



**Natural Gas STAR
Methane Challenge Program:
Supplementary Technical Information for ONE
Future Commitment Option**



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Introduction

This document provides additional details to augment the Natural Gas STAR Methane Challenge Program (“Methane Challenge”) proposal dated July 23, 2015,¹ which EPA has received feedback on and is in the process of revising and finalizing. The July proposal listed methane emission sources that EPA is considering for inclusion in the Best Management Practices Commitment Option (BMP Option), and on October 19, 2015, EPA released a document that provided additional information for each of those sources, including source descriptions, additional detail on mitigation options, and proposed Greenhouse Gas Reporting Program (GHGRP) and voluntary reporting data elements that would be reported annually to EPA to track partner progress. This document is intended to provide similar details for a number of additional oil and gas methane emission sources, which would be needed to track the emissions intensity commitment under the proposed ONE Future Commitment Option. Because companies selecting the ONE Future Commitment Option would need to quantify all of their methane emission sources, this document is intended to be comprehensive and cover all methane emitting sources covered in the GHGRP and the Greenhouse Gas Inventory (GHGI).

EPA requests feedback on the information presented in this document. Specific questions are presented in Appendix A.

Methane Challenge Commitment Options and Program Reporting

As described in the July Methane Challenge Program proposal, the ONE Future Option entails making a commitment to achieve a specified average rate of emissions intensity across all facilities within a specific segment by 2025. Under the BMP Option, companies would commit to company-wide implementation of best practices to reduce methane emissions from key sources by a future date, as determined by the partner company.² EPA’s intent through Methane Challenge is to promote voluntary methane emission reduction actions beyond regulatory requirements (e.g., State regulations and New Source Performance Standards (NSPS)). Partner companies would designate the timing for achieving company-wide implementation of related voluntary mitigation actions for one or more of the key emission sources (BMP Option) or would specify milestones for achieving their target emissions rate (ONE Future Option).

Transparency is a key principle of the Methane Challenge Program proposal. To achieve this transparency, Methane Challenge partner companies would report annually on their actions supporting this voluntary Program through an EPA platform. EPA aims to minimize the reporting burden to allow partner companies to focus time and resources on implementation of methane-reducing activities. Because relevant oil and gas data are already collected by Subpart W³ of the GHGRP for many industry operations, EPA intends to rely on that data to the extent possible.

Facilities subject to Subpart W are already required to report most of the information that would be

¹ The Methane Challenge Program proposal can be found on the Natural Gas STAR website at http://www3.epa.gov/gasstar/documents/methane_challenge_proposal_072315.pdf.

² EPA released on October 19, 2015 “Draft Supplementary Technical Information” to provide proposed technical details for the BMP commitment option sources.

³ 40 CFR, Part 98, Subpart W (http://www.ecfr.gov/cgi-bin/text-idx?SID=68e8c5c1fb460b0cde0c1401850f7b26&mc=true&node=sp40.21.98.w&rgn=div6#se40.21.98_1234)



relevant to tracking Methane Challenge Program commitments at the company level. Supplementary voluntarily-supplied data to be submitted under the Methane Challenge Program (through an EPA platform, to be developed) would allow the partners and EPA to comprehensively track progress towards commitments. For example, supplementary data would be needed to track progress on a partner's facilities that are not required to report to the GHGRP, and on sources and mitigation activities not currently covered by the GHGRP.⁴

EPA proposes that parent companies submit the following information as part of annual reporting, in order to provide context for participation in the Program and facilitate annual tracking of progress:

- List of included facilities that report to Subpart W (facility ID)
- List of included facilities not reporting to Subpart W (a process will be developed for generating a facility ID for facilities that do not report to Subpart W)
- Applicable air regulations for included facilities, including a listing of the sources covered in the partner's Methane Challenge commitment that are affected by each regulation
- List of facilities acquired/divested during the reporting year

This document includes the following information for each emission source: the segments in which the source's methane emissions would be quantified, the methods for quantifying such emissions, and the corresponding data elements to be reported by Partners. Each data element includes a specification of whether it is already being reported to GHGRP. EPA is proposing to use GHGRP quantification methods for sources covered in Subpart W, and GHGI quantification methods for sources not included in Subpart W. For the supplemental data, in the cases where multiple emission quantification methods are suggested and there is no specification as to their use, partner companies can select any quantification method. EPA is also considering the inclusion of other quantification methods that are supplemental to GHGRP Subpart W for certain emission sources (e.g. measurement for certain sources), for which facilities could potentially select either the GHGRP or Methane Challenge Quantification Method for purposes of tracking Methane Challenge commitments⁵. EPA requests feedback on this approach⁶.

For equipment leaks/fugitive emissions and pneumatic pumps, EPA recognizes the potential overlap for coverage of this emissions source with on-going regulatory actions, including the proposed updates to NSPS and draft Control Techniques Guidelines. Methane Challenge intends to specify mitigation options that are consistent with regulatory approaches, with greater flexibility included in the voluntary Program as needed. Therefore, as a result of regulatory developments in process, a proposal for these sources will be phased-in at a later date.

⁴ For example, distribution sector stakeholders have indicated interest in addressing emissions from distribution pipeline blowdowns and reporting the use of cast iron pipe liners, both of which are not reported to the GHGRP.

⁵ Participation in Methane Challenge does not in any way change legal obligations of partners to comply with applicable laws and regulations, including GHGRP Subpart W.

⁶ EPA requests that commenters focus on EPA's overall approach regarding quantification methods, including where new quantification methods are needed to cover certain sources due to gaps in the current options (e.g. in cases where EFs may not cover emissions levels before and after mitigation), and whether measurement should be allowed for some sources for which Subpart W does not currently allow measurement. EPA will not consider comments on changing the available GHGI EFs or Subpart W quantification methods. Those comments should be shared through GHGRP and GHGI channels.



For reporting purposes, the Methane Challenge Program intends to utilize the same source, segment and facility definitions as Subpart W, to the extent applicable. Data would be reported at the facility level, except where specified.

Emission Sources

Acid Gas Removal Vents

Applicable Segments:

- Production⁷, Gathering and Boosting⁸, and Processing⁹

Quantification Methods:

- GHGI segment specific EFs¹⁰

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Acid Gas Removal (AGR) vents	Actual count of AGR units	X
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ¹¹	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Associated Gas Venting & Flaring

Applicable Segments:

- Production¹²

Quantification Methods:

- Subpart W Calculation Methodology¹³

⁷ 40 CFR 98.232(c)(17)

⁸ 40 CFR 98.232(j)(3)

⁹ 40 CFR 98.232(d)(5)

¹⁰ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-136: 2013 Data and CH₄ Emissions [Mg] for the Natural Gas Processing Stage

¹¹ As calculated per the specified emission quantification methodologies for each source.

¹²

40 CFR 98.232(c)(13)

¹³ 40 CFR 98.233(m) and 40 CFR 98.233(n)



Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Associated Gas Venting & Flaring	Volume of oil produced during venting/flaring	X
	Volume of associated gas sent to sales (scf)	X
	Actual count of wells venting associated gas	X
	Actual count of wells flaring associated gas	X
	Annual CH ₄ Emissions from Venting (mt CH ₄)	X
	Annual CH ₄ Emissions from Flaring (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ¹⁴	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Blowdowns - Distribution Pipeline

Applicable Segments:

- Distribution

Quantification Methods:

- GHGI segment specific EFs¹⁵

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Routine maintenance: Pipeline Blowdowns	Miles of pipeline	
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ¹⁶	Number of blowdowns that routed gas to a compressor or capture system for beneficial use, flare, or low-pressure system	
	Number of hot taps utilized that avoided the need to blowdown gas to the atmosphere	
	Emission reductions from voluntary action (mt CH ₄)	

Blowdowns – Gathering Pipelines

Applicable Segments:

- Gathering & Boosting¹⁷

¹⁴ As calculated per the specified emission quantification methodologies for each source.

¹⁵ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-138: 2013 Data and CH₄ Emissions (Mg) for the Natural Gas Distribution Stage

¹⁶ As calculated per the specified emission quantification methodologies for each source.

¹⁷ 40 CFR 98.232(j)(5)



Quantification Methods:

- Subpart W Calculation method using the volume of gathering pipeline segment between isolation valves and the pressure and temperature of the gas within the gathering pipeline¹⁸
- Subpart W Calculation method using direct measurement of emissions using a flow meter¹⁹

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Gathering pipeline blowdowns	Actual count of blowdowns	X
	Annual CH ₄ Emissions (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ²⁰	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Blowdowns - Transmission Pipeline (Between Compressor Stations)

Applicable Segments:

- Transmission Pipelines²¹

Quantification Methods:

- Subpart W Calculation method using the volume of transmission pipeline segment between isolation valves and the pressure and temperature of the gas within the transmission pipeline²²
- Subpart W Calculation method using direct measurement of emissions using a flow meter²³

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Transmission Pipeline Blowdowns (between Compressor Stations)	Actual count of blowdowns by equipment or event type	X
	Total CH ₄ emissions (mt CH ₄) per equipment or event type	X
	Annual CH ₄ Emissions (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ²⁴	Total number of blowdowns	
	Number of blowdowns that routed gas to a mitigation option	
	Number of blowdowns that routed gas to a compressor or capture system for beneficial use	
	Number of blowdowns that routed gas to a flare	
	Number of blowdowns that routed gas to a low-pressure system	
	Number of hot taps utilized that avoided the need to blowdown	

¹⁸ 98.233(i)(2)

¹⁹ 98.233(i)(3)

²⁰ As calculated per the specified emission quantification methodologies for each source.

²¹ 40 CFR 98.232(m)

²² 98.233(i)(2)

²³ 98.233(i)(3)

²⁴ As calculated per the specified emission quantification methodologies for each source.



Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
	gas to the atmosphere	
	Number of blowdowns that utilized other emissions control techniques (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH ₄)	

Blowdown Vent Stacks

Applicable Segments:

- Gathering and Boosting²⁵, Processing²⁶, Transmission Compression²⁷, and LNG Import/Export²⁸

Quantification Methods:

- Subpart W Calculation method using engineering calculation method by equipment or event type²⁹
- Subpart W Calculation method using direct measurement of emissions using a flow meter³⁰

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Blowdown Vent Stacks	Actual count of blowdowns by equipment or event type	X
	Annual CH ₄ emissions by equipment or event type (mt CH ₄) (emissions calculated by equipment or event type)	X
	Annual total CH ₄ emissions calculated by flow meter (mt CH ₄) (emissions calculated using flow meters)	X
Voluntary action to reduce methane emissions during the reporting year ³¹	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Blowdowns - Vessel Blowdowns

Applicable Segments:

- Production

Quantification Methods:

- GHGI segment specific EFs³²

²⁵ 40 CFR 98.232(j)(5)

²⁶ 40 CFR 98.232(d)(3)

²⁷ 40 CFR 98.232(e)(4)

²⁸ 40 CFR 98.232(h)(3)

²⁹ 98.233(i)(2)

³⁰ 98.233(i)(3)

³¹ As calculated per the specified emission quantification methodologies for each source.

³² Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-126: 2013 CH₄ Emissions from Petroleum Production Field Operations



Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Vessel blowdowns	Actual count of blowdowns	
	Actual count of vessels	
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ³³	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Combustion Units - Internal

Applicable Segments:

- Production³⁴, Gathering and Boosting³⁵, Processing³⁶, Transmission Compression³⁷, Storage³⁸, LNG Storage³⁹, LNG Import/Export⁴⁰, and Distribution⁴¹

Quantification Methods:

- Subpart W EF^{42,43}

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Internal combustion units	Actual count of internal fuel combustion units that are not compressor-drivers, with a rated heat capacity less than or equal to 1 mmBtu/hr	X
	Actual count of internal fuel combustion units that are not compressor-drivers, with a rated heat capacity greater than 1 million Btu per hour	X
	Annual CH ₄ Emissions (mt CH ₄) for internal fuel combustion units that are not compressor-drivers, with a rated heat capacity greater than 1 million Btu per hour	X
	Actual count of internal fuel combustion units of any heat	X

³³ As calculated per the specified emission quantification methodologies for each source.

³⁴ 40 CFR 98.232(c)(22)

³⁵ 40 CFR 98.232(j)(12)

³⁶ 40 CFR 98.33

³⁷ *ibid*

³⁸ *ibid*

³⁹ *ibid*

⁴⁰ *ibid*

⁴¹ 40 CFR 98.232(i)(7)

⁴² 40 CFR 98.233(z)(1); 40 CFR 98.233(z)(2)

⁴³ 40 CFR 98.236(z)(1); 40 CFR 98.236(z)(2)



Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
	capacity that are compressor-drivers	
	Annual CH ₄ Emissions (mt CH ₄) for internal fuel combustion units of any heat capacity that are compressor-drivers	X
Voluntary action to reduce methane emissions during the reporting year ⁴⁴	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Combustion Units - External

Applicable Segments:

- Production⁴⁵, Gathering and Boosting⁴⁶, Processing⁴⁷, Transmission Compression⁴⁸, Storage⁴⁹, LNG Storage⁵⁰, LNG Import/Export⁵¹, and Distribution⁵²

Quantification Methods:

- Subpart W EF⁵⁶

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
External combustion units	Actual count of external fuel combustion units with a rated heat capacity less than or equal to 5 million Btu per hour	X
	Actual count of external fuel combustion units with a rated heat capacity greater than 5 million Btu per hour	X
	Annual CH ₄ Emissions (mt CH ₄) for external fuel combustion units with a rated heat capacity greater than 5 million Btu per hour	X
Voluntary action to reduce methane emissions during the reporting year ⁵³	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

⁴⁴ As calculated per the specified emission quantification methodologies for each source.

⁴⁵ 40 CFR 98.232(c)(22)

⁴⁶ 40 CFR 98.232(j)(12)

⁴⁷ 40 CFR 98.33

⁴⁸ *ibid*

⁴⁹ *ibid*

⁵⁰ *ibid*

⁵¹ *ibid*

⁵² 40 CFR 98.232(i)(7)

⁵³ As calculated per the specified emission quantification methodologies for each source.



Centrifugal Compressors – Production and Gathering & Boosting

Applicable Segments:

- Production⁵⁴, and Gathering & Boosting⁵⁵

Quantification Methods:

- Subpart W Calculation Methodologies: Default population EF for compressors with wet seal oil degassing vents⁵⁶

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Centrifugal compressors	Number of centrifugal compressors with wet seal oil degassing vents	X
	Annual CH ₄ emissions (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ⁵⁷	Number of compressors routed to vapor recovery units	
	Number of compressors routed to flare	
	Number of compressors where source emissions are captured for fuel use or routed to a thermal oxidizer	
	Number of compressors utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH ₄)	

Centrifugal Compressors – Other Segments

Applicable Segments:

- Processing⁵⁸, Transmission Compression⁵⁹, Storage⁶⁰, LNG Storage⁶¹, and LNG Import/Export⁶²

Quantification Methods:

- Subpart W - Individual compressor source “as found” measurements⁶³
 - Operating mode: blowdown valve leakage and rod packing emissions
 - Not-operating-depressurized mode: isolation valve leakage
 - Site-specific EF⁶⁴

⁵⁴ 40 CFR 98.232(c)(19)

⁵⁵ 40 CFR 98.232(j)(8)

⁵⁶ 40 CFR 98.233(o)(10)

⁵⁷ As calculated per the specified emission quantification methodologies for each source.

⁵⁸ 40 CFR 98.232(d)(2)

⁵⁹ 40 CFR 98.232(e)(2)

⁶⁰ 40 CFR 98.232(f)(2)

⁶¹ 40 CFR 98.232(g)(2)

⁶² 40 CFR 98.232(h)(2)

⁶³ 40 CFR 98.233(o)(1)(i)

⁶⁴ 40 CFR 98.233(o)(6)



- Subpart W - Continuous monitoring⁶⁵
- Subpart W - Manifolder “as found” measurements⁶⁶

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Centrifugal compressors	Actual count of centrifugal compressors with wet seals	X
	Actual count of centrifugal compressors with dry seals	X
	Actual count of manifolded groups of compressors with wet seals, isolation valves, or blowdown valves	X
	Actual count of compressors with wet seals, isolation valves, or blowdown valves that are routed to a flare	X
	Actual count of compressors with wet seals, isolation valves, and or blowdown valves that have vapor recovery	X
	Actual count of compressors with wet seals, isolation valves, or blowdown valves that are routed to a thermal oxidizer or emissions are captured for beneficial use	X
	Annual CH ₄ emissions vented to the atmosphere (mt CH ₄)	X
	Annual CH ₄ Emissions (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ⁶⁷	Number of compressors routed to vapor recovery units	
	Number of compressors routed to flare	
	Number of compressors where source emissions are captured for fuel use or routed to a thermal oxidizer	
	Number of compressors utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH ₄)	

Note: Onshore petroleum and natural gas production facilities only report total annual centrifugal compressor CH₄ Emissions

Reciprocating Compressors – Production and Gathering and Boosting

Applicable Segments:

- Production⁶⁸ and Gathering & Boosting⁶⁹

Quantification Methods:

- Subpart W Calculation Methodologies: Default population EF for reciprocating compressors⁷⁰

⁶⁵ 40 CFR 98.233(o)(1)(ii)

⁶⁶ 40 CFR 98.233(o)(1)(iii)

⁶⁷ As calculated per the specified emission quantification methodologies for each source.

⁶⁸ 40 CFR 98.232(c)(11)

⁶⁹ 40 CFR 98.232(j)(9)

⁷⁰ 40 CFR 98.233(p)(10)



Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Reciprocating compressors	Number of reciprocating compressors	X
	Annual CH ₄ emissions (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ⁷¹	Number of replaced reciprocating compressor rod packing	
	Number of compressors routed to vapor recovery units	
	Number of compressors routed to flare	
	Number of compressors where source emissions are captured for fuel use or routed to a thermal oxidizer	
	Number of compressors utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH ₄)	

Reciprocating Compressors – Other Segments

Applicable Segments:

- Processing⁷², Transmission Compression⁷³, Storage⁷⁴, LNG storage⁷⁵, and LNG Import/Export⁷⁶

Quantification Methods:

- Subpart W – Individual compressor source “as found” measurements⁷⁷
 - Operating mode: blowdown valve leakage and rod packing emissions
 - Standby-pressurized mode: blowdown valve leakage
 - Not-operating-depressurized mode: isolation valve leakage
 - Site-specific EF⁷⁸
- Subpart W - Continuous monitoring⁷⁹
- Subpart W - Manifolder “as found” measurements⁸⁰

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Reciprocating compressors	Number of compressors with rod packing emissions vented to the atmosphere	X
	Number of manifolded groups of compressor sources:	X

⁷¹ As calculated per the specified emission quantification methodologies for each source.

⁷² 40 CFR 98.232(d)(1)

⁷³ 40 CFR 98.232(e)(1)

⁷⁴ 40 CFR 98.232(f)(1)

⁷⁵ 40 CFR 98.232(g)(1)

⁷⁶ 40 CFR 98.232(h)(1)

⁷⁷ 40 CFR 98.233(p)(1)(i)

⁷⁸ 40 CFR 98.233(p)(6)

⁷⁹ 40 CFR 98.233(p)(1)(ii)

⁸⁰ 40 CFR 98.233(p)(1)(iii)



Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
	isolation valves, blowdown valves, and rod packing	
	Number of compressors routing isolation valve leakage to flares, combustion units, or capture systems for beneficial use	X
	Number of compressors routing blowdown valve leakage to flares, combustion units, or capture systems for beneficial use	X
	Number of compressors routing rod packing vents to flares, combustion units, or capture systems for beneficial use	X
	Annual CH ₄ emissions from flares and combustion units due to combustion of emissions from isolation valves, blowdown valves, and rod packing vents (mt CH ₄)	X
	Annual CH ₄ emissions vented to the atmosphere from isolation valves, blowdown valves, and rod packing (including estimated fraction of CH ₄ from manifolded compressor sources) (mt CH ₄)	X
	Annual CH ₄ emissions (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ⁸¹	Number of replaced reciprocating compressor rod packing	
	Number of compressors routed to vapor recovery units	
	Number of compressors routed to flare	
	Number of compressors where source emissions are captured for fuel use or routed to a thermal oxidizer	
	Number of compressors utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH ₄)	

Compressors Blowdowns

Applicable Segments:

- Production

Quantification Methods:

- GHGI segment specific EFs⁸²

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Compressor blowdowns	Actual count of blowdowns	
	Actual count of compressors	
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce	Mitigation actions implemented to reduce methane	

⁸¹ As calculated per the specified emission quantification methodologies for each source.

⁸² Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-133: 2013 Data and Calculated CH₄ Potential Emissions [Mg] for the Natural Gas Production Stage, by NEMS Region



Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
methane emissions during the reporting year ⁸³	emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Compressor Starts

Applicable Segments:

- Production

Quantification Methods:

- GHGI segment specific EFs⁴²

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Compressor starts	Actual count of starts	
	Actual count of compressors	
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ⁸⁴	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Dehydrator Vents

Applicable Segments:

- Production⁸⁵, Gathering and Boosting⁸⁶, and Processing⁸⁷

Quantification Methods:

- Subpart W Calculation Method 1 using computer modeling for glycol dehydrators that have an annual average of daily natural gas throughput that is greater than or equal to 0.4 million standard cubic feet per day, adjusted as needed for vents routed to VRU (beneficial use)⁸⁸
- Subpart W Calculation Method 2 using emission factors and population counts for glycol dehydrators that have an annual average of daily natural gas throughput that is less than 0.4 million standard cubic feet per day, adjusted as needed for vents routed to VRU (beneficial use)⁸⁹
- Subpart W Calculation Method 3 using engineering calculations for desiccant dehydrators, adjusted as needed for vents routed to VRU (beneficial use)⁹⁰

⁸³ As calculated per the specified emission quantification methodologies for each source.

⁸⁴ As calculated per the specified emission quantification methodologies for each source.

⁸⁵ 40 CFR 98.232(c)(14)

⁸⁶ 40 CFR 98.232(j)(4)

⁸⁷ 40 CFR 98.232(d)(4)

⁸⁸ 40 CFR Part 98.233(e)(1); 40 CFR Part 98.233(e)(5)

⁸⁹ 40 CFR Part 98.233(e)(2); 40 CFR Part 98.233(e)(5)

⁹⁰ 40 CFR Part 98.233(e)(3); 40 CFR Part 98.233(e)(5)



Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Dehydrators	For Calculation Method 1 and Calculation Method 2, actual count of glycol dehydrators	X
	For Calculation Method 3, actual count of desiccant dehydrators	X
	Count of dehydrators venting to a flare or regenerator firebox/fire tubes	X
	Count of dehydrators at the facility that vented to a vapor recovery device	X
	Annual CH ₄ emissions from dehydrators venting to a flare or regenerator firebox/fire tubes (mt CH ₄)	X
	Annual CH ₄ Emissions from all dehydrators that were not vented to a flare or regenerator firebox/fire tubes (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ⁹¹	Number of Dehydrators routed to Vapor Recovery Units	
	Number of Dehydrators routed to Flare or Regenerator Firebox/Fire Tubes	
	Number of Dehydrators utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH ₄)	

Dig-Ins (Excavation Damage)

Applicable Segments:

- Distribution

Quantification Methods:

- GHGI segment specific EFs⁹²

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Dig-Ins (Excavation Damage)	Miles of pipeline	
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ⁹³	Actions taken to minimize excavation damages/reduce methane emissions from excavation damages	
	Emission reductions from voluntary action (mt CH ₄)	

⁹¹ As calculated per the specified emission quantification methodologies for each source.

⁹² Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-138: 2013 Data and CH₄ Emissions (Mg) for the Natural Gas Distribution Stage

⁹³ As calculated per the specified emission quantification methodologies for each source.



Distribution Mains

Applicable Segments:

- Distribution⁹⁴

Quantification Methods:

- Subpart W - Equipment leaks calculated using population counts and factors⁹⁵
 - Cast Iron Mains EF
 - Plastic Mains EF (for plastic mains and for cast iron or unprotected steel distribution mains with plastic liners or inserts)
 - Protected Steel Mains EF
 - Unprotected Steel Mains EF

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Distribution Mains	Total miles of cast iron distribution mains	X
	Annual CH ₄ emissions from cast iron mains (mt CH ₄)	X
	Total miles of plastic distribution mains	X
	Annual CH ₄ emissions from plastic mains (mt CH ₄)	X
	Total miles of protected steel distribution mains	X
	Annual CH ₄ emissions from protected steel mains (mt CH ₄)	X
	Total miles of unprotected steel distribution mains	X
	Annual CH ₄ emissions from unprotected steel mains (mt CH ₄)	X
	Total miles of cast iron or unprotected steel distribution mains with Plastic Liners or Inserts	
	Annual CH ₄ emissions from cast iron or unprotected steel distribution mains with Plastic Liners or Inserts (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ⁹⁶	Miles of cast iron mains replaced with plastic, protected steel, or rehabilitated with plastic pipe inserts or cured-in-place liners	
	Miles of unprotected steel mains cathodically protected, replaced with protected steel, or rehabilitated with pipe inserts or cured-in-place liners	
	Emission reductions from voluntary action (mt CH ₄)	

Distribution Services

Applicable Segments:

- Distribution⁹⁷

⁹⁴ 40 CFR 98.232(i)(5)

⁹⁵ 40 CFR 98.233(r)

⁹⁶ As calculated per the specified emission quantification methodologies for each source.

⁹⁷ 40 CFR 98.232(i)(6)



Quantification Methods:

- Subpart W - Equipment leaks calculated using population counts and factors⁹⁸
 - Cast Iron Services EF
 - Plastic Services EF
 - Protected Steel Services EF
 - Unprotected Steel Services EF

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Distribution Services	Total number of cast iron services	
	Annual CH ₄ emissions from cast iron services (mt CH ₄)	
	Total number of copper services	X
	Annual CH ₄ emissions from copper services (mt CH ₄)	X
	Total number of plastic services	X
	Annual CH ₄ emissions from plastic services (mt CH ₄)	X
	Total number of protected steel services	X
	Annual CH ₄ emissions from protected steel services (mt CH ₄)	X
	Total number of unprotected steel services	X
	Annual CH ₄ emissions from unprotected steel services (mt CH ₄)	X
	Total number of cast iron or unprotected steel services with plastic liners or inserts	
	Annual CH ₄ emissions from cast iron or unprotected steel services with plastic liners or inserts (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ⁹⁹	Actual count of cast iron services replaced with plastic, protected steel, copper, or rehabilitated with plastic pipe inserts	
	Actual count of unprotected steel services replaced with cathodically protected or replaced with protected steel, plastic, copper, or rehabilitated with plastic pipe inserts	
	Emission reductions from voluntary action (mt CH ₄)	

Flare Stacks

Applicable Segments:

- Production¹⁰⁰, Gathering and Boosting¹⁰¹, Processing¹⁰², Transmission Compression¹⁰³, Storage¹⁰⁴,

⁹⁸ 40 CFR 98.233(r)

⁹⁹ As calculated per the specified emission quantification methodologies for each source.

¹⁰⁰ 40 CFR 98.232(c)(9)

¹⁰¹ 40 CFR 98.232(j)(7)

¹⁰² 40 CFR 98.232(d)(6)

¹⁰³ 40 CFR 98.232(e)(6)

¹⁰⁴ 40 CFR 98.232(f)(4)



LNG Storage¹⁰⁵, and LNG Import/Export¹⁰⁶.

Quantification Methods:

- Subpart W Calculation Methodology¹⁰⁷

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Flare Stacks	Actual count of flare stacks	X
	Annual CH ₄ Emissions (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ¹⁰⁸	Number of flares with all or part of gas flow routed to VRU, fuel, or other beneficial use	
	Combined volume of gas routed to VRU, fuel, or other beneficial use	
	Emission reductions from voluntary action (mt CH ₄)	

Liquids Unloading

Applicable Segments:

- Production¹⁰⁹

Quantification Methods:

- Subpart W Calculation Method 1 using direct measurement for each tubing diameter and pressure group with and without plunger lifts¹¹⁰
- Subpart W Calculation Method 2 using engineering calculations for wells without plunger lifts¹¹¹
- Subpart W Calculation Method 3 using engineering calculations for wells with plunger lifts¹¹²

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Liquids unloading for wells	Actual count of wells conducting liquids unloading without plunger lifts that are vented to the atmosphere	X
	Count of unloadings for all wells without plunger lifts	X
	Annual CH ₄ emissions from wells conducting liquids unloading without plunger lifts that are vented to the atmosphere (mt CH ₄)	X

¹⁰⁵ 40 CFR 98.232(g)(4)

¹⁰⁶ 40 CFR 98.232(h)(4)

¹⁰⁷ 40 CFR Part 98.233(n)(5); 40 CFR Part 98.233(n)(6)

¹⁰⁸ As calculated per the specified emission quantification methodologies for each source.

¹⁰⁹ 40 CFR 98.232(c)(4)

¹¹⁰ 40 CFR 98.233(f)(1), data elements will be reported separately for wells with plunger lifts and wells without plunger lifts

¹¹¹ 40 CFR 98.233(f)(2)

¹¹² 40 CFR 98.233(f)(3)



Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
	Actual count of wells conducting liquids unloading with plunger lifts that are vented to the atmosphere	X
	Count of unloadings for all wells with plunger lifts	X
	Annual CH ₄ emissions from wells conducting liquids unloading with plunger lifts that are vented to the atmosphere (mt CH ₄)	X
	Annual CH ₄ Emissions from liquids unloading (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ¹¹³	Number of wells reducing emissions voluntarily	
	Emissions control methodology being implemented (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Meters - Residential

Applicable Segments:

- Distribution

Quantification Methods:

- GHGI segment specific EFs¹¹⁴

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Residential meters	Actual count of outdoor residential meters	
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ¹¹⁵	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Meters - Commercial/Industrial

Applicable Segments:

- Distribution

Quantification Methods:

- GHGI segment specific EFs⁴

¹¹³ As calculated per the specified emission quantification methodologies for each source.

¹¹⁴ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-138: 2013 Data and CH₄ Emissions (Mg) for the Natural Gas Distribution Stage

¹¹⁵ As calculated per the specified emission quantification methodologies for each source.



Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Commercial/Industrial Meters	Actual count of commercial/industrial meters	
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ¹¹⁶	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Mishaps

Applicable Segments:

- Production

Quantification Methods:

- GHGI segment specific EF_s¹¹⁷

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Mishaps	Actual count of mishaps	
	Miles of pipeline	
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ¹¹⁸	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Natural Gas Pneumatic Device (Controller) Vents

Applicable Segments:

- Production¹¹⁹, Gathering & Boosting¹²⁰, Processing¹²¹, Transmission Compression¹²², and Storage¹²³

¹¹⁶ As calculated per the specified emission quantification methodologies for each source.

¹¹⁷ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-133: 2013 Data and Calculated CH₄ Potential Emissions [Mg] for the Natural Gas Production Stage, by NEMS Region

¹¹⁸ As calculated per the specified emission quantification methodologies for each source.

¹¹⁹ 40 CFR 98.232(c)(1)

¹²⁰ 40 CFR 98.232(j)(1)

¹²¹ Not required in GHGRP

¹²² 40 CFR 98.232(e)(5)

¹²³ 40 CFR 98.232(f)(3)



Quantification Methods:

- Subpart W Calculation Methodology using actual count of devices and default emission factors¹²⁴

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Natural Gas Pneumatic Device (Controller) Vents (all sectors except processing)	Actual count of high-bleed pneumatic controllers ¹²⁵	X
	Annual CH ₄ emissions from high-bleed pneumatic controllers (mt CH ₄)	X
	Actual count of intermittent-bleed pneumatic controllers	X
	Annual CH ₄ emissions from intermittent-bleed pneumatic controllers (mt CH ₄)	X
	Actual count of low-bleed pneumatic controllers ¹²⁶	X
	Annual CH ₄ emissions from low-bleed pneumatic controllers (mt CH ₄)	X
Natural Gas Pneumatic Device (Controller) Vents (processing sector only) ¹²⁷	Actual count of high-bleed pneumatic controllers ¹²⁸	
	Annual CH ₄ emissions from high-bleed pneumatic controllers (mt CH ₄)	
	Actual count of intermittent-bleed pneumatic controllers	
	Annual CH ₄ emissions from intermittent-bleed pneumatic controllers (mt CH ₄)	
	Actual count of low-bleed pneumatic controllers ¹²⁹	
	Annual CH ₄ emissions from low-bleed pneumatic controllers (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ¹³⁰	Number of high-bleed controllers converted to low-bleed	
	Number of high-bleed controllers converted to zero emitting or removed from service	
	Number of intermittent-bleed pneumatic controllers converted to zero emitting or removed from service	
	Number of low bleed pneumatic controllers converted to zero emitting or removed from service	
	Emission reductions from voluntary action (mt CH ₄)	

¹²⁴ *ibid*

¹²⁵ Natural gas-actuated controllers with a bleed rate greater than 6 scf per hour

¹²⁶ Natural gas-actuated controllers with a bleed rate less than or equal to 6 scf per hour

¹²⁷ Processing sector reporters providing voluntary supplementary information should use the Transmission Compression segment EFs to quantify methane emissions (40 CFR 98.232(e)(5)).

¹²⁸ Natural gas-actuated controllers with a bleed rate greater than 6 scf per hour

¹²⁹ Natural gas-actuated controllers with a bleed rate less than or equal to 6 scf per hour

¹³⁰ As calculated per the specified emission quantification methodologies for each source.



Pressure Relief Valves - Upsets

Applicable Segments:

- Production

Quantification Methods:

- GHGI segment specific EFs¹³¹

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Pressure relief valves	Actual count of PRVs	
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ¹³²	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

PRV Releases

Applicable Segments:

- Production, Distribution

Quantification Methods:

- GHGI segment specific EFs^{133 134}

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Routine maintenance: Pressure relief valve releases	Actual count of PRVs (production)	
	Miles of main (distribution)	
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ¹³⁵	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

¹³¹ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-133: 2013 Data and Calculated CH₄ Potential Emissions [Mg] for the Natural Gas Production Stage, by NEMS Region

¹³² As calculated per the specified emission quantification methodologies for each source.

¹³³ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-126: 2013 CH₄ Emissions from Petroleum Production Field Operations

¹³⁴ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-138: 2013 Data and CH₄ Emissions (Mg) for the Natural Gas Distribution Stage

¹³⁵ As calculated per the specified emission quantification methodologies for each source.



Storage Tank Vented Emissions

Applicable Segments:

- Production¹³⁶, and Gathering & Boosting¹³⁷

Quantification Methods:

- Subpart W Calculation Method 1 using computer modeling for gas-liquid separators or gathering and boosting non-separator equipment with annual average daily throughput of oil greater than or equal to 10 barrels per day¹³⁸,
- Subpart W Calculation Method 2 using engineering calculations for gas-liquid separators or gathering and boosting non-separator equipment or wells flowing directly to atmospheric storage tanks with annual average daily throughput of oil greater than or equal to 10 barrels per day¹³⁹, or
- Subpart W Calculation Method 3 using an emission factor and population counts for hydrocarbon liquids flowing to gas-liquid separators, non-separator equipment, or directly to atmospheric storage tanks with annual average daily throughput of oil less than 10 barrels per day¹⁴⁰

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Storage Tank Vents Using Calculation Methods 1 and 2	Total volume of oil sent to tanks from all gas-liquid separators or gathering and boosting non-separator equipment or wells flowing directly to atmospheric tanks with oil throughput ≥ 10 barrels/day (bbl/day)	X
	Number of wells sending oil to gas-liquid separators or gathering and boosting non-separator equipment or wells flowing directly to atmospheric tanks with oil throughput ≥ 10 bbl/day	X
	Count of tanks that control emissions with vapor recovery systems	X
	Annual CH ₄ emissions from tanks with vapor recovery systems (mt CH ₄)	X
	Count of tanks that vented directly to the atmosphere	X
	Annual CH ₄ emissions from venting (mt CH ₄)	X
	Actual count of atmospheric tanks	X
	Count of tanks with flaring emission control measures	X
	Annual CH ₄ Emissions (mt CH ₄)	X
	Annual CH ₄ emissions from flaring (mt CH ₄)	X
Count of gas-liquid separators whose liquid dump valves did	X	

¹³⁶ 40 CFR 98.232(c)(10)

¹³⁷ 40 CFR 98.232(j)(6)

¹³⁸ 40 CFR 98.233(j)(1)

¹³⁹ 40 CFR 98.233(j)(2)

¹⁴⁰ 40 CFR 98.233(j)(3)

	not close properly	
	Annual CH ₄ emissions from improperly functioning dump valves (mt CH ₄)	X
Storage Tank Vents Using Calculation Method 3	Total volume of oil sent to tanks from all wellhead separators and direct from wells with oil throughput <10 barrels/day (bbl/day)	X
	Count of tanks that did not control emissions with flares	X
	Annual CH ₄ emissions from tanks without flares (mt CH ₄ emissions)	X
	Count of wells with gas-liquid separators	X
	Count of wells without gas-liquid separators	X
	Count of tanks that vented directly to the atmosphere	X
	Annual CH ₄ emissions from venting (mt CH ₄)	X
	Actual count of atmospheric tanks	X
	Count of tanks with flaring emission control measures	X
	Annual CH ₄ Emissions (mt CH ₄)	X
	Annual CH ₄ emissions from flaring (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ¹⁴¹	Number of tanks routed to VRU or beneficial use	
	Number of tanks routed to flare	
	Emission reductions from voluntary action (mt CH ₄)	

Storage Tank Vents - Transmission

Applicable Segments:

- Transmission Compression¹⁴²

Quantification Methods:

- Subpart W Calculation Methodology¹⁴³

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Transmission storage tank vents	Count of storage tank vent stacks with flares attached	X
	Count of storage tank vent stacks without flares attached	X
	Count of storage tank vent stacks with dump valve leakage direct to atmosphere	X
	Annual CH ₄ emissions from storage tank vent stacks with dump valve leakage venting gas directly to the atmosphere (mt CH ₄)	X
	Count of storage tank vent stacks with flared dump valve leakage	X

¹⁴¹ As calculated per the specified emission quantification methodologies for each source.

¹⁴² 40 CFR 98.232(e)(3)

¹⁴³ 40 CFR 98.233(k)

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
	Annual CH ₄ emissions from storage tank vent stacks with flared dump valve leakage (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ¹⁴⁴	Number of tanks with compressor scrubber dump valve leakage routed to flare or control device	
	Emission reductions from voluntary action (mt CH ₄)	

Storage Station - Venting

Applicable Segments:

- Storage, LNG Storage

Quantification Methods:

- GHGI segment specific EFs¹⁴⁵

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Storage Station - Venting	Actual count of stations (natural gas)	
	Actual count of LNG Stations	
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ¹⁴⁶	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Transmission Station - Venting

Applicable Segments:

- Storage, LNG Storage

Quantification Methods:

- GHGI segment specific EFs⁷⁸

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Transmission Station -	Actual count of stations (natural gas)	

¹⁴⁴ As calculated per the specified emission quantification methodologies for each source.

¹⁴⁵ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-137: 2013 Data and CH₄ Emissions [Mg] for the Natural Gas Transmission Stage

¹⁴⁶ As calculated per the specified emission quantification methodologies for each source.



Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Venting	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ¹⁴⁷	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Well Drilling

Applicable Segments:

- Production

Quantification Methods:

- GHGI segment specific EFs¹⁴⁸

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Well drilling	Actual count of wells drilled	
	Annual CH ₄ Emissions (mt CH ₄)	
Voluntary action to reduce methane emissions during the reporting year ¹⁴⁹	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

Well Venting During Well Completions/Workovers With Hydraulic Fracturing

Applicable Segments:

- Production^{150 151}

Quantification Methods:

- Subpart W Calculation Methodology using combined production rate measurement and engineering calculations using Equation W-10A¹⁵²
- Subpart W Calculation Methodology using measured vented or flared volume from each well using Equation W-10B¹⁵³

¹⁴⁷ As calculated per the specified emission quantification methodologies for each source.

¹⁴⁸ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, Table A-126: 2013 CH₄ Emissions from Petroleum Production Field Operations

¹⁴⁹ As calculated per the specified emission quantification methodologies for each source.

¹⁵⁰ 40 CFR 98.232(c)(6)

¹⁵¹ 40 CFR 98.232(c)(8)

¹⁵² 40 CFR 98.233(g)(1)(i)

¹⁵³ 40 CFR 98.233(g)(1)(ii)



Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Well venting during well completions with hydraulic fracturing ¹⁵⁴	Actual count of completions in the calendar year	X
	Actual count of wells that conduct flaring	X
	Actual count of wells that have reduced emission completions	X
	Annual CH ₄ Emissions (mt CH ₄)	X
Well venting during well workovers with hydraulic fracturing ¹⁵⁵	Total count of workovers	X
	Actual count of wells that conduct flaring	X
	Actual count of wells that have reduced emission workovers	X
	Annual CH ₄ Emissions (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ¹⁵⁶	Number of well completions/workovers utilizing flaring	
	Number of well completions/workovers utilizing reduced emission completions	
	Number of well completions/workovers utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH ₄)	

Gas Well Venting During Well Completions/Workovers Without Hydraulic Fracturing

Applicable Segments:

- Production¹⁵⁷

Quantification Methods:

- For workovers, calculate emissions according to Subpart W using a count of workovers and an emission factor¹⁵⁸
- For completions, calculate emissions according to Subpart W using measured production rate¹⁵⁹

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Gas well venting during well completions without hydraulic fracturing	Total count of completions that vented directly to atmosphere without flaring	X
	Total count of completions with flaring	X
	Annual CH ₄ Emissions that resulted from venting gas directly to the atmosphere for completions (mt CH ₄)	X
	Annual CH ₄ Emissions that resulted from flares for completions	X

¹⁵⁴ For oil wells, this section is limited to oil wells that have a gas-oil ratio (GOR) of 300 scf/STB or greater.

¹⁵⁵ For oil wells, this section is limited to oil wells that have a gas-oil ratio (GOR) of 300 scf/STB or greater.

¹⁵⁶ As calculated per the specified emission quantification methodologies for each source.

¹⁵⁷ 40 CFR 98.232(c)(5) and 40 CFR 98.232(c)(7)

¹⁵⁸ 40 CFR 98.233(h)

¹⁵⁹ *ibid*



Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Gas well venting during well workovers without hydraulic fracturing	Total count of workovers that vented directly to atmosphere without flaring	X
	Total count of workovers with flaring	X
	Annual CH ₄ Emissions that resulted from venting gas directly to the atmosphere for workovers (mt CH ₄)	X
	Annual CH ₄ Emissions that resulted from flares for workovers	X
Voluntary action to reduce methane emissions during the reporting year ¹⁶⁰	Number of workovers utilizing flaring	
	Number of workovers utilizing other emissions control technique (specify emissions control methodology)	
	Emission reductions from voluntary action (mt CH ₄)	

Well Testing Venting & Flaring

Applicable Segments:

- Production¹⁶¹

Quantification Methods:

- Subpart W Calculation Methodology for oil wells using Equation W-17A¹⁶²
- Subpart W Calculation Methodology for gas wells using Equation W-17B¹⁶³

Reporting:

Emission Source	Data Elements Collected via Facility-Level Reporting	GHGRP
Well Testing Venting & Flaring	Actual count of wells tested in a calendar year that vented emissions to the atmosphere	X
	Average number of days wells were tested that vented emissions to the atmosphere	X
	Actual count of wells tested in a calendar year that flared emissions	X
	Average number of days wells were tested that flared emissions	X
	Annual CH ₄ Emissions from venting (mt CH ₄)	X
	Annual CH ₄ Emissions from flaring (mt CH ₄)	X
Voluntary action to reduce methane emissions during the reporting year ¹⁶⁴	Mitigation actions implemented to reduce methane emissions (list)	
	Emission reductions from voluntary action (mt CH ₄)	

¹⁶⁰ As calculated per the specified emission quantification methodologies for each source.

¹⁶¹ 40 CFR 98.232(c)(12)

¹⁶² 40 CFR 98.233(l)

¹⁶³ *ibid*

¹⁶⁴ As calculated per the specified emission quantification methodologies for each source.



Appendix A: Questions for Stakeholders

EPA encourages stakeholders to provide comments on any and all aspects of this document. EPA will carefully consider and evaluate all feedback received through the feedback deadline. To the extent appropriate, applicable, and consistent with the aims of the Methane Challenge Program, this feedback will be incorporated into a revised framework document. Following are specific areas in which EPA encourages stakeholders to provide feedback:

1. EPA proposes annual collection of information on voluntary actions that were undertaken to reduce methane emissions. The quantification of methane emission reductions is proposed to be calculated per the specified emission quantification methodologies for each source (e.g. using the suggested methods to quantify emissions before and after mitigation actions to quantify reductions achieved). EPA seeks feedback on this proposal. In particular, are there sources that companies plan to mitigate for which the proposed quantification method(s) would not be capable of capturing emissions levels before and after mitigation? If so, please provide a listing of those sources and recommendations on how to quantify emissions reductions from those sources.
2. In the “Draft Supplementary Technical Information” document released October 19, 2015, EPA had proposed that companies report on Distribution segment Excavation Damages by calculating methane emissions for each incident (as opposed to using EFs). Distribution companies selecting the ONE Future Commitment Option may or may not seek to reduce Excavation Damages to meet their commitment. If they do plan to mitigate Excavation damages, EPA recommends that they report using the BMP method, but for other companies that don’t want to demonstrate reductions from this source they may want to report using EFs.
3. Per the previous question about reporting emissions and activities from Distribution segment Excavation Damages, EPA seeks comment on whether there are other sources that should be treated in a similar way.
4. Are potential partners interested in reporting measured methane emissions for any sources that currently don’t include measurement in the quantification options? Please comment on this and, if so, provide information on recommended measurement protocols for sources of interest.
5. EPA seeks feedback on the proposal to use the plastic pipe EF for “Distribution Mains - Cast Iron or Unprotected Steel with Plastic Liners or Inserts” and “Distribution Services - Cast Iron or Unprotected Steel with Plastic Liners or Inserts.”
6. For cast iron services, EPA seeks comment on how to quantify methane emissions, and requests quantification methodology suggestions, including any available data.
7. The Natural Gas STAR Program Annual Reporting Forms specify Sunset Dates (the length of time a technology or practice can continue to accrue emission reductions after implemented) for mitigation options (<http://www3.epa.gov/gasstar/tools/program-forms.html>). Should the Methane Challenge Program create a similar structure to establish Sunset Dates for designated mitigation options?