6560-50-P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 60, 61, and 63

[EPA-HQ-OAR-2014-0738; FRL 9922-91-OAR]

Receipt of Approval Requests for the Operation of Pressure-Assisted Multi-Point Ground Flare Technology

AGENCY: Environmental Protection Agency.

ACTION: Request for comments.

SUMMARY: On August 5, 2014, The Dow Chemical Company (Dow) requested an Alternative Means of Emission Limitation (AMEL) under the Clean Air Act (CAA) in order to operate pressure-assisted multi-point ground flares at its Propane Dehydrogenation Plant and its Light Hydrocarbons Plant at its Texas Operations site located in Freeport, Texas. On October 21, 2014, ExxonMobil Chemical Company (ExxonMobil) requested an AMEL under the CAA for its pressure-assisted multi-point ground flares at its' Olefins Plant in Baytown, Texas, and its' Plastics Plant in Mont Belvieu, Texas. In this document, the Environmental Protection Agency (EPA) is soliciting comment on all aspects of the AMEL requests and the resulting alternative operating conditions that are necessary to achieve a reduction in emissions of volatile organic compounds (VOC) and hazardous air pollutants (HAPs) at least equivalent to the reduction in

emissions required by various standards in 40 CFR parts 60, 61 and 63 that apply to emission sources controlled by these pressure-assisted multi-point ground flares. These standards point to the operating requirements for flares in the General Provisions to parts 60 and 63, respectively, to comply with the emission reduction requirements. Because pressure-assisted multi-point ground flares cannot meet the velocity requirements in these General Provisions, Dow and ExxonMobil are seeking an AMEL.

DATES: Comments. Written comments must be received on or before **[insert date 45 days after publication in the federal register]**. Public Hearing. If requested by **[insert date 5 days after publication in the federal register],** we will hold a public hearing on **[insert date 15 days after publication in the federal register]**, from 1:00 p.m. [Eastern Standard Time] to 5:00 p.m. [Eastern Standard Time] at EPA's Campus located in Research Triangle Park, NC. We will provide details on the public hearing on our Web site at:

http://www.epa.gov/ttn/atw/groundflares/groundflarespg.html

To be clear, a public hearing will not be held unless someone specifically requests that the EPA hold a public hearing regarding these requests. Please contact Ms. Virginia Hunt of the Sector Policies and Programs Division (E143-01), Office of

Air Quality Planning and Standards, Environmental Protection Agency, Research Triangle Park, NC 27711; telephone number: (919) 541-0832; email address: hunt.virginia@epa.gov; to request a public hearing, to register to speak at the public hearing or to inquire as to whether or not a public hearing will be held. The last day to pre-register in advance to speak at the public hearing will be **[insert date 12 days after publication in the federal register].**

ADDRESSES: Submit your comments, identified by Docket ID No. EPA OAR- 2014-0738, by one of the following methods:

- http://www.regulations.gov. Follow the on-line instructions for submitting comments.
- E-mail: a-and-r-docket@epa.gov. Attention Docket ID Number EPA-HQ-OAR-2014-0738
- Fax: (202) 566-9744. Attention Docket ID Number EPA-HQ-OAR-2014-0738
- Mail: U.S. Postal Service, send comments to: EPA Docket Center (EPA/DC), Attention Docket ID Number EPA-HQ-OAR-2014-0738, U.S. Environmental Protection Agency, Mailcode: 28221T, 1200 Pennsylvania Ave., NW, Washington, DC 20460.

- Hand Delivery: U.S. Environmental Protection Agency, EPA WJC West Building, Room 3334, 1301 Constitution Ave., NW, Washington, DC 20004. Attention Docket ID Number EPA-HQ-OAR-2014-0738. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions. Direct your comments to Docket ID Number EPA-HQ-Oar-2014-0738. The EPA's policy is that all comments received will be included in the public docket without change and may be made available online at http://www.regulations.gov, including any personal information provided, unless the comment includes information claimed to be confidential business information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through http://www.regulations.gov or email. The http://www.regulations.gov Web site is an "anonymous access" system, which means the EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an email comment directly to the EPA without going through http://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 disk or CD-ROM you submit. If the EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, the EPA may not be able to consider your comment. Electronic files should 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: http://www.epa.gov/dockets.

Docket. The EPA has established a docket for this rulemaking under Docket ID Number EPA-HQ-OAR-2014-0738. All documents in the docket are listed in the regulations.gov index. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy. Publicly available docket materials are available either electronically in regulations.gov or in hard copy at the EPA Docket Center (EPA/DC), 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.

FOR FURTHER INFORMATION CONTACT: For questions about this proposed action, contact Ms. Brenda Shine, Sector Policies and Programs Division (E143-01), Office of Air Quality Planning and Standards (OAQPS), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; telephone number: (919) 541-3608; fax number: (919) 541-0246; and email address: shine.brenda@epa.gov.

SUPPLEMENTARY INFORMATION:

Acronyms and Abbreviations.

We use multiple acronyms and terms in this document. While this list may not be exhaustive, to ease the reading of this document and for reference purposes, the EPA defines the following terms and acronyms here:

AMEL	alternative means of emission limitation
BOP	Baytown Olefins Plant
Btu/scf	British thermal units per standard cubic feet
LFL	lower flammability limit
LFLcz	combustion zone lower flammability limit
LHC	Light Hydrocarbons Unit
LRGO	Linear relief gas oxidizer
MACT	maximum achievable control technology
MBPP	Mont Belvieu Plastics Plant
MPGF	multi-point ground flare
NESHAP	national emission standard for hazardous air pollutants
NHV	net heating value
NHVcz	combustion zone net heating value
NSPS	new source performance standards

OAQPS	Office of Air Quality Planning and Standards
PDH	Propylene Dehydrogenation Unit
PFTIR	passive fourier transform infrared
SKEC	steam-assisted kinetic energy combustor

Organization of This Document. The information in this document is organized as follows:

I. Statutory and Regulatory Background

A. Flare Operating Requirements

In their requests, Dow and ExxonMobil cite various regulatory requirements in 40 CFR Parts 60, 61 and 63 that will apply to the different vent gas streams that will be collected and routed to their pressure-assisted multi-point ground flares (MPGF) at each plant. These requirements are included in Table

1.[1] In all cases, these rules reference the flare operating requirements located in 40 CFR 60.18 and 40 CFR 63.11.

Table 1 — Summary of Applicable Rules that May Apply to Vents Streams Controlled by Pressure-Assisted Multi-Point Ground Flares

Applicable Rules with Vent Streams going to Control Device	Dow Propane Dehydro-genation (PDH) Plant	Dow Light Hydro-carbons (LHC) Plant	Exxon-Mobil Baytown Olefins Plant	Exxon-Mobil Mont Belvieu Plastics Plant	Emission Reduction Required and Rule Citation	Provisions for Alternative Means of Emission Limitation
NSPS Subpart Kb		X	X		60.112b(a)(3)(ii)-Reduce VOC inlet emissions by 95%; If a flare is used as a control device, flare must meet requirements of 60.18.	60.114b allows for AMEL.
NSPS Subparts VV/Vva	X	X	X		60.482-10a-Reduce VOC emissions by 95% or greater; flare used to comply with subpart must meet requirements of 60.18. *Note - Under Dow PDH Plant column, NSPS	60.484(a) allows for AMEL.

[1] EPA prepared Table 1 using the information provided in the requests, corrected as appropriate based on its own review of the regulations. However, the EPA has not independently verified whether Table 1 includes all of the regulatory requirements with which these plants must comply.

					subpart VVa applies, but DOW is opting to comply with 40 CFR part 63, subpart H (as referenced by Miscellaneous Organic NESHAP(MON) which should satisfy requirements in subpart VVa.	
NSPS Subpart DDD				X	60.562-1- Reduce emissions of Total Organic Carbon (TOC) by 98%, or combust in a flare that meets the requirements of 60.18.	CAA section 111(h)(3) allows for AMEL.
NSPS Subpart NNN	X	X	X	X	60.662- Reduce emissions of TOC by 98%, or combust in a flare that meets the requirements of 60.18.	CAA section 111(h)(3) allows for AMEL.
NSPS Subpart RRR	X	X	X	X	60.702- Reduce emissions of TOC by 98%, or combust in a flare that meets the requirements of 60.18.	CAA section 111(h)(3) allows for AMEL.
NESHAP Subpart V			X		61.242-11(d)- flares used to comply with subpart V must comply with 60.18.	61.244 allows for AMEL; also see 61.12(d).
NESHAP Subpart FF		X	X		61.349(a)- reduce organic emissions vented to control device by 95%; a flare shall comply	61.353 allows for AMEL; also see 61.12(d).

					with the requirements of 60.18.	
NESHAP Subparts F, G			X		63.102, 63.113, 63.126- Reduce emissions of Total Organic HAP (TOHAP) by 98%, or combust in a flare that meets the requirements of 63.11(b). 63.120- Combust in flare meeting 63.11. 63.139- Reduce emissions of TOHAP by 95%, or combust in a flare that meets the requirements of 63.11(b). 63.145(j)- Points to sections of 63.11(b) for flare control.	63.102(b) allows for AMEL.
NESHAP Subpart H	X		X		63.172- Reduce organic HAP or VOC by 95%; flares used to comply must meet requirements of 63.11(b).	63.177 allows for AMEL.
NESHAP Subpart SS	X	X	X	X	63.982(b) and 63.987(a) require that a flare meets the requirements in 63.11(b).	CAA section 112(h)(3) allows for AMEL.
NESHAP Subpart UU		X			63.1034- Nonflare control devices shall reduce emissions by	63.1021 allows for AMEL.

					95%; flares shall comply with subpart SS	
NESHAP Subpart XX		X			63.1091 requires compliance with subpart FF, which requires compliance with 60.18.	61.353 allows for AMEL; also see 61.12(d).
NESHAP Subpart YY		X	X		Table 7 references subpart SS, which requires compliance with 60.18.	63.1113 allows for AMEL.
NESHAP Subpart EEEE			X	X	63.2378(a) references subpart SS, which requires compliance with 60.18.	63.2346(g) allows for AMEL; also see Table 12 which makes 63.6(g) applicable to this subpart.
NESHAP Subpart FFFF	X			X	63.2450 requires compliance with limits in Tables 1-7, which include reducing total organic HAP in vent streams by either 95% or 98%, and provide an option for control using a flare meeting requirements of 63.982(b) which requires meeting 63.987, which requires a flare to meet the requirements of 63.11(b).	63.2540 and Table 12 allow for AMEL by making 63.6(g) applicable to this subpart.

As shown in Table 1, the applicable rules require that control devices achieve destruction efficiencies of either 95

percent or 98 percent either directly, or by reference, or allow control by flares meeting the flare operating requirements in 40 CFR 60.18 or 63.11. The flare operating requirements in 40 CFR 60.18 and 63.11 specify that flares shall be: (1) steam-assisted air-assisted, or non-assisted[2]; (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. The flare operating requirements in 40 CFR 60.18 and 63.11 also specify requirements for both the minimum heat content of gas combusted in the flare and the maximum exit velocity at the flare tip.[3] These provisions 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 (see 40 CFR 60.18(c)(3), 63.11(b)(6)). These maximum flare tip velocities are required to ensure that the flame does not "lift off" or separate from the flare tip, which could cause flame instability and/or potentially result in a portion of the flare gas being released without proper combustion. Proper combustion

[2] While Dow and ExxonMobil describe their flares as "pressure-assisted," these flares qualify as "non-assisted" flares under 40 CFR 60.18(b) or 63.11(b) because they do not employ assist gas.

[3] These requirements are not all inclusive. There are other requirements in 40 CFR 60.18 and 63.11 relating to monitoring and testing that are not described here.

for flares is considered to be 98 percent destruction efficiency or greater for HAPs and VOCs, as discussed in our recent proposal titled "Petroleum Refinery Sector Risk and Technology Review and New Source Performance Standards," 79 FR 36,880, 36,904-36,912 (June 30, 2014).

The MPGF proposed by both Dow and ExxonMobil are conceptually similar yet inherently different in both flare head design and operation than the more traditional steam-assisted, air-assisted and non-assisted flare types currently able to comply with the flare operating requirements in 40 CFR 60.18 or 63.11. The MPGF technology operates by using the pressure upstream of each individual flare tip burner to enhance mixing with air at the flare tip due to high exit velocity, which allows the MPGF to operate with smokeless burning. The MPGF are constructed differently than normal elevated flares in that they consist of many rows of individual flare tips which are approximately 8 feet above ground level. The ground flare staging system opens and closes staging valves according to gas pressure such that stages containing multiple burners are activated as the flow and pressure increase or decrease in the header. While information supplied by Dow, and relied on by both Dow and ExxonMobil, indicates that the flare tips operate smokelessly and achieve high destruction efficiencies, the MPGF

cannot meet the exit velocity requirements in 40 CFR 60.18 and 40 CFR 63.11, which limit the exit velocity at the flare tip to a maximum of 400 feet per second. The exit velocities from MPGF typically range from 600 feet per second up to sonic velocity (which ranges from 700 to 1,400 feet per second for common hydrocarbon gases), or Mach =1 conditions. As a result, Dow and ExxonMobil are seeking an alternative means of complying with the flare operating requirements in 40 CFR 60.18 and 63.11; specifically, the exit velocity requirements in 40 CFR 60.18(c)(3), (c)(4), and (c)(5) and in 40 CFR 63.11(b)(6),(b)(7) and (b)(8).

B. Alternative Means of Emission Limitation

As noted in Table 1, the specific rules in 40 CFR parts 60, 61 and 63, or the General Provisions for parts 60, 61 and 63 of the CAA[4] allow a facility to request an AMEL. These provisions allow the Administrator to permit the use of an alternative means of complying with an applicable standard, if the requestor demonstrates that the alternative achieves at least an equivalent reduction in emissions. The EPA must provide notice

[4] CAA section 111(h)(3) states: "If after notice and opportunity for public hearing, any person establishes to the satisfaction of the Administrator that an alternative means of emission limitation will achieve a reduction in emissions of any air pollutant at least equivalent to the reduction in emissions of such air pollutant achieved under the requirements of paragraph (1), the Administrator shall permit the use of such alternative by the source for purposes of compliance with this section with respect to such pollutant." Section 112(h)(3) contains almost identical language.

of the request and an opportunity for a public hearing on the request. After considering comments received, the EPA will issue a notice permitting the use of an alternative means of emission limitation, if the Administrator determines that the alternative will achieve an equivalent reduction in emissions.

II. Requests for Alternative Means of Emission Limitation

A. Dow AMEL

In its August 5, 2014, request, Dow indicates that it plans to construct and operate two new MPGFs at its Texas Operations site in Freeport, TX. One MPGF would be located at Dow's Propane Dehydrogenation Plant (PDH-1), scheduled to start-up in early 2015 and whose primary product is propylene. The other MPGF would be located at Dow's Light Hydrocarbons Plant (LHC-9), scheduled to start-up in early 2017 and whose primary product is ethylene.

The flare systems proposed for use by Dow at both plants consist of a staged design concept. The first stage, which is not at issue nor specifically part of the notice requesting an AMEL because it can meet the flare operating requirements of 40 CFR of 60.18 and 63.11, is a steam-assisted ground flare which has the primary function of controlling waste gases during periods of normal operation. The remaining stages consist of arrays of pressure-assisted flare tips (the MPGFs) and will

control waste gases during periods of upset, maintenance, startup and shutdown (high-pressure, high flow periods). Pressure-assisted flares are also known as sonic flares because the exit velocity during periods of high-pressure feeds is at sonic velocities.

At Dow, Stage 1 is the low pressure stage in which the flare acts as a steam-assisted flare. Stages 2 and beyond are activated for high-pressure/high exit velocity flows. The flare system is surrounded by a panel type fence to protect nearby workers from the radiant heat from the flare system. At various times ranging from 2 hours for startup of processing equipment to 160 hours for a complete plant shutdown, Dow will have emissions from the MPGF for the following maintenance, start-up and shutdown (MSS) activities: perform plant start-up and shutdown, process equipment startup and shutdown, off-spec flaring, non-routine clearing and commissioning of process equipment and piping, fuel purging and flaring to maintain pressure of the net-gas system.

Dow conducted testing on the two types of individual flare tips in its MPGF design to demonstrate that the MPGF can achieve good combustion efficiency under certain conditions and has proposed operating requirements for these MPGF that can achieve the emissions standards in the applicable NSPS and NESHAP. These

proposed operating requirements are contained in Dow's request dated August 5, 2014, located in the docket for this document. A summary of test data and a complete copy of the emission testing report and appendices are available in the docket. The tests were conducted on individual flare tips because it is not possible to test the full field of MPGF because of the size and configuration of the full-scale MPGF installation (there are approximately 300 flare tips in the proposed array pattern that cover the size approximately equivalent to that of a football field in the actual installations). Although two flare tip types were tested during the effort, the results of one burner type, a steam-assisted flare burner, John Zink model SKEC, are not discussed further as Dow is not seeking an AMEL for this burner because it operates at lower velocity and, thus, can meet the existing flare operating requirements.

B. ExxonMobil AMEL

In its October 21, 2014, request, ExxonMobil indicates it plans to construct and operate two MPGFs, one at its Baytown Olefins Plant (BOP) in Baytown, TX, and the other at its Mont Belvieu Plastics Plant (MBPP) in Mont Belview, TX. Both of the proposed control strategies will be designed such that vent gases are routed to either a low pressure system, or in infrequent cases where high-pressure/high flow events occur, the

high pressure MPGF. Both low pressure control systems at the BOP and MBPP consist of an elevated flare, but the MBPP low pressure control system also consists of three flameless thermal oxidizers. The elevated flares at both the BOP and MBPP will comply with 40 CFR 60.18 and/or 40 CFR 63.11, as applicable.

ExxonMobil did not supply any additional test data, but rather is relying on a series of publically available MPGF emissions tests, among them the 2013 test submitted by Dow, a 2012 test done by Marathon Petroleum Corporation, LP, a 2006 pipeline burner test done by Dow, and two earlier tests conducted by the EPA in the 1980s. ExxonMobil indicates that the BOP and MBPP burner tip designs will have comparable performance to the burners recently tested and submitted December 14, 2014, supplemental application containing additional information on plans to use the John Zink LRGO burners for the MPGF installation at the MBPP, and ZEECO burners at the BOP. ExxonMobil asserts that the ZEECO burner design provides equivalent combustion efficiency and flame stability as that of the John Zink burners tested, although ExxonMobil has not supplied any data or information that could confirm this assertion of equivalency. We are requesting comment on this assertion as well as specifically soliciting data and comments

from the public on burner design and performance of these MPGF burners.

C. EPA's Analysis of MPGF Burner Emission Tests

Dow and ExxonMobil are proposing to follow all of the flare operating requirements contained in either 40 CFR 60.18 or 63.11, except for the exit velocity requirements. They are proposing to operate their high pressure MPGFs at higher velocity than the current requirements because their data indicate that these burners can operate with a stable flame at higher velocities and still achieve good combustion and destruction efficiencies. Instead of complying with the exit velocity requirements in 40 CFR 60.18 and 63.11, Dow and ExxonMobil are requesting that EPA grant their AMEL requests to allow them to operate the high pressure sections of their MPGFs such that the vent gas flowing to the flare tips is maintained with a net heating value that has been demonstrated to be equal to or greater than the values that were determined to achieve a reduction in emissions of pollutants being controlled by a steam-assisted, air-assisted or non-assisted flare complying with the requirements of either 40 CFR 63.11(b) or 40 CFR 60.18(b) during the burner emission tests.

In the emission tests, the high pressure burners were subjected to a number of different operating conditions, and

each set of conditions represented a separate test series. For purposes of this discussion, the relevant test results are those from Dow's 2013 test report, which are comprised of runs from test series P1 through P4 and were tested on John Zink's pressure assisted flare burner model LRGO-HC, as well as emissions data reported in Marathon's 2012 test report, which are from test series PA1 and PA2 and were tested on John Zink's pressure assisted flare burner model LRGO-D. These tests used the analytical technique of passive fourier transform infrared (PFTIR) spectroscopy to assess combustion efficiency. Dow's 2013 test report also presents data collected using an extractive method where flue gas was extracted from a collection hood that was suspended above the burner tip and analyzed using standard EPA methods. The Marathon 2012 test report (see "Performance Test of Steam-Assisted and Pressure-Assisted Ground Flare Burners with Passive FTIR – Garyville") and the Dow 2013 test report (see "Report on Emissions Testing of Pressure Assisted LRGO-HC and Steam Assisted SKEC Burners") are provided in the docket.

The results of the PFTIR testing indicated that when a flame was present on the pressure-assisted flare burners tested that an average combustion efficiency of 99 percent or greater was always achieved. Each set of operating conditions tested by

both Dow and Marathon for both combustion efficiency and flame stability generally consisted of a series of triplicate runs. In all, a total of 34 test runs were analyzed from these two tests (21 from Dow's P1 through P3 test series and 13 from Marathon's PA1 and PA2 test series). For test series P4, which was conducted as part of Dow's 2013 test using a 90 volume percent hydrogen/10 volume percent natural gas mixture, no combustion efficiency test was conducted; instead, a qualitative indication that the flame was stable at the conditions tested was made. We note that in Dow's 2013 test report that three of the 21 test runs were aborted because of loss of flame (which we refer to as flameout); only two of the three test runs (one in the P2H series and one in the P2L series) produced enough information before flameout to be analyzed in more detail. We requested more detailed information from Dow on the conditions that resulted in this loss of flame as it informs us of the conditions that would create a failure of the burners to sustain a stable flame and achieve good combustion. This document is included in the docket titled "Supplement 1 to Dow report." Additionally, we also note that in Marathon's 2012 test report that two of the 13 test runs also experienced loss of flame (test PA1 Runs 4(2) and 4(4)). The results of all of these test runs are discussed in the

memorandum titled "Review of Available Test Data on Multipoint Ground Flares," located in the docket.

There are two general conclusions from these test reports that are consistent with the earlier EPA 1985 study done on pressure-assisted flares (see conclusions on pages 2-19 and 2-22 in September 1985 EPA report titled "Evaluation of the efficiency of industrial flares: Flare head design and gas composition"). The first is that "flare head design can influence the flame stability curve." This is evident in Figures 2-3 and 2-5 of the 1985 EPA report where different stability curves were generated for the different flare heads (burners) tested over a range of differing exit velocities and flare gas net heating values. When comparing the current maximum flare tip velocity requirements in the general provisions with those tested on pressure-assisted flare burners, this conclusion still holds true. The agency's current requirements would require that flares meet an increasing minimum net heating value with increasing velocity, all the way up to a minimum waste gas net heating value of 1,000 BTU/scf and maximum velocity of 400 feet per second. However, the recent test reports on pressure-assisted burners show that flame stability can be achieved at significantly higher velocities (i.e., sonic velocity) with waste gas net heating values below 1,000 BTU/scf. The second

general conclusion made from EPA's 1985 study is 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." The data where flameout of the burners occurred from test runs in both the Marathon 2012 test report and the Dow 2013 test report showed that the flare operating envelope was different for the different gas mixtures tested. Additionally, it was observed that combustion degradation beyond the edge of the operating envelope for pressure-assisted MPGF burners was so rapid that when a flame was present, the flare would still achieve a high level of combustion efficiency right up until the point of flameout.

In order to assess the proper operating envelope for these flare types, the EPA evaluated both the net heating value (in BTU/scf), which is how the 40 CFR part 60 and 63 General Provisions currently address combustion zone properties, as well as the lower flammability limit (LFL) because the LFL may be a better indicator of performance than net heating value for some flare vent gas streams, notably those with the potential for

high hydrogen content. Hydrogen is relatively flammable, but its net heating value is low on a BTU/scf basis when compared to other hydrocarbons. By using LFL, we eliminate the need to correct the hydrogen heat content or to select a lower BTU/scf limit for high hydrogen cases. Although Dow has requested operating limits in the form of BTU/scf and has presented the test data in BTU/scf, we believe it is important to consider both types of operating limits.

Our review indicates that the LRGO burners tested achieve a high level of combustion efficiency when the lower flammability limit of waste gases burned in the flare is less than 6.5 volume percent (vol%) LFL or above 800 BTU/scf. We suggest the 6.5 vol% LFL based on the flammability of the stream during the flame out conditions experienced during the high pressure test run P2H1 (at 6.6 vol% LFL). The corresponding BTU content of the waste gas at this value was 789 BTU/scf (according to Dow, the gas chromatograph analysis indicated this value was 746 BTU/scf, although the John Zink report based on measured flow rates indicated it was 789 BTU/scf). Dow's proposed operating conditions included startup/shutdown cases where the waste gas heat content could be as low as 690 BTU/scf and as high as 6.9 vol% LFL, and data from these tests indicate that good combustion can occur at these conditions. However, to establish

the alternative operating requirements at a level that ensures good combustion and flame stability at all times under all operating conditions, we believe it is reasonable to establish the heat content requirements for BTU/scf above which there were no flame out observations. For LFL, that level would be set below which there are no flame out observations. This is because gas mixtures with a relatively high LFL are less flammable when released to the air than mixtures with a relatively low LFL. A gas mixture with a relatively high LFL requires a larger volume of the mixture to burn in a specific volume of air, than would a mixture of gases with a relatively low LFL being combusted in that same volume of air. We believe the flame out observations establish the limiting case because a flameout is a complete failure of the burner, indicating zero-percent combustion. Because of the quantity of waste gases potentially flared in the high-pressure zones of these MPGF, we believe it would be prudent to establish limits on the conservative side to prevent air emissions of unburned waste gas.

We also reviewed whether we should consider velocity or burner operating pressure in describing conditions that should be met during the MPGF operation and whether we should require some testing to ensure that the individual burners will ignite properly when a new stage goes into service. Dow provided

information on its process control system and indicated that cross-light testing (testing of burner ignition from pilots) of individual burners at its off-site test facility has been conducted and the burners performed as expected. This discussion, titled "Process control system overview-multipoint ground flare system," is in the docket for this action. At this time, we are not considering any requirements for additional process control or ignition testing. However, we believe it would be important to require that cameras are installed and operated such that operators have a visual indication of flames from the flare at all times that the MPGF is operating and that this footage be available for inspection by the permitting agency, along with operational records of the waste gas flowrate, pressure in header and stages, pilot and waste gas composition.

Because these flares are located at ground level, it is possible that ambient concentrations of pollutants could be higher than they would be under an alternative scenario where waste gases would be flared in an elevated flare, enabling greater dispersion and potentially lessening the impact to neighboring communities. To that end, we are soliciting comment on whether additional ambient monitoring is warranted to provide for immediate notification to emergency planning officials and

the community during significant events and malfunctions of the system.

III. AMEL for Pressure-Assisted MPGF

Considering the above requests from both Dow and ExxonMobil, we are seeking the public's input on the operating requirements for the proposed pressure-assisted MPGFs that would be used by both companies which would establish an AMEL that will achieve a reduction in emissions at least equivalent to the reduction in emissions being controlled by a steam-assisted, air-assisted or non-assisted flare complying with the requirements of either 40 CFR 63.11(b) or 40 CFR 60.18(b). Information provided in the AMEL requests and the available emissions test data from the test reports described above indicate that the following list of operating requirements for pressure-assisted MPGF result in destruction efficiencies at least equivalent to destruction efficiencies expected from complying with the requirements of 40 CFR 63.11(b) and 40 CFR 60.18(b) for the pressure-assisted MPGF being proposed for use by both Dow and ExxonMobil:

1. The flare system must be designed and operated such that the net heating value of the combustion zone gas (NHV_{cz}) for the pressure assisted flare burners meets a minimum heating value of 800 BTU/scf or a lower flammability

limit of the combustion zone gas (LFL_{cz}) of less than or equal to 6.5 percent by volume under all conditions. We would expect owners or operators to calculate NHV_{cz} and LFL_{cz} in a manner similar to those in the currently proposed requirements of 79 FR36980- 40 CFR 63.670(l)-(m).

2. The flare system must be operated with a flame present at all times when in use. Each row of flare burners must have at least one pilot with a constant pilot flame. The pilot flame(s) must be continuously monitored by a thermocouple. The time, date and duration of any loss of pilot flame must be recorded. Each monitoring device must be maintained or replaced at a frequency in accordance with the manufacturer's specifications.
3. The flare system must be operated with no visible emissions except for periods not to exceed a total of 5 minutes during any 2 consecutive hours. A video camera can be used in order to conduct visible emission observations since operating personnel cannot enter the fenced area while the MPGF is operating.
4. The operator must install and operate an on-line vent gas flow meter and an on-line gas chromatograph to measure the flow and composition of the vent gas to each flare.

We would expect the operator to comply with similar monitoring and testing requirements and recordkeeping and reporting requirements for these monitoring systems as currently proposed in 79 FR36980- 40 CFR 63.670(i)-(j) and (l)-(m).

5. The operator should install and operate pressure and/or flow monitors on each stage of the flare. We would expect the operator to comply with similar applicable monitoring and testing requirements and recordkeeping and reporting requirements for these monitoring systems as currently proposed in 79 FR36980- 40 CFR 63.670(i).

IV. Request for Comments

We solicit comments on all aspects of these requests for an AMEL. We specifically seek comment regarding whether or not the potential alternative operating requirements listed in section III above would be adequate for ensuring that the MPGF will achieve good combustion at all times and enable the facilities to meet their applicable emission standards. Additionally, several other entities have indicated to us that they intend to make similar requests for the ability to operate pressure-assisted MPGFs. We are also soliciting comment on whether the requirements listed above, if followed by these other entities, could enable these other facilities to receive approval of their

own AMELs. As noted in section II.B above, we also solicit comment and data on other pressure-assisted flare burner types.

Commenters should include data or specific examples in support of their comments.

Dated: February 3, 2015.

Janet G. McCabe,
Acting Assistant Administrator.

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