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## **Program Review Report and Technical Support Document on Proposed Amendments to**

***310 CMR 7.73 Reducing Methane Emissions from  
Natural Gas Distribution Mains and Services***

**December 2020**

### **Regulatory Authority:**

**M.G.L. c. 21A, §§ 2, 8, and 16  
M.G.L. c. 21N, §§ 3(b) and 3(d)  
and M.G.L. c. 111, §§ 2C and 142A – 142E**

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## I. SUMMARY

The Massachusetts Department of Environmental Protection (MassDEP) regulation 310 CMR 7.73 *Reducing Methane Emissions from Natural Gas Distribution Mains and Services* requires MassDEP to conduct a program review by December 31, 2020. One purpose of the program review is to determine whether the regulation should be amended or extended past 2020. As detailed below, MassDEP solicited stakeholder input with a meeting and comment period, and has concluded that the regulation should be extended. In order to have 2021 emission limits effective by the end of 2020, it was necessary to promulgate an emergency regulation.

On December 21, 2020 MassDEP filed amendments to 310 CMR 7.73 as an emergency regulation with the Massachusetts Secretary of the Commonwealth. These amendments were effective upon filing and will be published in the Massachusetts Register on January 8, 2021. In order to make the regulations permanent, MassDEP is now soliciting public comment on the regulation in order to comply with the public review process requirements under Massachusetts General Laws (M.G.L.) Chapter 30A. MassDEP will hold a public hearing on the amendments on January 19, 2021, and the deadline to submit public comments is January 29, 2021.

## II. BACKGROUND

On August 11, 2017, MassDEP promulgated 310 CMR 7.73 *Reducing Methane Emissions from Natural Gas Distribution Mains and Services* to assist in reducing emissions of greenhouse gases associated with the natural gas distribution sector. The regulation established 2018 through 2020 mass-based, annually declining limits on methane emissions from mains and services for individual natural gas distribution system operators with a Gas System Enhancement Plan (GSEP)<sup>1</sup> order from the Massachusetts Department of Public Utilities (DPU) (“gas operators”).

The emergency regulation MassDEP filed with the Secretary of State’s Office on December 21, 2020, established 310 CMR 7.73 gas operator mass-based annually declining emission limits for 2021, 2022, 2023, and 2024 (the “Emergency Regulation”).<sup>2</sup>

One purpose of this Emergency Regulation is to comply with the Massachusetts Supreme Judicial Court’s (SJC) September 2018 decision in New England Power Generators Ass’n, Inc. v. Dep’t of Env’tl. Prot., 480 Mass. 398 (2018) (NEPGA). In the NEPGA decision, the SJC held that “[t]he most sensible reading of ... Section 16 [of G.L. c. 21N] is that, after December 31, 2020, only the current regulations promulgated under § 3(d) expire.” NEPGA at 410. MassDEP’s “authority and obligation to promulgate new regulations under § 3(d) after December 31, 2020, is undisturbed.” Id. The Emergency Regulation satisfies the Court’s directive “to promulgate

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<sup>1</sup> DPU’s Gas System Enhancement Plan program is designed to set gas operators on a course to replace aging leak-prone natural gas pipeline and services with newer pipe material over the course of a series of years. DPU conducts an annual docket process upon the filing by gas operators of their annual plans, the GSEPs. DPU approves the scope of total pipe repair and replacement work for each gas operator for each calendar year by April 30<sup>th</sup> of that same year. The DPU dockets for the six gas operators with GSEP orders can be accessed at <https://eeaonline.eea.state.ma.us/DPU/Fileroom/dockets/bynumber>, e.g., “19-GSEP-01” through “19-GSEP-06.”

<sup>2</sup> These annual emission limits are now in effect for 90 days. They will either be made permanent by the filing of a confirmatory statement by MassDEP by March 19, 2021 or amended by the filing of an amended version of the Emergency Regulation by MassDEP.

“new regulations” effective on or before December 31, 2020 based on “updated information,” to ensure that the future Statewide limits for 2030, 2040, and 2050 will be met.

MassDEP determined that the best way to address the Court’s directive was to consider information received through required program filings under 7.73, in DPU GSEP dockets and through its 2020 Program Review, which it conducted this year as required by 310 CMR 7.73 (see the following section for details). MassDEP is considering information obtained from DPU GSEP dockets and information on recent natural gas distribution system studies noted by stakeholders, as primary sources of updated information that MassDEP is considering at this time.

Based on the updated information outlined above, MassDEP has determined that:

- the existing declining emission limits in 310 CMR 7.73 have been effective over the last three years at providing a back-stop cap to the DPU GSEP orders and reducing CH<sub>4</sub> emissions from the affected gas operators; and
- the regulation should be extended as part of ongoing climate policy measures to ensure that the Commonwealth remains on track to achieve the goals of the M.G.L. c. 21N, § 3(d) of the Massachusetts Global Warming Solutions Act (GWSA).

Additional information regarding the 310 CMR 7.73 *Reducing Methane Emissions from Natural Gas Distribution Mains and Services* program is available on MassDEP’s website at <https://www.mass.gov/service-details/reducing-methane-ch4-emissions-from-natural-gas-distribution-mains-services-310-cmr> including the Program Review stakeholder presentation discussed below.<sup>3</sup>

## Overview

Pursuant to the authority in M.G. L. c. 21A, §§ 2, 8 and 16, M.G.L. c. 21N, § 3(b) and (d) and M.G.L. c. 111, § 2C and 142A – 142E, among other authorities, MassDEP is proposing to amend the regulation aimed at reducing methane (CH<sub>4</sub>) emissions from natural gas distribution mains and services in the Commonwealth. The regulation, 310 CMR 7.73: *Reducing Methane Emissions from Natural Gas Distribution Mains and Services*, contains mass-based, annually declining aggregate limits on methane emissions from main and service lines owned by gas operators with GSEPs, consistent with the GWSA. This emissions reduction action is one of many climate policy strategies outlined in the *Massachusetts Clean Energy and Climate Plan for 2020 Update*.<sup>4</sup>

The primary ingredient of natural gas, methane, can leak from the pipelines and systems used during distribution to homes and businesses. In the atmosphere, methane is a potent contributor

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<sup>3</sup> See also December 16, 2016 “Background Document On Proposed New and Amended Regulations, 310 CMR 7.00 and 310 CMR 60.00,” at <https://www.mass.gov/doc/background-document-on-proposed-new-amended-regulations-december-2016/download>, August 2017 310 CMR 7.73 Fact Sheet at <https://www.mass.gov/doc/fact-sheet-310-cmr-773/download>, and August 2017 *Response to Comment on the Proposed and Amended: 310 CMR 7.73 Reducing Methane Emissions from Natural Gas Distribution Mains and Services and 310 CMR 60.05 Global Warming Solutions Act Requirements for Transportation and 310 CMR 60.06 CO<sub>2</sub> Emission Limits for State Fleet Passenger Vehicles*.

<sup>4</sup> <https://www.mass.gov/doc/massachusetts-updated-clean-energy-and-climate-plan-for-2020/download>

to global warming, with an Intergovernmental Panel on Climate Change (IPCC) *Fourth Assessment Report* (AR4)<sup>5</sup> 100-year Global Warming Potential (GWP) roughly 25 times that of carbon dioxide. In recent years, increasing attention has been paid to leaks from the aging natural gas distribution system in Massachusetts, which result in methane emissions into the atmosphere.

In 2014, to address leaks from Massachusetts' aging pipeline infrastructure, the Massachusetts Legislature enacted M.G.L. c. 164, §§ 144 and 145, requiring gas operators to address three grades of leaks. These requirements were promulgated by DPU as 220 CMR 114 *Uniform Natural Gas Leaks Classification*, which specified that each gas operator must identify all leaks in its Annual Quality Service Plan as one of the following:

*(a) Grade 1 Leak. A Grade 1 leak shall be a leak that represents an existing or probable hazard to persons or property. Grade 1 leaks require the immediate commencement of repair and continuous action until the condition is no longer hazardous, the source of the leak is eliminated, and permanent repairs have been completed. ...*

*(b) Grade 2 Leak. A Grade 2 leak shall be a leak that is recognized as nonhazardous to persons or property at the time of detection, but justifies scheduled repair based on probable future hazard. The Gas Company shall repair Grade 2 leaks or replace the Pipeline within 12 months from the date the leak was classified. ...*

*(c) Grade 3 Leak. A Grade 3 leak shall be a leak that is recognized as nonhazardous to persons or property at the time of detection and can be reasonably expected to remain nonhazardous. The Gas Company shall reevaluate Grade 3 leaks during the next scheduled survey, or within 12 months from the date last evaluated, whichever occurs first, until the leak is eliminated or the Pipeline is replaced. ...*

See 220 CMR 114(3).

M.G.L. c. 164, § 145, also permits gas companies to submit GSEPs to DPU. These plans “include a timeline for removing all leak-prone infrastructure on an accelerated basis specifying an annual replacement pace and program end date with a target end date of either (i) not more than 20 years, or (ii) a reasonable target end date . . .” The following gas operators currently submit GSEPs to DPU: National Grid, Berkshire Gas Company, Fitchburg Gas and Electric Light Company d/b/a Unitil, Liberty Utilities, Bay State Gas Company d/b/a Columbia Gas of Massachusetts, and NSTAR Gas Company d/b/a Eversource Energy, and Eversource Gas Company of Massachusetts (the new gas operator of the pipelines and services for which Bay State Gas Company d/b/a Columbia Gas of Massachusetts filed a GSEP plan for 2020).<sup>6</sup> Under

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<sup>5</sup> <https://www.ipcc.ch/reports/>

<sup>6</sup> Blackstone Gas Company supplies natural gas in the Commonwealth, but it did not submit a GSEP because its distribution system contains no leak-prone infrastructure. Bay State Gas Company d/b/a Columbia Gas of Massachusetts had submitted GSEP filings to DPU for its pipelines and services; however, those pipelines and services have been sold to Eversource Gas Company of Massachusetts as of November 1, 2020, which company has become the new gas operator of those pipelines and services as of that date. See October 7, 2020 DPU Order in “Joint Petition of Eversource Energy, NiSource Inc., Eversource Gas Company of Massachusetts, and Bay State Gas Company d/b/a Columbia Gas of Massachusetts for approval by the Department of Public Utilities of (1) the sale of

the GSEPs, the gas operators have plans in place to replace or improve their entire aging or leaking natural gas infrastructure over 20 years (from 2015 to 2034) or, in the case of Eversource Energy and National Grid/Boston Gas, 25 years (from 2015 to 2039). GSEPs are leading to a decline in methane emission leaks, and the resulting reductions are the basis of the declining annual emission limits proposed under this regulation.

In 2016, the Legislature passed Session Law: Chapter 188 of the Acts of 2016, an Act to Promote Energy Diversity (Energy Bill). Section 13 of the Energy Bill required DPU, in consultation with MassDEP, to address the environmental impact of gas leaks that have been classified as Grade 3 and establish a plan to repair leaks that have a “significant environmental impact.” DPU promulgated these requirements on March 22, 2019, as amendments to 220 CMR 114, requiring gas operators to identify and repair Grade 3 significant environmental leaks. The regulation also requires gas operators with a GSEP to report the number of environmentally significant Grade 3 leaks on each length of GSEP-eligible pipe in its annual Gas System Enhancement Plan Reconciliation (GREC) filing. MassDEP expects that in addressing such leaks, gas operators will be able to accelerate the decline in emissions of methane from natural gas infrastructure and thereby improve their ability to comply with the declining emissions required by this regulation.

In 2018, the Massachusetts Legislature enacted Session Law: Chapter 227 of the Acts of 2018, An Act to Advance Clean Energy. Section 19 required DPU to promulgate regulations requiring gas companies to report lost and unaccounted for (LAUF) gas in a uniform manner. These requirements were promulgated by DPU on December 27, 2019 as 220 CMR 115 *Uniform Reporting of Lost and Unaccounted-for Gas*. DPU’s program required additional reporting that MassDEP has found useful in reviewing the 310 CMR 7.73 program.

## **Program Review**

310 CMR 7.73(9) includes a requirement for MassDEP to complete a program review:

*(9) Program Review. Not later than December 31, 2020, the Department shall complete a review, including an opportunity for public comment on the program review, of the requirements of 310 CMR 7.73 to determine whether the program should be amended or extended. This review shall evaluate whether to require the use of feasible technologies to detect and quantify gas leaks and any other information relevant to review of the program.*

As part of the program review, MassDEP posted a presentation<sup>7</sup> in August 2020, which was discussed at a stakeholder meeting conducted via virtual video conference on Thursday September 10, 2020, at 5:00 pm.

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Bay State Gas Company to Eversource Energy; and (2) a settlement agreement resolving the proposed sale and two pending Department investigations into the Merrimack Valley Incident: Bay State Gas Company, D.P.U. 19-140 and Bay State Gas Company, D.P.U. 19-141.” Consolidated Docket Nos. D.P.U. 20-59/D.P.U. 19-140/D.P.U. 19-141 at <https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/12751142>

<sup>7</sup> <https://www.mass.gov/doc/presentation-310-cmr-773-program-overview/download>

MassDEP posed questions for discussion during the stakeholder meeting, and made information requests of the gas operators. Feedback was received during the meeting and via written comments due Friday September 18, 2020, at 5:00 pm and is summarized below.<sup>8</sup>

1. Should the decreasing annual emission limits be extended beyond 2020?

Commenters supported extending the limits beyond 2020. Some commenters suggested that additional limits be issued one year at a time, while others suggested that limits be issued now for each year through the end of the GSEP program or until the Commonwealth phases out fossil fuels.

2. What is the appropriate size and role of the emissions set-aside?

One commenter found it alarming that the emissions set-aside can be allocated based on greater distribution system growth than anticipated, saying that is counter to the Massachusetts GWSA. The gas operators responded to a MassDEP information request indicating that there remain approximately 1600 miles of pipeline that may need to be reclassified from cathodically- to noncathodically-protected steel (which is one factor used to calculate the size of the emissions set-aside). Also, the gas operators prefer that the petition and set-aside process account for *force majeure* events, but otherwise largely be made redundant by issuing annual limits one year at a time, with a percentage margin.

3. What are the most appropriate emission factors or other metrics to determine emission limits and evaluate progress?

A number of commenters stated that the emission factors promulgated in 2017 do not account for the subset of gas leaks with the highest emissions. Some commenters recommended using information from a recent study to calculate updated emission factors.<sup>9</sup> Some commenters recommended combining updated emission factors with the number of leaks, rather than with miles of pipeline and number of services. Another commenter recommended using Massachusetts-specific leak counts per length of pipe and pipe material, yielding new emissions factors per length of pipe of a given material, which could be tailored to the actual leak data from each gas operator and updated periodically if the leak counts come down. A commenter stated that the decreasing annual limits should decline at a more rapid pace, consistent with state mandates for GHG reduction goals. Another commenter

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<sup>8</sup> Comments were received from Drs. Hutyra, Sargent and Wofsy; Boston Gas Company and former Colonial Gas Company each d/b/a National Grid, NSTAR Gas Company d/b/a Eversource Energy, Bay State Gas Company d/b/a Columbia Gas of Massachusetts, The Berkshire Gas Company, Liberty Utilities (New England Gas Company) Corp. d/b/a Liberty, Fitchburg Gas and Electric Light Company d/b/a Unitil (via Keegan Werlin, D. Winter, Esq. and N. Kaplan, Esq.); NSTAR Gas Company d/b/a Eversource Energy, Bay State Gas Company d/b/a Columbia Gas of Massachusetts (C. Finneran, S. McNulty Collins); Mothers Out Front Cambridge (S. DeVos); Mothers Out Front (C. Corcoran); Environmental Defense Fund (E. Murphy, N. Karas); HEET (A. Shulman, Z. Magavi); Nathan Phillips; Berkshire Environmental Action Team's No Fracked Gas in Mass program (J. Winn, R. Wessel); and MA Sierra Club & Gas Leaks Allies (D. Zeek).

<sup>9</sup> *A National Estimate of Methane Leakage from Pipeline Mains in Natural Gas Local Distribution Systems*, Zachary D. Weller, Steven P. Hamburg, and Joseph C. von Fischer, *Environ. Sci. Technol.* 2020, 54, 14, 8958–8967, <https://pubs.acs.org/doi/10.1021/acs.est.0c00437>.

suggested revisiting emission factors every three to five years to adjust for progress. Gas operators expressed concerns with using data from the recent study, including: unlike the data used in 310 CMR 7.73 to date (from Lamb et al.,<sup>10</sup>) methane leak rates were not directly measured in the recent study; the pipeline material type that was leaking was not verified; leak location was not distinguished between mains and services; and the unexplained “counter-intuitive observation ... that coated steel seemed to have a higher number of leak indications per mile than bare steel of the same age.” Gas operators suggest using the emission factors from EPA’s annual US GHG inventory (GHGI) and basing limits and compliance calculations on pipeline replacement mileage (which is within gas operators’ control), rather than basing limits and compliance calculations on leak counts which are influenced by weather or pipeline damage (which are outside of gas operators’ control). Gas operators stated that a drawback of MassDEP basing limits on GSEP work anticipated in the upcoming four years is that the actual work locations evolve over time. Gas operators also stated that given the possibility of financial penalties, MassDEP must utilize a clear, well vetted, and acceptable method for developing benchmarks for year over year reductions in emissions that are within the gas operators’ relative control. Some commenters stated that more recent methane Global Warming Potentials should be used to calculate limits, report emissions for regulatory compliance and publish the state GHG emissions inventory. One commenter stated that the emissions inventory back to 1990 should be reevaluated with updated emissions factors.

- a. Are there practical, economically feasible technologies to detect and quantify gas leaks?
- b. Are DPU’s 3/22/2019 regulation 220 CMR 114 *Uniform Natural Gas Leaks Classification* (which details technologies to detect and quantify the areal extent of gas leaks) and 12/27/2019 regulation 220 CMR 115 *Uniform Reporting of Lost and Unaccounted-for [LAUF] Gas* (which quantifies LAUF components) sufficient?

On these two questions, comments ranged from suggesting that the gas leak areal extent approach used by gas operators is a reasonable cost effective approach, to suggesting particular technologies such as Advanced Leak Detection Technologies and Data Analytics (ALD+) and cavity ring down spectrometers, and recommending sampling of end-user meters to measure meter error. One commenter stated that only a subset of leaks are reported to DPU, and all leaks should be reported. Other commenters would like to see MassDEP conduct regular measurement of methane in proximity to infrastructure in the state and conduct follow-up testing at reported leak locations. Gas operators stated that technologies to detect and quantify gas leaks are not an appropriate metric for this regulation, as they provide only a snapshot in time of the distribution system, and do not provide a method for extrapolating that measurement into a forecast of annual emission limits.

4. Does the petition process in 310 CMR 7.73(4)(c) need any changes?

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<sup>10</sup> *Direct Measurements Show Decreasing Methane Emissions from Natural Gas Local Distribution Systems in the United States*, Brian K. Lamb, Steven L. Edburg, Thomas W. Ferrara, Touché Howard, Matthew R. Harrison, Charles E. Kolb, Amy Townsend-Small, Wesley Dyck, Antonio Possolo, and James R. Whetstone, *Environ. Sci. Technol.* 2015, 49, 8, 5161–5169, <https://pubs.acs.org/doi/abs/10.1021/es505116p>.



The gas operators agreed with MassDEP’s suggestion to stakeholders that petition categories be streamlined and that petitions be submitted annually on April 15. Other commenters interpreted the petition question as relating to the frequency at which program reviews should occur, suggesting program reviews occur on a three-year cycle.

Additional comments were received on other topics, including:

- MassDEP’s suggestion at the stakeholder meeting that Eversource and the former Columbia Gas would be listed with combined annual limits in the amended regulation was inappropriate, as Eversource and the former Columbia Gas will continue to operate and report separately even after Eversource’s purchase of the assets of Columbia is complete.
- The state energy efficiency programs should be reformed.
- DPU should not permit any new fossil fuel infrastructure, in keeping with the state’s 2050 Decarbonization Roadmap.
- Top down emissions estimates (based on atmospheric sampling) indicate that there are missing sources of methane in bottom-up inventories (based on multiplying activity by emission factors, as used in both the EPA US-wide GHGI and the MassDEP Massachusetts emissions inventory), which should be addressed.

### **III. DESCRIPTION OF PROPOSED AMENDMENTS**

MassDEP is proposing to finalize the Emergency Regulation that established annual emission limits for the years 2021 through 2024 based upon its current methodology for calculation of emissions and streamlined the petition process for accessing the emissions set-aside. In addition, MassDEP is taking public comment on an alternative set of emission factors and therefore emission limits for the years 2022 through 2024, which is outlined in detail below.

#### **Description of the Emergency Regulation**

*Applicability: 310 CMR 7.73(3)*

This regulation will continue to apply to all Massachusetts gas operators with a GSEP approved by the Massachusetts Department of Public Utilities pursuant to M.G.L. c. 164, § 145. Specifically, the regulation will apply to CH<sub>4</sub> emissions from all active mains and services of gas operators with GSEPs. “Main” means a distribution line that serves as a common source of supply for more than one service, and “Service” means a distribution line that transports gas from a common source of supply to an individual customer, to two adjacent or adjoining residential or small commercial customers, or to multiple residential or small commercial customers served through a meter header or manifold. A service ends at the inlet of the customer meter or at the connection to a customer’s piping, whichever is further upstream, or at the connection to customer piping if there is no meter. This definition of service excludes customer meters, so as to correspond to the infrastructure sampled in establishing the service line emission factors in Table 9 in the regulation. See below for a discussion of the Table 9 emission factors used in the Emergency Regulation.

To address the sale of the pipelines and services of Bay State Gas Company d/b/a Columbia Gas of Massachusetts, the definition of “Gas Operator” has been amended to include successor

companies or companies that purchase the assets of existing companies within the definition of the parties responsible for compliance with 310 CMR 7.73, as follows:

“Gas Operator” means every Massachusetts gas operator with a Gas System Enhancement Plan applicable to its mains and services approved by the Massachusetts Department of Public Utilities (DPU) pursuant to M.G.L. c. 164, § 145 as of August 11, 2017, the corporate successor of such gas operator and/or the purchaser of the mains and services that are subject to a DPU-approved Gas System Enhancement Plan.

This amendment will also ensure that there is a responsible gas operator in the event of any other future transfers of corporate or asset ownership of GSEP-regulated pipelines and services.

*Maximum Individual Annual CH<sub>4</sub> Emission Limits: 310 CMR 7.73(4)(a)*

MassDEP has established in the Emergency Regulation maximum annual limits on CH<sub>4</sub> emissions from active mains and services for calendar year 2021, 2022, 2023 and 2024, for each gas operator with a GSEP, as listed in Tables 1 through 6 in the regulation. These are the years covered by the most recent DPU GSEP Orders, issued April 30, 2020, for which MassDEP established CH<sub>4</sub> emission limits as backstops to ensure emissions reductions, and, therefore, as noted above, there is sufficient information to establish limits for those years. Each limit is expressed in metric tons of carbon dioxide equivalent. The limits were determined by summing the emissions for each material type in Table 9 in the regulation. The emissions for each material type were calculated by multiplying the emissions factors in Table 9 by the miles of main and number of services of each material type for each year for each operator. A spreadsheet detailing the calculation of the proposed limits is attached as Appendix A.

Gas operators are required to publicly report miles of main and number of services annually to the United States Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) and to MassDEP; the most recent such reports were for 2019. MassDEP calculated the limits for each operator in the Emergency Regulation, incorporating each company’s actual 2019 pipeline and services inventory and projected 2020 through 2024 GSEP work and system growth (submitted by gas operators as part of the stakeholder review process for this regulation).

MassDEP is not proposing to issue new annual emission limits for each gas operator one year at a time, with a percentage margin, as suggested by the gas operators. MassDEP believes the information in the DPU GSEP proceedings provide sufficient basis to establish annual limits for the 2020-2024 years covered by the GSEP orders issued in April 2020. Also, MassDEP is not proposing a percentage margin, as this would be equivalent to simply setting a higher limit.

See below for a discussion of the Table 9 emission factors used in the Emergency Regulation.

At the public hearing on January 19, 2021 and during the public comment period that continues until January 29, 2021, MassDEP will take comment on the assumptions and methodology of how the CH<sub>4</sub> emission limits were calculated and on the CH<sub>4</sub> emission limits themselves.

*CH<sub>4</sub> Emissions Set-Aside and Petition Process for Modifying CH<sub>4</sub> Emission Limit: 310 CMR 7.73(4)(c)*

In the Emergency Regulation, MassDEP has continued its policy of setting an overall sector limit and a petition process for gas operators to obtain set-aside emissions through a petition process. The gas operators report miles of main and number of services to PHMSA and MassDEP annually by type of material. However, gas operators have on occasion discovered discrepancies between the material of main and services listed in their records, and that found in the field while conducting work on the natural gas distribution system. In addition, the gas operators update their GSEP plans in filings with DPU on October 31 of each year. The updates reflect the most recent construction plans, which are influenced by many factors, including, for example, the need to coordinate with municipal paving schedules, or a need to prioritize unexpected emergency repairs. While the limits proposed in Tables 1 through 6 in the regulation account for expected distribution system growth in miles of main and number of services (as discussed above), it is possible that the actual growth will be greater or less than accounted for.

Information regarding potentially reclassified steel main was requested from the gas operators as part of the program review, and two gas operators (Unitil with 6.86 miles and National Grid with 1,600 miles), responded that they might have miles of pipeline that would need to be reclassified.<sup>11</sup> MassDEP believes that an annual emissions set-aside for such significant unanticipated sources of emissions in the pipeline system is still warranted. Therefore, MassDEP has finalized the Emergency Regulation with the emissions set-aside provision to permit some flexibility to accommodate pipeline materials reclassification, safety, weather or other emergent issues.

Table 7 in the Emergency Regulation lists the sum of the individual gas operator limits in Tables 1 through 6. Each annual emissions set-aside amount is equal to 5% of the annual Table 7 sum of the gas operator limits plus the emissions from the potential reclassification of up to 1,606.86 miles of steel main from cathodically protected to uncathodically protected. The center column of Table 8 lists the emissions set-aside for each year. The right-hand column of Table 8 lists the sum of Table 7 and the center column of Table 8, and is the Maximum Allowable Annual Aggregate CH<sub>4</sub> Emission Limit across all gas operators. By setting aside only 5% of the total individual gas operator emission limits, MassDEP will ensure that the entire gas operator sector continues to achieve reductions in GHG emissions over the period from 2021 to 2024, while also allowing for unforeseen changes in pipeline miles and services.

MassDEP has also streamlined the petition process by which gas companies can request increases to their GHG limits from the emissions set-aside. Petitions may be submitted if the gas operator's limit in Tables 1 through 6 were not met because the PHMSA report for that year shows miles/services replacements were not met (e.g., because pipeline materials were

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<sup>11</sup> For details, see information about reclassification of pipe by material type in 16-GREC-03, <https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/9205132> pages 161 and 165 of 173; see also 17-GREC-03 Response to Information Request DPU-2-3, <https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/9177015>, stating "Steel main segments installed before August 1971 may be reclassified from cathodically protected to non-cathodically protected if they are found to be deficient and no longer feasible for protection."

discovered and reported to be different than earlier assumptions). MassDEP has proposed a single petition deadline of April 15th after the calendar year for which the gas operator is seeking to access the emissions set-aside, rather than the previous multiple possible deadlines based on issuance of DPU orders and the end of the calendar year.

*Annual Reporting: 310 CMR 7.73(5)*

By April 15, 2021 and on April 15th of each year listed in Tables 1 through 6, each gas operator must submit an annual report to MassDEP for emissions that occurred during the previous calendar year. The reporting form and spreadsheet are posted on MassDEP's webpage and require, among other items:

- The miles of mains and number of services owned, leased, operated, or controlled by the gas operator and located in Massachusetts by each material type listed in Table 9 of the regulation, as recorded in the annual report to PHMSA; and
- The number of metric tons of CH<sub>4</sub>, in carbon dioxide equivalents, by each material type listed in Table 9, emitted from mains and services owned, leased, operated, or controlled by the gas operator and located in Massachusetts during the year, as calculated by multiplying the miles of mains and number of services by the appropriate emission factor in Table 9.

Stakeholders recommended a recent technical report by Weller, which concluded that “finding and repairing the largest leaks in combination with focusing pipeline replacement on the oldest and leakiest sections of pipe can be expected to result in the largest reductions in natural gas main methane emissions.”<sup>12</sup> Weller also pointed out that gas operators’ current reporting of pipeline mileage by material type does not subdivide pipeline mileage by age. Therefore, in order to track progress on eliminating the oldest pipeline, the Emergency Regulation includes a new requirement for gas operators to categorize their pipeline mileage by material type and age in their annual reports to MassDEP.

*Emission Factors: 310 CMR 7.73(5) Table 9*

The gas operators asked MassDEP to update the emissions factors to those used by EPA in EPA's annual US GHG inventory (GHGI). However, MassDEP and EPA already use the same sources to derive emission factors. Both EPA and MassDEP derive emission factors from the 2015 Lamb study, with the exception of copper services, which are derived from a EPA/GRI 1996 study.

Emissions from mains and services are calculated by multiplying an emission factor (CH<sub>4</sub> emitted per mile or service) for each material type by the number of miles or services of each material type. The emission factors are calculated by multiplying the CH<sub>4</sub> emitted per leak by the number of leaks per mile. Both MassDEP and EPA use the 2015 Lamb values for the amount of CH<sub>4</sub> emitted per leak. The difference in MassDEP's and EPA's emission factors arises from the use of different leaks per mile values; MassDEP uses the leaks per mile values from the 2015

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<sup>12</sup> Weller, et al. p. 8966

Lamb study, while EPA continues to use the leaks per mile values from the 1996 EPA/GRI<sup>13</sup> study.

MassDEP has finalized the Emergency Regulation without modifying the emission factors in Table 9 of the regulation. The emission factors in Table 9 are derived from data sources described on page 18 and in footnotes 23 and 24 of the July 2016 *Statewide Greenhouse Gas Emissions Level: 1990 Baseline and 2020 Business As Usual Projection Update*.<sup>14</sup> These emission factors were updated as part of a nationwide effort coordinated by the Environmental Defense Fund, to improve understanding of emissions across the natural gas supply chain. Washington State University's Laboratory for Atmospheric Research led a nationwide field study to better characterize and understand methane emissions associated with the delivery of natural gas. Researchers quantified methane emissions from facilities and pipes operated by 13 utilities in various regions. National Grid was among the cosponsors of the study, and sampling occurred in the following municipalities served by National Grid: Braintree, Burlington, Milton, Norwood, Acton, Ayer, Quincy, Waltham, Wellesley, and Weymouth. Eversource also cooperated in this study.

The study found “no statistical difference in [emission factors] by region” (Lamb, page 5166) in the United States, indicating, “We also examined the pipeline leak data for regional differences. As shown in Table S4.4, there were differences in the leak emission factors among different pipeline types, but the small sample size and the large degree of variability indicate that these differences are not significant. In particular, the occurrence of one large leak for a particular type of pipe in a region had a large effect on the mean emission rate for the region and pipeline type. Thus, for emission factors of methane emissions from pipeline leaks, there is no advantage to using regional emission factors for extrapolation purposes.”<sup>15</sup>

MassDEP considered the recent Weller study provided during the September stakeholder meeting, but is concerned that the study did not directly measure emissions from pipelines, that it used a database rather than in-field confirmation to attribute the likely pipeline material associated with each leak, and that it could not distinguish between pipelines and services as the source of leaks (and therefore does not provide services emission factors). These assumptions may have been appropriate for a study seeking to estimate national emissions, but are difficult to justify technically in this regulation. The regulation's compliance methodology is based on annual datasets that are distinguished by the material type of pipelines and services. We agree with Weller's conclusion that “finding and repairing the largest leaks in combination with focusing pipeline replacement on the oldest and leakiest sections of pipe can be expected to

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<sup>13</sup> Table 3.6-6: *CH<sub>4</sub> Emission Factors for Natural Gas Systems, Data Sources/Methodology* of Annex 3.6 in EPA's most recent GHGI, published in April 2020, references the April 2016 *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2014: Revisions to Natural Gas Distribution Emissions* as the source of its Natural Gas Distribution emission factor data. This document notes that EPA updated its natural gas distribution system emission factors using the 2015 Lamb CH<sub>4</sub> emitted per leak but continued to use the leaks per mile values developed through a joint Gas Research Institute (GRI)/EPA study published in 1996. [https://www.epa.gov/sites/production/files/2016-08/documents/final\\_revision\\_ng\\_distribution\\_emissions\\_2016-04-14.pdf](https://www.epa.gov/sites/production/files/2016-08/documents/final_revision_ng_distribution_emissions_2016-04-14.pdf).

<sup>14</sup> Available at <http://www.mass.gov/eca/docs/dep/air/climate/gwsa-update-16.pdf>.

<sup>15</sup> Lamb, et al. Supplemental Information p. S62 at <https://pubs.acs.org/doi/abs/10.1021/es505116p>.

result in the largest reductions in natural gas main methane emissions.”<sup>16</sup> Therefore, MassDEP did add the new reporting requirement discussed previously to the Emergency Regulation.

*Program Review: 310 CMR 7.73(9)*

MassDEP has finalized the Emergency Regulation with a requirement to conduct a program review by December 31, 2024, which is the last year of limits included in said regulation.

*GWPs and Other Issues*

In 2016, MassDEP updated the spreadsheets that calculate the electricity import emissions portion of the Massachusetts greenhouse gas inventory, allowing users to re-calculate emissions using their choice of Global Warming Potential (using the Excel “dropdown” feature). MassDEP has extended that feature to the rest of the inventory to allow the selection of 20- or 100-year GWPs from the Intergovernmental Panel on Climate Change’s *Fourth Assessment Report* (AR4) and *Fifth Assessment Report* (AR5).

While a number of other suggestions were made during the stakeholder meeting, they are beyond the scope of this rulemaking (e.g., MassDEP should deploy large scale monitoring of methane emissions from the natural gas distribution systems across the Commonwealth), or are regulated by other agencies (e.g., DPU already has a meter testing and replacement requirement for gas operators). After 310 CMR 7.73 was originally promulgated in August 2017, DPU amended 220 CMR 114 *Uniform Natural Gas Leaks Classification* on March 22, 2019, to require gas operators to detect and categorize the areal extent and significance of pipeline leaks, which has provided additional oversight of natural gas distribution system leaks. MassDEP will continue to review information on top down versus bottom up studies of methane in the atmosphere.

**Alternative Emission Factors and Limits**

MassDEP is also seeking comment on an alternative set of emission factors that could be used for 2022-2024, which would require amending the regulation. This alternative set of emission factors would continue to use the CH<sub>4</sub> emitted per leak from the 2015 Lamb study but would multiply these with a leaks per mile value for each material type that MassDEP derived from 2019 data in the *Fugitive Emissions from Actual Gas Leaks* reports<sup>17</sup> from each gas operator required as part of DPU’s Annual Reporting of Lost and Unaccounted-for Gas (LAUF) pursuant to 220 CMR 115.00.

A change to the emission factors in Table 9 would also change the emission limits in Tables 1 through 8, because the limits are calculated based on the emission factors.<sup>18</sup> The limits would still be determined by summing the emissions for each material type in Table 9, and the emissions for each material type would be calculated by multiplying the emissions factors in

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<sup>16</sup> Weller, et al. p. 8966.

<sup>17</sup> <https://eeaonline.eea.state.ma.us/DPU/Fileroom/dockets/byindustry> as “20-LAUF-01”

<sup>18</sup> Note that while the alternative 2021 limits for each gas operator and the overall sector are expressed in numbers that are higher than the 2020 limits, the limit numbers are not directly comparable because of the change in the alternative pipeline system leak emissions estimation methodology. Both the Emergency Regulation Tables and the alternative Tables proposed in this document for consideration rely on the same total number of pipeline miles and number of services by material type. It is the application of different emission factors that causes a change in the calculated alternative emission limits.

Table 9 by the miles of main and number of services of each material type for each year for each operator. The below tables summarize the alternative emission limits and emission factors, and a spreadsheet detailing the calculation of the alternative proposed limits is attached as Appendix B.

**Table 1: Maximum Annual CH<sub>4</sub> Emission Limits – Boston Gas Company and Colonial Gas Company each d/b/a National Grid**

Calendar Year	Maximum Allowable CH <sub>4</sub> Emissions (metric tons of carbon dioxide equivalent)
2021	138,456
2022	132,649
2023	128,826
2024	121,173

**Table 2: Maximum Annual CH<sub>4</sub> Emission Limits - Eversource Gas Company of Massachusetts**

Calendar Year	Maximum Allowable CH <sub>4</sub> Emissions (metric tons of carbon dioxide equivalent)
2021	37,953
2022	34,842
2023	31,761
2024	28,640

**Table 3: Maximum Annual CH<sub>4</sub> Emission Limits – The Berkshire Gas Company**

Calendar Year	Maximum Allowable CH <sub>4</sub> Emissions (metric tons of carbon dioxide equivalent)
2021	4,751
2022	4,516
2023	4,301
2024	4,086

**Table 4: Maximum Annual CH<sub>4</sub> Emission Limits – Fitchburg Gas and Electric Light Company d/b/a Unitil**

Calendar Year	Maximum Allowable CH <sub>4</sub> Emissions (metric tons of carbon dioxide equivalent)
2021	2,817
2022	2,692
2023	2,601
2024	2,520

**Table 5: Maximum Annual CH<sub>4</sub> Emission Limits – Liberty Utilities (New England Natural Gas Company) Corp.**

Calendar Year	Maximum Allowable CH <sub>4</sub> Emissions (metric tons of carbon dioxide equivalent)
2021	7,139
2022	6,724
2023	6,311
2024	5,897

**Table 6: Maximum Annual CH<sub>4</sub> Emission Limits – NSTAR Gas Company d/b/a Eversource Energy**

Calendar Year	Maximum Allowable CH <sub>4</sub> Emissions (metric tons of carbon dioxide equivalent)
2021	27,313
2022	25,457
2023	23,600
2024	21,743

**Table 7: Sum of Annual CH<sub>4</sub> Emission Limits from Mains and Services of Gas Operators named in Tables 1 through 6**

Calendar Year	CH <sub>4</sub> Emissions (metric tons of carbon dioxide equivalent)
2021	218,429
2022	206,880
2023	195,400
2024	184,059

**Table 8: CH<sub>4</sub> Emissions Set-Aside and Maximum Annual Aggregate CH<sub>4</sub> Emission Limit**

Calendar Year	CH <sub>4</sub> Emissions Set-aside (metric tons of carbon dioxide equivalent)	Maximum Allowable Aggregate CH <sub>4</sub> Emission Limit (metric tons of carbon dioxide equivalent)
2021	28,319	246,748
2022	27,742	234,622
2023	27,168	222,568
2024	26,601	210,660



**Table 9: Methane Emission Factors by Material Type**

Mains	Metric tons of carbon dioxide equivalent/mile-year
Cast or wrought iron	50.623473
Ductile iron	
Copper	
Steel, cathodically unprotected and uncoated	16.194412
Steel, cathodically unprotected and coated	
Other	
Steel, cathodically protected and uncoated	5.367162
Steel, cathodically protected and coated	
Plastic	0.275960
Services	Metric tons of carbon dioxide equivalent/service-year
Steel, cathodically unprotected and uncoated	0.089933
Steel, cathodically unprotected and coated	
Cast or wrought iron	
Ductile iron	
Other	
Steel, cathodically protected and uncoated	0.013108
Steel, cathodically protected and coated	
Plastic	0.006193
Copper	0.121920

MassDEP seeks comment on the assumptions and methodology used to calculate the emissions factors and limits that became effective when filed December 21, 2020, and on the alternative Tables 1-8 emission limits and Table 9 Emission Factors.

**IV. IMPACTS OF PROPOSED AMENDMENTS**

**Economic Impacts**

MassDEP expects minimal economic impacts from 310 CMR 7.73 beyond those already expected from implementation of the GSEP orders because MassDEP has designed the proposed regulation with emission limits aligned with the GHG emissions reductions resulting from the gas operators’ GSEPs.

**Impact on Massachusetts Municipalities**

MassDEP does not expect there to be any impacts on Massachusetts municipalities, as they are not subject to the regulation.

## **Massachusetts Environmental Policy Act (MEPA)**

Pursuant to 301 CMR 11.03(12) (MEPA Regulations), this proposal will not reduce standards for environmental protection, opportunities for public participation in permitting or other review processes, or public access to information generated or provided in accordance with these regulations. This proposal, therefore, does not require the filing of an Environmental Notification Form under MEPA.

### **V. PUBLIC HEARING AND COMMENT**

After an emergency regulation is filed with the Massachusetts Secretary of State, M.G.L. c. 30A requires that the public process (i.e., the opportunity to review background and technical information for at least 21 days prior to a public hearing) be completed within three months, including filing any amendment to the regulation if the public comment and hearing process result in changes to an emergency regulation.

MassDEP gave formal notice to comply with M.G.L. c. 30A. This notice was issued at least 21 days before the public hearing. The hearing notice and proposed amendments are available on MassDEP's website at [www.mass.gov/eea/agencies/massdep/news/comment/](http://www.mass.gov/eea/agencies/massdep/news/comment/). The public hearing will be held on January 19, 2021. Questions about this document may be addressed to Sharon Weber at 617-556-1190 or [climate.strategies@mass.gov](mailto:climate.strategies@mass.gov).