 63.985(a) of subpart SS.

(v) The phrase “other than start-ups, shutdowns, or malfunctions” in § 63.994(c)(1)(ii)(D) of subpart SS.

(vi) Section 63.996(c)(2)(ii) of subpart SS.

(vii) Section 63.997(e)(1)(i) of subpart SS.

(viii) The term “breakdowns” from § 63.998(b)(2)(i) of subpart SS.

(ix) Section 63.998(b)(2)(iii) of subpart SS.

(x) The phrase “other than periods of startups, shutdowns, and malfunctions” from § 63.998(b)(5)(i)(A) of subpart SS.

(xi) The phrase “other than periods of startups, shutdowns, and malfunctions” from § 63.998(b)(5)(i)(C) of subpart SS.

(xii) The phrase “except as provided in paragraphs (b)(6)(i)(A) and (B) of this section” from § 63.998(b)(6)(i) of subpart SS.

(xiii) The second sentence of § 63.998(b)(6)(ii) of subpart SS.

(xiv) Section 63.998(c)(1)(ii)(D) through (G) of subpart SS.

(xv) Section 63.998(d)(1)(ii) of subpart SS.

(xvi) Section 63.998(d)(3)(i) and (ii) of subpart SS.

(xvii) The phrase “(except periods of startup, shutdown, or malfunction)” from § 63.1026(e)(1)(ii)(A) of subpart UU.

(xviii) The phrase “(except periods of startup, shutdown, or malfunction)” from § 63.1028(e)(1)(i)(A) of subpart UU.

(xix) The phrase “(except periods of startup, shutdown, or malfunction)” from § 63.1031(b)(1) of subpart UU.

\* \* \* \* \*

■ 20. Section 63.1104 is amended by revising paragraph (c) to read as follows:

**§ 63.1104 Process vents from continuous unit operations: Applicability assessment procedures and methods.**

\* \* \* \* \*

(c) *Applicability assessment requirement.* The TOC or organic HAP concentrations, process vent volumetric flow rates, process vent heating values, process vent TOC or organic HAP emission rates, halogenated process vent determinations, process vent TRE index values, and engineering assessments for process vent control applicability assessment requirements are to be determined during maximum representative operating conditions for the process, except as provided in paragraph (d) of this section, or unless the Administrator specifies or approves alternate operating conditions. For acrylic and modacrylic fiber production affected sources, polycarbonate production affected sources, and ethylene production affected sources,

operations during periods of malfunction shall not constitute representative conditions for the purpose of an applicability test. For all other affected sources, operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of an applicability test.

\* \* \* \* \*

■ 21. Section 63.1105 is amended by revising paragraph (a) introductory text and adding paragraph (a)(5).

**§ 63.1105 Transfer racks.**

(a) *Design requirements.* Except as specified in paragraph (a)(5) of this section, the owner or operator shall equip each transfer rack with one of the control options listed in paragraphs (a)(1) through (5) of this section.

\* \* \* \* \*

(5) Beginning no later than the compliance dates specified in § 63.1102(c), if emissions are vented through a closed vent system to a flare at an ethylene production affected source, then the owner or operator must comply with the requirements specified in § 63.1103(e)(4) instead of the requirements in § 63.987 and the provisions regarding flare compliance assessments at § 63.997(a) through (c).

\* \* \* \* \*

■ 22. Section 63.1107 is amended by revising paragraph (a) and adding paragraph (h) to read as follows:

**§ 63.1107 Equipment leaks.**

(a) Each piece of equipment within a process unit that can reasonably be expected to contain equipment in organic HAP service is presumed to be in organic HAP service unless an owner or operator demonstrates that the piece of equipment is not in organic HAP service. For a piece of equipment to be considered not in organic HAP service, it must be determined that the percent organic HAP content can be reasonably expected not to exceed the percent by weight control applicability criteria specified in § 63.1103 for an affected source on an annual average basis. For purposes of determining the percent organic HAP content of the process fluid that is contained in or contacts equipment, Method 18 of 40 CFR part 60, appendix A shall be used. For purposes of determining the percent organic HAP content of the process fluid that is contained in or contacts equipment for the ethylene production affected sources, the following methods shall be used for equipment: For equipment in gas and vapor service, as that term is defined in Subpart UU of this part, shall use Method 18 of 40 CFR

part 60, appendix A; for equipment in liquid service, as that term is defined in Subpart UU of this part, shall use a combination of Method 18 of 40 CFR part 60, appendix A, SW-846-8260B (incorporated by reference, see § 63.14); and SW-846-8270D (incorporated by reference, see § 63.14), as appropriate.

\* \* \* \* \*

(h) *Ethylene production pressure release requirements.* Beginning no later than the compliance dates specified in § 63.1102(c), except as specified in paragraph (h)(4) of this section, owners or operators of ethylene production affected sources must comply with the requirements specified in paragraphs (h)(1) and (2) of this section for pressure relief devices, such as relief valves or rupture disks, in organic HAP gas or vapor service instead of the pressure relief device requirements of § 63.1030 of subpart UU or § 63.165 of subpart H. Beginning no later than the compliance dates specified in § 63.1102(c), except as specified in paragraphs (h)(4) and (5) of this section, the owner or operator must also comply with the requirements specified in paragraphs (h)(3), and (6) through (8) of this section for all pressure relief devices.

(1) *Operating requirements.* Except during a pressure release, operate each pressure relief device in organic HAP gas or vapor service with an instrument reading of less than 500 ppm above background as measured by the method in § 63.1023(b) of subpart UU or § 63.180(b) and (c) of subpart H.

(2) *Pressure release requirements.* For pressure relief devices in organic HAP gas or vapor service, the owner or operator must comply with the applicable requirements in paragraphs (h)(2)(i) through (iii) of this section following a pressure release.

(i) If the pressure relief device does not consist of or include a rupture disk, conduct instrument monitoring, as specified in § 63.1023(b) of subpart UU or § 63.180(b) and (c) of subpart H, no later than 5 calendar days after the pressure relief device returns to organic HAP gas or vapor service following a pressure release to verify that the pressure relief device is operating with an instrument reading of less than 500 ppm.

(ii) If the pressure relief device includes a rupture disk, either comply with the requirements in paragraph (h)(2)(i) of this section (and do not replace the rupture disk) or install a replacement disk as soon as practicable after a pressure release, but no later than 5 calendar days after the pressure release. The owner or operator must conduct instrument monitoring, as

specified in § 63.1023(b) of subpart UU or § 63.180(b) and (c) of subpart H, no later than 5 calendar days after the pressure relief device returns to organic HAP gas or vapor service following a pressure release to verify that the pressure relief device is operating with an instrument reading of less than 500 ppm.

(iii) If the pressure relief device consists only of a rupture disk, install a replacement disk as soon as practicable after a pressure release, but no later than 5 calendar days after the pressure release. The owner or operator must not initiate startup of the equipment served by the rupture disk until the rupture disc is replaced. The owner or operator must conduct instrument monitoring, as specified in § 63.1023(b) of subpart UU or § 63.180(b) and (c) of subpart H, no later than 5 calendar days after the pressure relief device returns to organic HAP gas or vapor service following a pressure release to verify that the pressure relief device is operating with an instrument reading of less than 500 ppm.

(3) *Pressure release management.* Except as specified in paragraphs (h)(4) and (5) of this section, the owner or operator must comply with the requirements specified in paragraphs (h)(3)(i) through (v) of this section for all pressure relief devices in organic HAP service.

(i) The owner or operator must equip each affected pressure relief device with a device(s) or use a monitoring system that is capable of:

(A) Identifying the pressure release;

(B) Recording the time and duration of each pressure release; and

(C) Notifying operators immediately that a pressure release is occurring. The device or monitoring system must be either specific to the pressure relief device itself or must be associated with the process system or piping, sufficient to indicate a pressure release to the atmosphere. Examples of these types of devices and systems include, but are not limited to, a rupture disk indicator, magnetic sensor, motion detector on the pressure relief valve stem, flow monitor, or pressure monitor.

(ii) The owner or operator must apply at least three redundant prevention measures to each affected pressure relief device and document these measures. Examples of prevention measures include:

(A) Flow, temperature, liquid level and pressure indicators with deadman switches, monitors, or automatic actuators. Independent, non-duplicative systems within this category count as separate redundant prevention measures.

(B) Documented routine inspection and maintenance programs and/or operator training (maintenance programs and operator training may count as only one redundant prevention measure).

(C) Inherently safer designs or safety instrumentation systems.

(D) Deluge systems.

(E) Staged relief system where the initial pressure relief device (with lower set release pressure) discharges to a flare or other closed vent system and control device.

(iii) If any affected pressure relief device releases to atmosphere as a result of a pressure release event, the owner or operator must perform root cause analysis and corrective action analysis according to the requirement in paragraph (h)(6) of this section and implement corrective actions according to the requirements in paragraph (h)(7) of this section. The owner or operator must also calculate the quantity of organic HAP released during each pressure release event and report this quantity as required in § 63.1110(e)(8)(iii). Calculations may be based on data from the pressure relief device monitoring alone or in combination with process parameter monitoring data and process knowledge.

(iv) The owner or operator must determine the total number of release events that occurred during the calendar year for each affected pressure relief device separately. The owner or operator must also determine the total number of release events for each pressure relief device for which the root cause analysis concluded that the root cause was a force majeure event, as defined in § 63.1103(e)(2).

(v) Except for pressure relief devices described in paragraphs (h)(4) and (5) of this section, the following release events from an affected pressure relief device are a violation of the pressure release management work practice standards.

(A) Any release event for which the root cause of the event was determined to be operator error or poor maintenance.

(B) A second release event not including force majeure events from a single pressure relief device in a 3-calendar year period for the same root cause for the same equipment.

(C) A third release event not including force majeure events from a single pressure relief device in a 3-calendar year period for any reason.

(4) *Pressure relief devices routed to a control device, process, fuel gas system, or drain system.* (i) If all releases and potential leaks from a pressure relief device are routed through a closed vent system to a control device, back into the

process, a fuel gas system, or drain system, then the owner or operator is not required to comply with paragraph (h)(1), (2), or (3) of this section.

(ii) Before the compliance dates specified in § 63.1102(c), both the closed vent system and control device (if applicable) referenced in paragraph (h)(4)(i) of this section must meet the applicable requirements specified in § 63.982(b) and (c)(2). Beginning no later than the compliance dates specified in § 63.1102(c), both the closed vent system and control device (if applicable) referenced in paragraph (h)(4)(i) of this section must meet the applicable requirements specified in § 63.982(c)(2), § 63.983, and § 63.1103(e)(4).

(iii) The drain system (if applicable) referenced in paragraph (h)(4)(i) of this section must meet the applicable requirements specified in § 61.346.

(5) *Pressure relief devices exempted from pressure release management requirements.* The following types of pressure relief devices are not subject to the pressure release management requirements in paragraph (h)(3) of this section.

(i) Pressure relief devices in heavy liquid service, as defined in § 63.1020 of subpart UU.

(ii) Thermal expansion relief valves.

(iii) Pressure relief devices designed with a set relief pressure of less than 2.5 psig.

(iv) Pilot-operated pressure relief devices where the primary release valve is routed through a closed vent system to a control device or back into the process, a fuel gas system, or drain system.

(v) Balanced bellows pressure relief devices where the primary release valve is routed through a closed vent system to a control device or back into the process, a fuel gas system, or drain system.

(6) *Root cause analysis and corrective action analysis.* A root cause analysis and corrective action analysis must be completed as soon as possible, but no later than 45 days after a release event. Special circumstances affecting the number of root cause analyses and/or corrective action analyses are provided in paragraphs (h)(6)(i) through (iv) of this section.

(i) You may conduct a single root cause analysis and corrective action analysis for a single emergency event that causes two or more pressure relief devices that are installed on the same equipment to release.

(ii) You may conduct a single root cause analysis and corrective action analysis for a single emergency event that causes two or more pressure relief devices to release, regardless of the

equipment served, if the root cause is reasonably expected to be a force majeure event, as defined in § 63.1103(e)(2).

(iii) Except as provided in paragraphs (h)(6)(i) and (ii) of this section, if more than one pressure relief device has a release during the same time period, an initial root cause analysis must be conducted separately for each pressure relief device that had a release. If the initial root cause analysis indicates that the release events have the same root cause(s), the initial separate root cause analyses may be recorded as a single root cause analysis and a single corrective action analysis may be conducted.

(7) *Corrective action implementation.* Each owner or operator required to conduct a root cause analysis and corrective action analysis as specified in paragraphs (h)(3)(iii) and (6) of this section, must implement the corrective action(s) identified in the corrective action analysis in accordance with the applicable requirements in paragraphs (h)(7)(i) through (iii) of this section.

(i) All corrective action(s) must be implemented within 45 days of the event for which the root cause and corrective action analyses were required or as soon thereafter as practicable. If an owner or operator concludes that no corrective action should be implemented, the owner or operator must record and explain the basis for that conclusion no later than 45 days following the event.

(ii) For corrective actions that cannot be fully implemented within 45 days following the event for which the root cause and corrective action analyses were required, the owner or operator must develop an implementation schedule to complete the corrective action(s) as soon as practicable.

(iii) No later than 45 days following the event for which a root cause and corrective action analyses were required, the owner or operator must record the corrective action(s) completed to date, and, for action(s) not already completed, a schedule for implementation, including proposed commencement and completion dates.

(8) *Flowing pilot-operated pressure relief devices.* For ethylene production affected sources that commenced construction or reconstruction on or before October 9, 2019, owners or operators are prohibited from installing a flowing pilot-operated pressure relief device or replacing any pressure relief device with a flowing pilot-operated pressure relief device after [date 3 years after date of publication of final rule in the **Federal Register**]. For ethylene production affected sources that

commenced construction or reconstruction after October 9, 2019, owners or operators are prohibited from installing and operating flowing pilot-operated pressure relief devices. For purpose of compliance with this paragraph, a flowing pilot-operated pressure relief device means the type of pilot-operated pressure relief device where the pilot discharge vent continuously releases emissions to the atmosphere when the pressure relief device is actuated.

■ 23. Section 63.1108 is amended by revising paragraphs (a) introductory text, (a)(4)(i) and (ii), (b)(1)(ii), (b)(2) introductory text, (b)(3), (b)(4)(i) introductory text, and (b)(4)(ii)(B) to read as follows:

**§ 63.1108 Compliance with standards and operation and maintenance requirements.**

(a) *Requirements.* The requirements of paragraphs (a)(1), (2), and (5) of this section apply to all affected sources except acrylic and modacrylic fiber production affected sources, polycarbonate production affected sources, and beginning no later than the compliance dates specified in § 63.1102(c), ethylene production affected sources. The requirements of paragraph (a)(4) of this section apply only to acrylic and modacrylic fiber production affected sources, polycarbonate production affected sources and beginning no later than the compliance dates specified in § 63.1102(c), ethylene production affected sources. The requirements of paragraphs (a)(3), (6), and (7) of this section apply to all affected sources.

\* \* \* \* \*

(4) \* \* \*

(i) For acrylic and modacrylic fiber production affected sources and polycarbonate production affected sources, and beginning no later than the compliance dates specified in § 63.1102(c), ethylene production affected sources, the emission limitations and established parameter ranges of this part shall apply at all times except during periods of non-operation of the affected source (or specific portion thereof) resulting in cessation of the emissions to which this subpart applies. Equipment leak requirements shall apply at all times except during periods of non-operation of the affected source (or specific portion thereof) in which the lines are drained and depressurized resulting in cessation of the emissions to which the equipment leak requirements apply.

(ii) *General duty.* At all times, the owner or operator must operate and maintain any affected source, including associated air pollution control

equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emissions does not require the owner or operator to make any further efforts to reduce emissions if levels required by the applicable standard have been achieved. Determination of whether a source is operating in compliance with operation and maintenance requirements will be based on information available to the Administrator that may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the affected source.

\* \* \* \* \*

- (b) \* \* \*
(1) \* \* \*

(ii) Excused excursions are not allowed for acrylic and modacrylic fiber production affected sources, polycarbonate production affected sources, and beginning no later than the compliance dates specified in § 63.1102(c), ethylene production affected sources. For all other affected sources, including ethylene production affected sources prior to the compliance dates specified in § 63.1102(c), an excused excursion, as described in § 63.998(b)(6)(ii), is not a violation.

(2) Parameter monitoring: Excursions. An excursion is not a violation in cases where continuous monitoring is required and the excursion does not count toward the number of excused excursions (as described in § 63.998(b)(6)(ii)), if the conditions of paragraphs (b)(2)(i) or (ii) of this section are met, except that the conditions of paragraph (b)(2)(i) of this section do not apply for acrylic and modacrylic fiber production affected sources, polycarbonate production affected sources, and beginning no later than the compliance dates specified in § 63.1102(c), ethylene production affected sources. Nothing in this paragraph shall be construed to allow or excuse a monitoring parameter excursion caused by any activity that violates other applicable provisions of this subpart or a subpart referenced by this subpart.

\* \* \* \* \*

(3) Operation and maintenance procedures. Determination of whether acceptable operation and maintenance procedures are being used will be based on information available to the Administrator. This information may include, but is not limited to, monitoring results, review of operation and maintenance procedures (including

the startup, shutdown, and malfunction plan under § 63.1111, if applicable), review of operation and maintenance records, and inspection of the affected source, and alternatives approved as specified in § 63.1113.

(4) \* \* \*
(i) Applicability assessments. Unless otherwise specified in a relevant test method required to assess control applicability, each test shall consist of three separate runs using the applicable test method. Each run shall be conducted for the time and under the conditions specified in this subpart. The arithmetic mean of the results of the three runs shall apply when assessing applicability. Upon receiving approval from the Administrator, results of a test run may be replaced with results of an additional test run if it meets the criteria specified in paragraphs (b)(4)(i)(A) through (D) of this section.

\* \* \* \* \*

(ii) \* \* \*
(B) For acrylic and modacrylic fiber production affected sources, polycarbonate production affected sources, and beginning no later than the compliance dates specified in § 63.1102(c), ethylene production affected sources, performance tests shall be conducted under such conditions as the Administrator specifies to the owner or operator based on representative performance of the affected source for the period being tested. Representative conditions exclude periods of startup and shutdown unless specified by the Administrator or an applicable subpart. The owner or operator may not conduct performance tests during periods of malfunction. The owner or operator must record the process information that is necessary to document operating conditions during the test and include in such record an explanation to support that such conditions represent normal operation. Upon request, the owner or operator shall make available to the Administrator such records as may be necessary to determine the conditions of performance tests.

\* \* \* \* \*

■ 23. Section 63.1109 is amended by adding paragraphs (e) through (i) to read as follows:

§ 63.1109 Recordkeeping requirements.

\* \* \* \* \*

(e) Ethylene production flare records. For each flare subject to the requirements in § 63.1103(e)(4), owners or operators must keep records specified in paragraphs (e)(1) through (15) of this section in lieu of the information required in § 63.998(a)(1) of subpart SS.

(1) Retain records of the output of the monitoring device used to detect the

presence of a pilot flame as required in § 63.670(b) of subpart CC and § 63.1103(e)(4)(vi)(D) for a minimum of 2 years. Retain records of each 15-minute block during which there was at least one minute that no pilot flame is present when regulated material is routed to a flare for a minimum of 5 years. For each pressure-assisted multi-point flare that uses cross-lighting, retain records of each 15-minute block during which there was at least one minute that no pilot flame is present on each stage when regulated material is routed to a flare for a minimum of 5 years.

(2) Retain records of daily visible emissions observations or video surveillance images required in § 63.670(h) of subpart CC as specified in paragraphs (e)(2)(i) through (iv), as applicable, for a minimum of 3 years.

(i) To determine when visible emissions observations are required, the record must identify all periods when regulated material is vented to the flare.

(ii) If visible emissions observations are performed using Method 22 at 40 CFR part 60, appendix A-7, then the record must identify whether the visible emissions observation was performed, the results of each observation, total duration of observed visible emissions, and whether it was a 5-minute or 2-hour observation. Record the date and start time of each visible emissions observation.

(iii) If a video surveillance camera is used, then the record must include all video surveillance images recorded, with time and date stamps.

(iv) For each 2-hour period for which visible emissions are observed for more than 5 minutes in 2 consecutive hours, then the record must include the date and start and end time of the 2-hour period and an estimate of the cumulative number of minutes in the 2-hour period for which emissions were visible.

(3) The 15-minute block average cumulative flows for flare vent gas and, if applicable, total steam, perimeter assist air, and premix assist air specified to be monitored under § 63.670(i) of subpart CC, along with the date and time interval for the 15-minute block. If multiple monitoring locations are used to determine cumulative vent gas flow, total steam, perimeter assist air, and premix assist air, then retain records of the 15-minute block average flows for each monitoring location for a minimum of 2 years, and retain records of the 15-minute block average cumulative flows that are used in subsequent calculations for a minimum of 5 years. If pressure and temperature monitoring is used, then retain records of the 15-minute

block average temperature, pressure, and molecular weight of the flare vent gas or assist gas stream for each measurement location used to determine the 15-minute block average cumulative flows for a minimum of 2 years, and retain records of the 15-minute block average cumulative flows that are used in subsequent calculations for a minimum of 5 years.

(4) The flare vent gas compositions specified to be monitored under § 63.670(j) of subpart CC. Retain records of individual component concentrations from each compositional analysis for a minimum of 2 years. If an NHVvg analyzer is used, retain records of the 15-minute block average values for a minimum of 5 years.

(5) Each 15-minute block average operating parameter calculated following the methods specified in § 63.670(k) through (n) of subpart CC, as applicable.

(6) All periods during which operating values are outside of the applicable operating limits specified in § 63.670(d) through (f) of subpart CC and § 63.1103(e)(4)(vi) when regulated material is being routed to the flare.

(7) All periods during which the owner or operator does not perform flare monitoring according to the procedures in § 63.670(g) through (j) of subpart CC.

(8) For pressure-assisted multi-point flares, if a stage of burners on the flare uses cross-lighting, then a record of any changes made to the distance between burners.

(9) For pressure-assisted multi-point flares, all periods when the pressure monitor(s) on the main flare header show burners are operating outside the range of the manufacturer's specifications. Indicate the date and time for each period, the pressure measurement, the stage(s) and number of burners affected, and the range of manufacturer's specifications.

(10) For pressure-assisted multi-point flares, all periods when the staging valve position indicator monitoring system indicates a stage of the pressure-assisted multi-point flare should not be in operation and when a stage of the pressure-assisted multi-point flare should be in operation and is not. Indicate the date and time for each period, whether the stage was supposed to be open, but was closed or vice versa, and the stage(s) and number of burners affected.

(11) Records of periods when there is flow of vent gas to the flare, but when there is no flow of regulated material to the flare, including the start and stop time and dates of periods of no regulated material flow.

(12) Records when the flow of vent gas exceeds the smokeless capacity of the flare, including start and stop time and dates of the flaring event.

(13) Records of the root cause analysis and corrective action analysis conducted as required in § 63.670(o)(3) of subpart CC, including an identification of the affected flare, the date and duration of the event, a statement noting whether the event resulted from the same root cause(s) identified in a previous analysis and either a description of the recommended corrective action(s) or an explanation of why corrective action is not necessary under § 63.670(o)(5)(i) of subpart CC.

(14) For any corrective action analysis for which implementation of corrective actions are required in § 63.670(o)(5) of subpart CC, a description of the corrective action(s) completed within the first 45 days following the discharge and, for action(s) not already completed, a schedule for implementation, including proposed commencement and completion dates.

(15) Records described in § 63.10(b)(2)(vi) and (xi).

(f) *Ethylene production maintenance vent records.* For each maintenance vent opening subject to the requirements in § 63.1103(e)(5), the owner or operator must keep the applicable records specified in (f)(1) through (5) of this section.

(1) The owner or operator must maintain standard site procedures used to deinventory equipment for safety purposes (e.g., hot work or vessel entry procedures) to document the procedures used to meet the requirements in § 63.1103(e)(5). The current copy of the procedures must be retained and available on-site at all times. Previous versions of the standard site procedures, as applicable, must be retained for five years.

(2) If complying with the requirements of § 63.1103(e)(5)(i)(A) and the lower explosive limit at the time of the vessel opening exceeds 10 percent, records that identify the maintenance vent, the process units or equipment associated with the maintenance vent, the date of maintenance vent opening, and the lower explosive limit at the time of the vessel opening.

(3) If complying with the requirements of § 63.1103(e)(5)(i)(B) and either the vessel pressure at the time of the vessel opening exceeds 5 psig or the lower explosive limit at the time of the active purging was initiated exceeds 10 percent, records that identify the maintenance vent, the process units or equipment associated with the maintenance vent, the date of maintenance vent opening, the pressure

of the vessel or equipment at the time of discharge to the atmosphere and, if applicable, the lower explosive limit of the vapors in the equipment when active purging was initiated.

(4) If complying with the requirements of § 63.1103(e)(5)(i)(C), records used to estimate the total quantity of VOC in the equipment and the type and size limits of equipment that contain less than 50 pounds of VOC at the time of maintenance vent opening. For each maintenance vent opening for which the deinventory procedures specified in paragraph (f)(1) of this section are not followed or for which the equipment opened exceeds the type and size limits established in the records specified in this paragraph, records that identify the maintenance vent, the process units or equipment associated with the maintenance vent, the date of maintenance vent opening, and records used to estimate the total quantity of VOC in the equipment at the time the maintenance vent was opened to the atmosphere.

(5) If complying with the requirements of § 63.1103(e)(5)(i)(D), identification of the maintenance vent, the process units or equipment associated with the maintenance vent, records documenting actions taken to comply with other applicable alternatives and why utilization of this alternative was required, the date of maintenance vent opening, the equipment pressure and lower explosive limit of the vapors in the equipment at the time of discharge, an indication of whether active purging was performed and the pressure of the equipment during the installation or removal of the blind if active purging was used, the duration the maintenance vent was open during the blind installation or removal process, and records used to estimate the total quantity of VOC in the equipment at the time the maintenance vent was opened to the atmosphere for each applicable maintenance vent opening.

(g) *Ethylene production bypass line records.* For each flow event from a bypass line subject to the requirements in § 63.1103(e)(6), the owner or operator must maintain records sufficient to determine whether or not the detected flow included flow requiring control. For each flow event from a bypass line requiring control that is released either directly to the atmosphere or to a control device not meeting the requirements specified in Table 7 to § 63.1103(e), the owner or operator must include an estimate of the volume of gas, the concentration of organic HAP in the gas and the resulting emissions of organic HAP that bypassed the control



device using process knowledge and engineering estimates.

(h) *Decoking operation of ethylene cracking furnace records.* For each decoking operation of an ethylene cracking furnace subject to the standards in § 63.1103(e)(7) and (8), the owner or operator must keep the records specified in paragraphs (h)(1) through (6) of this section.

(1) Records that document the day and time each inspection specified in § 63.1103(e)(7)(i) took place, the results of each inspection, and any repairs made to correct the flame impingement.

(2) If the owner or operator chooses to monitor the CO<sub>2</sub> concentration during decoking as specified in § 63.1103(e)(7)(ii), then for each decoking cycle, records must be kept for all measured CO<sub>2</sub> concentration values and the target used to indicate combustion is complete.

(3) If the owner or operator chooses to monitor the temperature at the radiant tube(s) outlet during decoking as specified in § 63.1103(e)(7)(iii), then for each decoking cycle, records must be kept for all measured temperature values and the target used to indicate a reduction in temperature of the inside of the radiant tube(s) is necessary.

(4) If the owner or operator chooses to purge the radiant tube(s) with steam after decoking, but before returning the ethylene cracking furnace back to normal operation as specified in § 63.1103(e)(7)(iv), then records must be kept that document the verification that all air is removed after each decoking cycle.

(5) If the owner or operator chooses to apply a coating material to the interior of the radiant tube after decoking, but before returning the ethylene cracking furnace back to normal operation as specified in § 63.1103(e)(7)(v), then records must be kept that document when the coating was applied.

(6) For each decoking operation of an ethylene cracking furnace subject to the requirements in § 63.1103(e)(8), the owner or operator must keep records that document the day and time each inspection took place, the results of each inspection, and any repairs made to correct any isolation issues that were identified.

(i) *Ethylene production pressure relief devices records.* For each pressure release device subject to the pressure release management work practice standards in § 63.1107(h)(3), the owner or operator must keep the records specified in paragraphs (i)(1) through (3) of this section.

(1) Records of the prevention measures implemented as required in § 63.1107(h)(3)(ii).

(2) Records of the number of releases during each calendar year and the number of those releases for which the root cause was determined to be a force majeure event. Keep these records for the current calendar year and the past five calendar years.

(3) For each release to the atmosphere, the owner or operator must keep the records specified in paragraphs (i)(3)(i) through (iv) of this section.

(i) The start and end time and date of each pressure release to the atmosphere.

(ii) Records of any data, assumptions, and calculations used to estimate of the mass quantity of each organic HAP released during the event.

(iii) Records of the root cause analysis and corrective action analysis conducted as required in § 63.1107(h)(3)(iii), including an identification of the affected pressure relief device, a statement noting whether the event resulted from the same root cause(s) identified in a previous analysis and either a description of the recommended corrective action(s) or an explanation of why corrective action is not necessary under § 63.1107(h)(7)(i).

(iv) For any corrective action analysis for which implementation of corrective actions are required in § 63.1107(h)(7), a description of the corrective action(s) completed within the first 45 days following the discharge and, for action(s) not already completed, a schedule for implementation, including proposed commencement and completion dates.

■ 24. Section 63.1110 is amended by:

- a. Revising paragraphs (a) introductory text and (a)(7) and (9);
- b. Adding paragraph (a)(10);
- c. Revising paragraphs (d)(1) introductory text and (d)(1)(i);
- d. Adding paragraphs (d)(1)(iv) and (v);
- e. Revising paragraph (e)(1);
- f. Adding paragraphs (e)(4) through (8); and
- g. Revising paragraphs (g)(1) and (2).

The revisions and additions read as follows:

#### § 63.1110 Reporting requirements.

(a) *Required reports.* Each owner or operator of an affected source subject to this subpart shall submit the reports listed in paragraphs (a)(1) through (8) of this section, as applicable. Each owner or operator of an acrylic and modacrylic fiber production affected source or polycarbonate production affected source subject to this subpart shall also submit the reports listed in paragraph (a)(9) of this section in addition to the reports listed in paragraphs (a)(1) through (8) of this section, as applicable.

Beginning no later than the compliance dates specified in § 63.1102(c), each owner or operator of an ethylene production affected source subject to this subpart shall also submit the reports listed in paragraph (a)(10) of this section in addition to the reports listed in paragraphs (a)(1) through (8) of this section, as applicable.

\* \* \* \* \*

(7) Startup, Shutdown, and Malfunction Reports described in § 63.1111 (except for acrylic and modacrylic fiber production affected sources, ethylene production affected sources, and polycarbonate production affected sources).

\* \* \* \* \*

(9) Within 60 days after the date of completing each performance test (as defined in § 63.2), the owner or operator must submit the results of the performance tests, including any associated fuel analyses, required by this subpart according to the methods specified in paragraph (a)(9)(i) or (ii) of this section.

\* \* \* \* \*

(10) (i) Beginning no later than the compliance dates specified in § 63.1102(c), within 60 days after the date of completing each performance test required by this subpart, the owner or operator must submit the results of the performance test following the procedures specified in paragraphs (a)(10)(i)(A) through (C) of this section.

(A) *Data collected using test methods supported by the EPA's Electronic Reporting Tool (ERT) as listed on the EPA's ERT website (<https://www.epa.gov/electronic-reporting-air-emissions/electronic-reporting-tool-ert>) at the time of the test.* Submit the results of the performance test to the EPA via CEDRI, which can be accessed through the EPA's CDX (<https://cdx.epa.gov/>). The data must be submitted in a file format generated through the use of the EPA's ERT. Alternatively, you may submit an electronic file consistent with the extensible markup language (XML) schema listed on the EPA's ERT website.

(B) *Data collected using test methods that are not supported by the EPA's ERT as listed on the EPA's ERT website at the time of the test.* The results of the performance test must be included as an attachment in the ERT or an alternate electronic file consistent with the XML schema listed on the EPA's ERT website. Submit the ERT generated package or alternative file to the EPA via CEDRI.

(C) *CBI.* If you claim some of the information submitted under paragraph (a)(10)(i)(A) or (B) of this section is CBI,

then the owner or operator must submit a complete file, including information claimed to be CBI, to the EPA. The file must be generated through the use of the EPA's ERT or an alternate electronic file consistent with the XML schema listed on the EPA's ERT website. Submit the file on a compact disc, flash drive, or other commonly used electronic storage medium and clearly mark the medium as CBI. Mail the electronic medium to U.S. EPA/OAQPS/CORE CBI Office, Attention: Group Leader, Measurement Policy Group, MD C404-02, 4930 Old Page Rd., Durham, NC 27703. The same file with the CBI omitted must be submitted to the EPA via EPA's CDX as described in paragraphs (a)(10)(i)(A) and (B) of this section.

(ii) Beginning no later than the compliance dates specified in § 63.1102(c), the owner or operator must submit all subsequent Notification of Compliance Status reports required under paragraph (a)(4) of this section to the EPA via CEDRI, which can be accessed through EPA's CDX (<https://cdx.epa.gov/>). If you claim some of the information required to be submitted via CEDRI is CBI, then submit a complete report, including information claimed to be CBI, on a compact disc, flash drive, or other commonly used electronic storage medium and clearly mark the medium as CBI. Mail the electronic medium to U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Sector Policies and Programs Division, U.S. EPA Mailroom (E143-01), Attention: Ethylene Production Sector Lead, 109 T.W. Alexander Drive, Research Triangle Park, NC 27711. The same file with the CBI omitted must be submitted to the EPA via the EPA's CDX as described earlier in this paragraph.

(iii) If you are required to electronically submit a report through CEDRI in the EPA's CDX, you may assert a claim of EPA system outage for failure to timely comply with the reporting requirement. To assert a claim of EPA system outage, the owner or operator must meet the requirements outlined in paragraphs (a)(10)(iii)(A) through (G) of this section.

(A) The owner or operator must have been or will be precluded from accessing CEDRI and submitting a required report within the time prescribed due to an outage of either the EPA's CEDRI or CDX systems.

(B) The outage must have occurred within the period of time beginning five business days prior to the date that the submission is due.

(C) The outage may be planned or unplanned.

(D) The owner or operator must submit notification to the Administrator in writing as soon as possible following the date you first knew, or through due diligence should have known, that the event may cause or has caused a delay in reporting.

(E) The owner or operator must provide to the Administrator a written description identifying:

(1) The date(s) and time(s) when CDX or CEDRI was accessed and the system was unavailable;

(2) A rationale for attributing the delay in reporting beyond the regulatory deadline to EPA system outage;

(3) Measures taken or to be taken to minimize the delay in reporting; and

(4) The date by which you propose to report, or if you have already met the reporting requirement at the time of the notification, the date you reported.

(F) The decision to accept the claim of EPA system outage and allow an extension to the reporting deadline is solely within the discretion of the Administrator.

(G) In any circumstance, the report must be submitted electronically as soon as possible after the outage is resolved.

(iv) If you are required to electronically submit a report through CEDRI in the EPA's CDX, you may assert a claim of force majeure for failure to timely comply with the reporting requirement. To assert a claim of force majeure, the owner or operator must meet the requirements outlined in paragraphs (a)(10)(iv)(A) through (E) of this section.

(A) You may submit a claim if a force majeure event is about to occur, occurs, or has occurred or there are lingering effects from such an event within the period of time beginning five business days prior to the date the submission is due. For the purposes of this paragraph, a force majeure event is defined as an event that will be or has been caused by circumstances beyond the control of the affected facility, its contractors, or any entity controlled by the affected facility that prevents you from complying with the requirement to submit a report electronically within the time period prescribed. Examples of such events are acts of nature (e.g., hurricanes, earthquakes, or floods), acts of war or terrorism, or equipment failure or safety hazard beyond the control of the affected facility (e.g., large scale power outage).

(B) The owner or operator must submit notification to the Administrator in writing as soon as possible following the date you first knew, or through due diligence should have known, that the

event may cause or has caused a delay in reporting.

(C) The owner or operator must provide to the Administrator:

(1) A written description of the force majeure event;

(2) A rationale for attributing the delay in reporting beyond the regulatory deadline to the force majeure event;

(3) Measures taken or to be taken to minimize the delay in reporting; and

(4) The date by which you propose to report, or if you have already met the reporting requirement at the time of the notification, the date you reported.

(D) The decision to accept the claim of force majeure and allow an extension to the reporting deadline is solely within the discretion of the Administrator.

(E) In any circumstance, the reporting must occur as soon as possible after the force majeure event occurs.

\* \* \* \* \*

(d) *Notification of Compliance Status*—(1) *Contents*. The owner or operator shall submit a Notification of Compliance Status for each affected source subject to this subpart containing the information specified in paragraphs (d)(1)(i) and (ii) of this section. For pressure relief devices subject to the requirements of § 63.1107(e)(3), the owner or operator of an acrylic and modacrylic fiber production affected source or polycarbonate production affected source shall also submit the information listed in paragraph (d)(1)(iii) of this section in a supplement to the Notification of Compliance Status within 150 days after the first applicable compliance date for pressure relief device monitoring. For flares subject to the requirements of § 63.1103(e)(4), the owner or operator of an ethylene production affected source shall also submit the information listed in paragraph (d)(1)(iv) of this section in a supplement to the Notification of Compliance Status within 150 days after the first applicable compliance date for flare monitoring. For pressure relief devices subject to the pressure release management work practice standards in § 63.1107(h)(3), the owner or operator of an ethylene production affected source shall also submit the information listed in paragraph (d)(1)(v) of this section in a supplement to the Notification of Compliance Status within 150 days after the first applicable compliance date for pressure relief device monitoring.

(i) Except as specified in paragraphs (d)(1)(iv) and (v) of this section, the Notification of Compliance Status shall include the information specified in this subpart and the subparts referenced by this subpart. Alternatively, this

information can be submitted as part of a title V permit application or amendment.

\* \* \* \* \*

(iv) For each flare subject to the requirements in § 63.1103(e)(4), in lieu of the information required in § 63.987(b) of subpart SS, the Notification of Compliance Status shall include flare design (e.g., steam-assisted, air-assisted, non-assisted, or pressure-assisted multi-point); all visible emission readings, heat content determinations, flow rate measurements, and exit velocity determinations made during the initial visible emissions demonstration required by § 63.670(h) of subpart CC, as applicable; and all periods during the compliance determination when the pilot flame is absent.

(v) For pressure relief devices subject to the requirements § 63.1107(h), the Notification of Compliance Status shall include the information specified in paragraphs (d)(1)(v)(A) and (B) of this section.

(A) A description of the monitoring system to be implemented, including the relief devices and process parameters to be monitored, and a description of the alarms or other methods by which operators will be notified of a pressure release.

(B) A description of the prevention measures to be implemented for each affected pressure relief device.

\* \* \* \* \*

(e) \* \* \*

(1) *Contents.* Except as specified in paragraphs (e)(4) through (8) of this section, Periodic Reports shall include all information specified in this subpart and subparts referenced by this subpart.

\* \* \* \* \*

(4) *Ethylene production flare reports.* For each flare subject to the requirements in § 63.1103(e)(4), the Periodic Report shall include the items specified in paragraphs (e)(4)(i) through (vi) of this section in lieu of the information required in § 63.999(c)(3) of subpart SS.

(i) Records as specified in § 63.1109(e)(2) for each 15-minute block during which there was at least one minute when regulated material is routed to a flare and no pilot flame is present. Include the start and stop time and date of each 15-minute block.

(ii) Visible emission records as specified in § 63.1109(e)(3)(iv) for each period of 2 consecutive hours during which visible emissions exceeded a total of 5 minutes.

(iii) The periods specified in § 63.1109(e)(7). Indicate the date and start time for the period, and the net

heating value operating parameter(s) determined following the methods in § 63.670(k) through (n) of subpart CC as applicable.

(iv) For flaring events meeting the criteria in § 63.670(o)(3) of subpart CC:

(A) The start and stop time and date of the flaring event.

(B) The length of time that emissions were visible from the flare during the event.

(C) For steam-assisted, air-assisted, and non-assisted flares, the periods of time that the flare tip velocity exceeds the maximum flare tip velocity determined using the methods in § 63.670(d)(2) of subpart CC and the maximum 15-minute block average flare tip velocity recorded during the event.

(D) Results of the root cause and corrective actions analysis completed during the reporting period, including the corrective actions implemented during the reporting period and, if applicable, the implementation schedule for planned corrective actions to be implemented subsequent to the reporting period.

(v) For pressure-assisted multi-point flares, the periods of time when the pressure monitor(s) on the main flare header show the burners operating outside the range of the manufacturer's specifications.

(vi) For pressure-assisted multi-point flares, the periods of time when the staging valve position indicator monitoring system indicates a stage should not be in operation and is or when a stage should be in operation and is not.

(5) *Ethylene production maintenance vent reports.* For maintenance vents subject to the requirements § 63.1103(e)(5), Periodic Reports must include the information specified in paragraphs (e)(5)(i) through (iv) of this section for any release exceeding the applicable limits in § 63.1103(e)(5)(i). For the purposes of this reporting requirement, owners or operators complying with § 63.1103(e)(5)(i)(D) must report each venting event conducted under those provisions and include an explanation for each event as to why utilization of this alternative was required.

(i) Identification of the maintenance vent and the equipment served by the maintenance vent.

(ii) The date and time the maintenance vent was opened to the atmosphere.

(iii) The lower explosive limit, vessel pressure, or mass of VOC in the equipment, as applicable, at the start of atmospheric venting. If the 5 psig vessel pressure option in § 63.1103(e)(5)(i)(B) was used and active purging was

initiated while the lower explosive limit was 10 percent or greater, also include the lower explosive limit of the vapors at the time active purging was initiated.

(iv) An estimate of the mass of organic HAP released during the entire atmospheric venting event.

(6) *Bypass line reports.* For bypass lines subject to the requirements in § 63.1103(e)(6), Periodic Reports must include the date, time, duration, estimate of the volume of gas, the concentration of organic HAP in the gas and the resulting mass emissions of organic HAP that bypass a control device. For periods when the flow indicator is not operating, report the date, time, and duration.

(7) *Decoking operation reports.* For decoking operations of an ethylene cracking furnace subject to the requirements in § 63.1103(e)(7) and (8), Periodic Reports must include the information specified in paragraphs (e)(7)(i) and (ii) of this section.

(i) For each control measure selected to minimize coke combustion emissions as specified in § 63.1103(e)(7)(ii) through (v), report instances where the control measures were not followed.

(ii) Report instances where an isolation valve inspection was not conducted according to the procedures specified in § 63.1103(e)(8).

(8) *Ethylene production pressure relief devices reports.* For pressure relief devices subject to the requirements § 63.1107(h), Periodic Reports must include the information specified in paragraphs (e)(8)(i) through (iii) of this section.

(i) For pressure relief devices in organic HAP gas or vapor service, pursuant to § 63.1107(h)(1), report any instrument reading of 500 ppm or greater.

(ii) For pressure relief devices in organic HAP gas or vapor service subject to § 63.1107(h)(2), report confirmation that any monitoring required to be done during the reporting period to show compliance was conducted.

(iii) For pressure relief devices in organic HAP service subject to § 63.1107(h)(3), report each pressure release to the atmosphere, including duration of the pressure release and estimate of the mass quantity of each organic HAP released; the results of any root cause analysis and corrective action analysis completed during the reporting period, including the corrective actions implemented during the reporting period; and, if applicable, the implementation schedule for planned corrective actions to be implemented subsequent to the reporting period.

\* \* \* \* \*

(g) *Report and notification submission*—(1) *Submission to the Environmental Protection Agency*. All reports and notifications required under this subpart shall be sent to the appropriate EPA Regional Office and to the delegated State authority, except that request for permission to use an alternative means of emission limitation as provided for in § 63.1113 shall be submitted to the Director of the EPA Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, MD–10, Research Triangle Park, North Carolina, 27711. The EPA Regional Office may waive the requirement to submit a copy of any reports or notifications at its discretion, except that electronic reporting to CEDRI cannot be waived, and as such, compliance with the provisions of this paragraph does not relieve owners or operators of affected facilities of the requirement to submit electronic reports required in this subpart to the EPA.

(2) *Submission of copies*. If any State requires a notice that contains all the information required in a report or notification listed in this subpart, an owner or operator may send the appropriate EPA Regional Office a copy of the report or notification sent to the State to satisfy the requirements of this subpart for that report or notification, except that performance test reports and performance evaluation reports required under paragraph (a)(10) of this section must be submitted to CEDRI in the format specified in that paragraph.

\* \* \* \* \*

■ 25. Section 63.1111 is amended by revising paragraphs (a) introductory text, (b) introductory text, and (c) introductory text to read as follows:

**§ 63.1111 Startup, shutdown, and malfunction.**

(a) *Startup, shutdown, and malfunction plan*. Before [date 3 years after date of publication of final rule in the **Federal Register**], the requirements of this paragraph (a) apply to all affected sources except for acrylic and modacrylic fiber production affected sources and polycarbonate production

affected sources. On and after [date 3 years after date of publication of final rule in the **Federal Register**], the requirements of this paragraph (a) apply to all affected sources except for acrylic and modacrylic fiber production affected sources, ethylene production affected sources, and polycarbonate production affected sources.

(b) *Startup, shutdown, and malfunction reporting requirements*. Before [date 3 years after date of publication of final rule in the **Federal Register**], the requirements of this paragraph (b) apply to all affected sources except for acrylic and modacrylic fiber production affected sources and polycarbonate production affected sources. On and after [date 3 years after date of publication of final rule in the **Federal Register**], the requirements of this paragraph (b) apply to all affected sources except for acrylic and modacrylic fiber production affected sources, ethylene production affected sources, and polycarbonate production affected sources.

(c) *Malfunction recordkeeping and reporting*. Before [date 3 years after date of publication of final rule in the **Federal Register**], the requirements of this paragraph (c) apply only to acrylic and modacrylic fiber production affected sources and polycarbonate production affected sources. On and after [date 3 years after date of publication of final rule in the **Federal Register**], the requirements of this paragraph (c) apply only to acrylic and modacrylic fiber production affected sources, ethylene production affected sources, and polycarbonate production affected sources.

■ 26. Section 63.1112 is amended by revising paragraph (d)(2) to read as follows:

**§ 63.1112 Extension of compliance, and performance test, monitoring, recordkeeping and reporting waivers and alternatives.**

\* \* \* \* \*

(d) \* \* \*

(2) Recordkeeping or reporting requirements may be waived upon written application to the Administrator if, in the Administrator’s judgment, the affected source is achieving the relevant standard(s), or the source is operating under an extension of compliance, or the owner or operator has requested an extension of compliance and the Administrator is still considering that request. Electronic reporting to the EPA cannot be waived, and as such, compliance with the provisions of this paragraph does not relieve owners or operators of affected facilities of the requirement to submit electronic reports required in this subpart to the EPA.

\* \* \* \* \*

■ 27. Section 63.1113 is amended by revising paragraph (a)(2) to read as follows:

**§ 63.1113 Procedures for approval of alternative means of emission limitation.**

(a) \* \* \*

(2) Any such notice shall be published only after public notice and an opportunity for public comment.

\* \* \* \* \*

■ 28. Section 63.1114 is amended by revising paragraph (b) introductory text and adding paragraph (b)(6) to read as follows:

**§ 63.1114 Implementation and enforcement.**

\* \* \* \* \*

(b) In delegating implementation and enforcement authority of this subpart to a State, local, or tribal agency under 40 CFR part 63, subpart E, the authorities contained in paragraphs (b)(1) through (6) of this section are retained by the EPA Administrator and are not transferred to the State, local, or tribal agency.

(6) Approval of an alternative to any electronic reporting to EPA required by this subpart.

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