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40 CFR Part 60
Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills; Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 60

[EPA–HQ–OAR–2014–0451; FRL–9913–51–OAR]

RIN 2060–AS23

Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills

AGENCY: Environmental Protection Agency.

ACTION: Advanced Notice of Proposed Rulemaking.

SUMMARY: The purpose of this Advanced Notice of Proposed Rulemaking (ANPRM) is to request public input on methods to reduce emissions from existing municipal solid waste (MSW) landfills. The Environmental Protection Agency (EPA) intends to consider the information received in response to the ANPRM in evaluating whether additional changes beyond those in the proposed revisions for new sources are warranted. MSW landfill emissions are commonly referred to as ''landfill gas'' or ''LFG'' and contain methane, carbon dioxide (CO_2), and nonmethane organic compounds (NMOC). Some existing landfills are currently subject to control requirements in either the landfill new source performance standards (NSPS) or the federal or state plans implementing the landfill emission guidelines; both the NSPS and emission guidelines were promulgated in 1996. The EPA believes that these guidelines merit review to determine the potential for additional reductions in emissions of LFG. Such reductions would reduce air pollution and the resulting harm to public health and welfare. Significant changes have occurred in the landfill industry over time, including changes to the size and number of existing landfills, industry practices, and gas control methods and technologies. The ANPRM recognizes changes in the population of landfills and presents preliminary analysis regarding methods for reducing emissions of LFG. In determining whether changes to the emission guidelines are appropriate, the EPA will, in addition to evaluating the effectiveness of various methods for reducing emissions of LFG, consider the total methane emission reductions that can be achieved in addition to the reductions of NMOC emissions. The EPA is also seeking input on whether it should regulate methane directly. The ANPRM also addresses other regulatory issues including the definition of LFG treatment systems and requirements for closed areas of landfills, among other topics.

DATES: *Comments.* Comments must be received on or before September 15, 2014.

ADDRESSES: Submit your comments, identified by Docket ID Number EPA–HQ–OAR–2014–0451, by one of the following methods:

- *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the online instructions for submitting comments.
- *Email: A-and-R-Docket@epa.gov.* Include Docket ID No. EPA–HQ–OAR–2014–0451 in the subject line of your message.
- *Fax:* (202) 566–9744. Attention Docket ID No. EPA–HQ–OAR–2014–0451.
- *Mail:* Environmental Protection Agency, EPA Docket Center (EPA/DC), Mailcode 28221T, Attention Docket ID No. EPA–HQ–OAR–2014–0451, 1200 Pennsylvania Avenue NW., Washington, DC 20460. Please include a total of two copies. In addition, please mail a copy of your comments on the information collection provisions to the Office of Information and Regulatory Affairs, Office of Management and Budget, Attn: Desk Officer for EPA, 725 17th Street NW., Washington, DC 20503.
- *Hand/Courier Delivery:* EPA Docket Center, Room 3334, EPA WJC West Building, 1301 Constitution Avenue NW., Washington, DC 20004. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to Docket ID No. EPA–HQ–OAR–2014–0451. The EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *http://www.regulations.gov,* including any personal information provided, unless the comment includes information claimed to be confidential business information (CBI) or other information whose disclosure is restricted by statute.

Do not submit information that you consider to be CBI or otherwise protected through *http://www.regulations.gov* or email. Send or deliver information identified as CBI to only the mail or hand/courier delivery address listed above, attention: Mr. Roberto Morales, OAQPS Document Control Officer (Room C404–02), U.S. EPA, Research Triangle Park, NC 27711, Attention Docket ID No. EPA–HQ–OAR–2014–0451. The *http://www.regulations.gov* Web site is an ''anonymous access'' system, which means the EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an email comment directly to the EPA without going through *http://www.regulations.gov,* your email address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, the EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD–ROM you submit. If the EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, the EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses.

Docket: All documents in the docket are listed in the *http://www.regulations.gov* index. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically at *http://www.regulations.gov* or in hard copy at the Air Docket, EPA/DC, WJC West Building, Room B102, 1301 Constitution Ave. NW., Washington, DC. This Docket Facility is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Air Docket is (202) 566–1742.

FOR FURTHER INFORMATION CONTACT: For information concerning this ANPRM, contact Ms. Hillary Ward, Fuels and Incineration Group, Sector Policies and Programs Division, Office of Air Quality Planning and Standards (OAQPS) (E143–05), Environmental Protection Agency, Research Triangle Park, NC 27711; telephone number: (919) 541–3154; fax number: (919) 541–0246; email address: *ward.hillary@epa.gov.*

SUPPLEMENTARY INFORMATION:

Acronyms and Abbreviations. The following acronyms and abbreviations are used in this document.

ACT Alternative compliance timeline
ANPRM Advanced Notice of Proposed Rulemaking
AR4 IPCC Fourth Assessment Report
ARB Air Resources Board
BMP Best management practice
CAA Clean Air Act
CBI Confidential business information
CFR Code of Federal Regulations
CO_2 Carbon dioxide

CO_2e Carbon dioxide equivalent
CRDS Cavity ringdown spectroscopy
DOC Degradable organic carbon
EPA Environmental Protection Agency
FTIR Fourier Transform Infrared
GCCS Gas collection and control system
GHG Greenhouse gas
GHGRP Greenhouse Gas Reporting Program
GWP Global warming potential
HAP Hazardous air pollutants
HOV Higher operating value
IPCC Intergovernmental Panel on Climate Change
IRIS Integrated Risk Information System
LFG Landfill gas
LMOP Landfill Methane Outreach Program
m^3 Cubic meters
Mg Megagram
Mg/yr Megagram per year
MSW Municipal solid waste
NAAQS National ambient air quality standards
NAICS North American Industry Classification System
NMOC Nonmethane organic compounds
NO_X Nitrogen oxides
NSPS New source performance standards
NTTAA National Technology Transfer and Advancement Act
OAQPS Office of Air Quality Planning and Standards
OMB Office of Management and Budget
$PM_{2.5}$ Fine particulate matter
ppm Parts per million
ppmv Parts per million by volume
PRA Paperwork Reduction Act
RCRA Resource Conservation and Recovery Act
RFA Regulatory Flexibility Act
RPM Radial plume mapping
SEM Surface emissions monitoring
SIP State implementation plan
TDL Tunable diode laser
Tg Teragram
TTN Technology Transfer Network
UMRA Unfunded Mandates Reform Act
VOC Volatile organic compounds

Organization of This Document. The following outline is provided to aid in locating information in this document.

I. General Information

A. Does this action apply to me?

This ANPRM addresses existing MSW landfills and associated solid waste management programs. Potentially affected categories and entities include those listed in Table 1 of this document.

TABLE 1—REGULATED ENTITIES

Category	NAICS [a]	Examples of affected facilities
Industry: Air and water resource and solid waste management	924110	Solid waste landfills.
Industry: Refuse systems—solid waste landfills	562212	Solid waste landfills.
State, local and tribal government agencies	924110	Administration of air and water resource and solid waste management programs.

[a] North American Industry Classification System.

This table is not intended to be exhaustive but rather provides a guide for readers regarding entities likely to be regulated. The EPA is specifically requesting input on MSW landfills subject to state plans or federal plan (40 CFR part 62, subpart GGG) that implement the emission guidelines at 40 CFR part 60, subpart Cc. The EPA will also take this information into account in determining if additional changes to the NSPS at 40 CFR part 60, subpart WWW are appropriate. If you have any questions regarding whether the EPA is seeking input regarding a particular MSW landfill, contact the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

B. What should I consider as I prepare my comments?

1. Submitting CBI

Clearly mark the part or all of the information that you claim to be CBI. For CBI information in a disk or CD ROM that you mail to the EPA, mark the outside of the disk or CD ROM as CBI and then identify electronically within the disk or CD ROM the specific information that is claimed as CBI. In addition to one complete version of the comment that includes information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket. Information marked as CBI will not be disclosed except in accordance with procedures set forth in 40 CFR part 2.

Do not submit information that you consider to be CBI or otherwise protected through *http://www.regulations.gov* or email. Send or deliver information identified as CBI to only the following address: Mr. Roberto Morales, OAQPS Document Control Officer (Room C404–02), U.S. EPA, Research Triangle Park, NC 27711, Attention Docket ID No. EPA–HQ–OAR–2014–0451.

If you have any questions about CBI or the procedures for claiming CBI, please consult the person identified in the **FOR FURTHER INFORMATION CONTACT** section.

Make sure to submit your comments by the comment period deadline identified in the preceding section titled **DATES**.

2. Docket

The docket number for the review of the municipal solid waste landfills emission guidelines is Docket ID No.

EPA–HQ–OAR–2014–0451. Docket ID Nos. EPA–HQ–OAR–2003–0215 and A–88–09 contain supporting information for 40 CFR part 60, subparts Cc and WWW.

C. Where can I get a copy of this document and other related information?

World Wide Web (WWW). In addition to being available in the docket, an electronic copy of this ANPRM is available on the Technology Transfer Network (TTN) Web site. Following signature, the EPA will post a copy of this document at *http://www.epa.gov/ttn/atw/landfill/landflpg.html*. The TTN provides information and technology exchange in various areas of air pollution control.

II. Background

A. Landfill Gas Emissions and Climate Change

In June 2013, President Obama issued a Climate Action Plan directing the EPA and other federal agencies to take a wide variety of significant steps to reduce methane emissions. The plan, which encompassed a wide range of actions and voluntary initiatives, recognized that methane emissions constitute a significant percentage of domestic greenhouse gas (GHG) emissions, highlighted reductions in methane emissions since 1990, and outlined specific actions that could be taken to achieve additional progress. Specifically, the federal agencies were instructed to focus on ''assessing current emissions data, addressing data gaps, identifying technologies and best practices for reducing emissions, and identifying existing authorities and incentive-based opportunities to reduce methane emissions.''

The focus on reducing methane emissions reflects the fact that methane is a potent GHG with a global warming potential (GWP) that is 25 times greater than that of CO_2.[1] Methane has an atmospheric life of 12 years, and because of its potency as a GHG and its atmospheric life, reducing methane emissions is one of the best ways to achieve a near-term beneficial impact in mitigating global climate change.

In response to the directive in the 2013 Climate Action Plan, the ''Climate Action Plan: Strategy to Reduce Methane Emissions'' (the Methane Strategy) was released in March 2014. The Methane Strategy noted that the landfill standards at issue here and voluntary programs already in place have considerably reduced methane emissions, while creating jobs and improving public health. With respect to landfills, the Methane Strategy directs the agency to build upon progress to date through updates to the EPA's rules for reducing emissions from new, modified, and reconstructed landfills; to issue an ANPRM to explore options to address emissions from existing landfills; and to encourage energy recovery from LFG through voluntary programs.

The EPA has long recognized the climate benefits associated with reducing methane emissions from landfills. In the 1991 Landfill NSPS Background Information Document,[2] the EPA noted that reduction of methane emissions from MSW landfills is one of the many options available to reduce global warming. When the EPA promulgated the NSPS for MSW landfills, which regulates MSW landfill emissions (landfill gas), in 1996, the EPA noted the climate co-benefit of controlling methane, which was not as well understood at the time as today (61 FR 9917, March 12, 1996). In 1996, the EPA stated:

> ''An ancillary benefit from regulating air emissions from MSW landfills is a reduction in the contribution of MSW landfill emissions to global emissions of methane. Methane is a major greenhouse gas, and is 20 to 30 times more potent than CO_2 on a molecule-per-molecule basis. There is a general concern within the scientific community that the increasing emissions of greenhouse gases could lead to climate change, although the rate and magnitude of these changes are uncertain.''

Since 1996, the EPA and the scientific community have gained a better understanding of GHGs, including methane, and their effects on climate change and human health and welfare. In 2009, the EPA Administrator issued the document known as the Endangerment Finding under CAA section 202(a)(1).[3] In the Endangerment Finding, which focused on public health and public welfare impacts within the United States, the Administrator found that elevated concentrations of GHGs[4] in the atmosphere may reasonably be anticipated to endanger the public health and welfare of current and future generations. In light of this finding, the EPA has been examining regulatory options for reducing GHG emissions.

The EPA is reviewing the MSW landfills emission guidelines and in light of the President's Climate Action Plan, the Methane Strategy, and improvements in the science related to GHG emissions, is exploring opportunities to achieve additional reductions in emissions, including methane emissions. The EPA intends to issue a proposed review of the emission guidelines by March 2015 and take final action on the proposal by March 2016.

Landfill gas is a collection of air pollutants, including methane and NMOC. Landfill gas is typically composed of roughly 50-percent methane, 50-percent CO_2, and less than 1 percent NMOC by volume. The NMOC portion of LFG, although a small amount by volume, can contain a variety of significant air pollutants. NMOC includes various organic hazardous air pollutants (HAP) and volatile organic compounds (VOC). When 40 CFR part 60, subparts Cc and WWW were promulgated in 1996, NMOC was selected as a surrogate for MSW landfill emissions because NMOC contains the landfill air pollutants that pose more concern due to their adverse health and welfare effects. Today, there is a greater emphasis on methane emissions because of their effects on climate change. Note that in 2012, landfills represented 18.1 percent of total U.S. methane emissions.[5] Methane represents 8.7 percent of all GHG emissions (in CO_2e) in the United States.[6] For these reasons, the EPA is considering changes to the emission guidelines that are based on reducing the methane and NMOC components of LFG. The EPA is seeking input on whether it should regulate methane directly.

B. What is the EPA's authority for reviewing the emission guidelines?

The EPA is not statutorily obligated to conduct a review of the emission guidelines, but has the discretionary authority to do so when circumstances

[1] IPCC Fourth Assessment Report (AR4), 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

[2] Air Emissions from Municipal Solid Waste Landfills-Background Information for Proposed Standards and Guidelines, U.S. EPA (EPA–450/3–90–011a) (NTIS PB 91–197061) page 2–15.

[3] Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 FR 66496 (December 15, 2009) (Endangerment Finding).

[4] Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

[5] Total U.S. methane emissions were just below 600 million Mg CO_2e in 2012. ''Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2012.'' Available at *http://www.epa.gov/climatechange/ghgemissions/gases/ch4.html*.

[6] U.S. EPA. 2012. ''Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2012. Executive Summary.'' Available at *http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2014-Chapter-Executive-Summary.pdf*.

indicate that this is appropriate. Based on changes in the landfills industry and changes in size, ownership, and age of landfills since the emission guidelines were promulgated in 1996, the EPA has concluded that it is appropriate to review the landfills emission guidelines at this time. As part of the data collection efforts for the statutorily mandated review of the MSW landfills NSPS, the EPA received, and has since compiled, new information on existing landfills. That information, together with the information being solicited through this ANPRM, will allow the EPA to conduct an assessment of the current practices, emissions and the potential for reductions in emissions. Any changes to the emission guidelines that might result from this review will ultimately apply to landfills that accepted waste on or after November 8, 1987 [7], and that commenced construction, reconstruction, or modification prior to publication of proposed revisions to the landfills NSPS, 40 CFR part 60, subpart XXX, as discussed in further detail in sections II.F and II.G of this document.

C. What is the purpose and scope of this action?

The purpose of this ANPRM is to request public input on methods to reduce emissions from existing MSW landfills and to request input on potential resolutions or clarifications regarding issues that have arisen during implementation of the existing standards.

D. Why are we reviewing the emission guidelines?

The EPA is considering changes to the emission guidelines for a number of reasons, including the following: (1) The opportunity to build on progress to date and achieve additional reductions of LFG and its components, consistent with the President's Methane Strategy, (2) changes in size, ownership, and age of landfills as reflected in new data, (3) new options for demonstrating compliance, and (4) the completion of efforts regarding implementation issues for which the EPA previously proposed resolution. The EPA is considering these topics in its review, as discussed in the following sections.

1. Opportunity To Achieve Additional Reductions From Existing Landfills

The EPA recognizes the opportunity to build on progress to date and achieve additional reductions of LFG and its components. A subset of existing landfills are controlled by either the landfill emission guidelines (40 CFR part 60, subpart Cc) or by the landfill NSPS (40 CFR part 60, subpart WWW). Controls installed as a result of these regulations have successfully reduced LFG emissions. Although methane emissions from landfills in 2012 are 30 percent lower than they were in 1990, methane emissions from landfills continue to be a concern. Despite these controls installed to date, in 2012, landfills emitted 102.8 teragrams (Tg) (or 102.8 million metric tons) CO_2e, making landfills the third largest source of human-related methane emissions in the United States. The number of existing landfills (≤1,800) is significantly higher than the number of new landfills (21) that are projected to open in the next 5 years. Therefore, if there are cost effective changes for existing landfills, revising these regulations may realize a great benefit given the number of existing landfills.

In this ANPRM, the EPA is exploring and requesting input on approaches that have the potential to achieve additional emission reductions from MSW landfills. Some of these approaches are adjustments to the current framework of the landfills regulations, others would complement the existing framework, and still others would be entirely outside the current framework. These approaches are presented in section IV of this document and include potential adjustments to the design capacity threshold; the NMOC emissions threshold; and the timing of installing, expanding and removing the gas collection and control system (GCCS). Approaches also include potential changes to emission threshold determinations, consideration of best management practices (BMPs), and new technologies that could improve collection and control of LFG emissions. The EPA will consider the input and data received on these approaches during the review of the landfills emission guidelines and determine whether it is appropriate to revise the emission guidelines to further reduce LFG emissions from existing landfills.

2. New Data Available Since Emission Guidelines Were Originally Promulgated in 1996

The EPA collected current data for the statutorily required review of the landfills NSPS, 40 CFR part 60, subpart WWW. Three sources were used for that effort: A landfill and LFG energy project database maintained by EPA's Landfill Methane Outreach Program (LMOP), a voluntary survey of landfills, and the Greenhouse Gas Reporting Program (GHGRP). The creation of the landfill dataset, including identification of the sources of the information contained therein, is detailed in the docketed memorandum, ''Summary of Landfill Dataset Used in the Cost and Emission Reduction Analysis of Landfills Regulations. 2014.'' The EPA used the dataset, which included landfill-specific data such as landfill open and closure year, landfill design capacity, landfill design area and landfill depth, to examine the effects of potential changes to the size and emission thresholds for installing controls. The dataset also provides information on landfill practices such as liquids recirculation, waste composition, presence and type of GCCS and energy recovery projects. The availability of new data on MSW landfills is discussed in section II.D.2 of this document.

3. New Options for Demonstrating Compliance

The EPA is considering and requesting input on potential options for demonstrating compliance. For example, the EPA is considering alternative wellhead monitoring requirements that could include exclusion or reduced frequency of temperature, oxygen/nitrogen monitoring requirements and whether such adjustments should be limited only to landfills that beneficially use LFG or should be available to all landfills, including small entities. The EPA is considering and requesting public input on potential approaches to surface emission monitoring. Approaches include changing the walking pattern that traverses the landfill, adding an integrated methane concentration measurement and allowing sampling only when wind is below a certain speed. These new options for demonstrating compliance are discussed in section IV.D of this document. The EPA will consider the input and data received on these approaches during the review of the landfills emission guidelines with the intent of further reducing LFG emissions from existing landfills.

4. Concerns Arising From Implementation of Subparts Cc and WWW That the EPA Plans To Address in a Forthcoming Proposal

The landfill emission guidelines were originally promulgated in 1996. Over time, the EPA has become aware of a

[7] This date in 1987 is the date on which permit programs were established under the Hazardous and Solid Waste Amendments of RCRA. This date was also selected as the regulatory cutoff in the EG for landfills no longer receiving wastes because EPA judged States would be able to identify active facilities as of this date.

number of implementation issues associated with the regulatory requirements and for which landfill owners and operators, as well as regulators, need clarification. The EPA proposed amendments to the landfills NSPS and emission guidelines (40 CFR part 60, subpart WWW and 40 CFR part 60, subpart Cc) on May 23, 2002 (67 FR 36475), and September 8, 2006 (71 FR 53271). Those amendments were never finalized. The EPA is not taking final action on either the May 23, 2002, or the September 8, 2006, proposed rules through this ANPRM, but we are soliciting input on the unresolved implementation issues. These issues include but are not limited to: LFG treatment, accounting for emissions from closed areas of landfills, surface monitoring, and corrective action timelines. Note that the EPA addressed some of these implementation issues as they apply to new MSW landfills in the **Federal Register** document that proposes a new subpart resulting from the EPA's review of the landfills NSPS. The EPA plans to address amendments and clarifications resulting from implementation activities as they apply to subparts Cc and WWW in forthcoming amendments to these subparts. See section IV.G of this document for details.

E. What is the statutory authority for landfill emission guidelines?

Clean Air Act (CAA) section 111, which Congress enacted as part of the 1970 CAA Amendments, establishes mechanisms for controlling emissions of air pollutants from stationary sources. This provision requires the EPA to promulgate a list of categories of stationary sources that the Administrator, in his or her judgment, finds ''causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare.'' [8] The EPA has listed more than 60 stationary source categories under this provision, including municipal solid waste landfills.[9] Once EPA lists a source category, the EPA must, under CAA section 111(b)(1)(B), establish ''standards of performance'' for emissions of air pollutants from new sources in the source categories.[10] These standards are known as new source performance standards or NSPS, and they are national requirements that apply directly to the sources subject to them.

When the EPA establishes NSPS for new sources in a particular source category, the EPA is also required, under CAA section 111(d)(1), to prescribe regulations for states to submit plans regulating existing sources in that source category for any air pollutant that, in general, is not regulated under the CAA section 109 requirements for the National Ambient Air Quality Standards (NAAQS) or regulated under the CAA section 112 requirements for HAP. CAA section 111(d)'s mechanism for regulating existing sources differs from the one that CAA section 111(b) provides for new sources because CAA section 111(d) is implemented through state plans that establish ''standards of performance'' for the affected sources and that contain other measures to implement and enforce those standards.

''Standards of performance'' are defined under CAA section 111(a)(1) as standards for emissions that reflect the emission limitation achievable from the ''best system of emission reduction,'' considering costs and other factors, that ''the Administrator determines has been adequately demonstrated.'' CAA section 111(d)(1) grants states the authority, in applying a standard of performance to particular sources, to take into account the source's remaining useful life or other factors.

Under CAA section 111(d), a state must submit its plan to the EPA for approval, and the EPA must approve the state plan if it is ''satisfactory.'' [11] If a state does not submit a plan, or if the EPA does not approve a state's plan, then the EPA must establish a plan for that state.[12] Once a state receives the EPA's approval for its plan, the provisions in the plan become federally enforceable against the entity responsible for noncompliance, in the same manner as the provisions of an approved State Implementation Plan (SIP) under CAA section 110.

The EPA issued regulations implementing CAA section 111(d) in 1975.[13] These implementing regulations provide that, in promulgating requirements for sources under CAA section 111(d), the EPA first develops regulations known as ''emission guidelines,'' which establish binding requirements that states must address when they develop their plans.[14] The implementing regulations also establish timetables for state and EPA action: States must submit state plans within 9 months of the EPA's issuance of the guidelines,[15] and the EPA must take final action on the state plans within 4 months of the due date for those plans,[16] although the EPA has authority to extend those deadlines.[17]

Over the last 40 years, under CAA section 111(d), the agency has regulated four pollutants from five source categories (i.e., sulfuric acid plants (acid mist), phosphate fertilizer plants (fluorides), primary aluminum plants (fluorides), Kraft pulp plants (total reduced sulfur), and municipal solid waste landfills (LFG)).[18]

F. What are the landfill emission guidelines and what sources would be affected by a review of the emission guidelines?

The Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills (emission guidelines) are codified at 40 CFR part 60, subpart Cc. The emission guidelines cross reference many provisions in the Standards of Performance for Municipal Solid Waste Landfills (landfills NSPS) (40 CFR part 60, subpart WWW), including control requirements, operational standards, monitoring provisions, and reporting and recordkeeping requirements. As a result, many of the proposed changes to the standards of performance for new, reconstructed, and modified MSW landfills could affect subpart Cc. A detailed summary of the current emission guideline requirements appears in section IV.B.1 of this document.

CAA section 111(d) calls for a partnership between the EPA and states, as described above. To recap, the EPA establishes source-category-specific emission guidelines that specify the minimum requirements for an approvable state plan, including the requisite level of emission reductions that must be achieved. Each state must

[8] CAA section 111(b)(1)(A).

[9] See 40 CFR part 60, subparts Cb through OOOO.

[10] CAA section 111(b)(1)(B), 111(a)(1).

[11] CAA section 111(d)(2)(A).

[12] CAA section 111(d)(2)(A).

[13] ''State Plans for the Control of Certain Pollutants From Existing Facilities,'' 40 FR 53340 (November 17, 1975).

[14] 40 CFR 60.22. In the 1975 rulemaking, the EPA explained that it used the term ''emissions guidelines''—instead of emissions limitations—to make clear that guidelines would not be binding requirements applicable to the sources, but instead are ''criteria for judging the adequacy of State plans.'' 40 FR 53343.

[15] 40 CFR 60.23(a)(1).

[16] 40 CFR 60.27(b).

[17] See 40 CFR 60.27(a).

[18] See ''Phosphate Fertilizer Plants; Final Guideline Document Availability,'' 42 FR 12022 (March 1, 1977); ''Standards of Performance for New Stationary Sources; Emission Guideline for Sulfuric Acid Mist,'' 42 FR 55796 (October 18, 1977); ''Kraft Pulp Mills, Notice of Availability of Final Guideline Document,'' 44 FR 29828 (May 22, 1979); ''Primary Aluminum Plants; Availability of Final Guideline Document,'' 45 FR 26294 (April 17, 1980); ''Standards of Performance for New Stationary Sources and Guidelines for Control of Existing Sources: Municipal Solid Waste Landfills, Final Rule,'' 61 FR 9905 (March 12, 1996).

develop a state plan establishing standards of performance for the affected sources in the state based on the requirements of the emission guidelines. The state must submit its state plan to the EPA for approval. The EPA reviews the state plan to ensure that it meets the minimum requirements of the emission guidelines, and approves the plan if it does. If the state does not submit a state plan, or the state plan is disapproved, the EPA would have the authority to promulgate a federal plan under CAA section 111(d)(2)(A). MSW landfills constructed, modified or reconstructed prior to proposal of the revised landfills NSPS, 40 CFR part 60, subpart XXX that have accepted waste since November 8, 1987 would be considered ''existing'' and would be affected by any changes to the emission guidelines resulting from this review. States with designated facilities would be required to develop (or revise) and submit a state plan to the EPA within 9 months of promulgation of any revisions to the emission guidelines unless the EPA specifies a longer time frame. Any revisions to an existing state plan and any newly adopted state plan must be established following the requirements of 40 CFR part 60, subpart B. Those requirements include making the state plan publically available and providing opportunity for public discussion. Once the EPA receives a complete state plan or plan revision and completes its review of that plan or plan revision, the EPA will propose the plan or plan revision for approval or disapproval and must take final action to approve or disapprove the plan or plan revision no later than 4 months after the date the plan or plan revision was required to be submitted. The EPA will publish state plan approvals or disapprovals in the **Federal Register** and will include an explanation of its decision. The EPA will also revise the existing federal plan (40 CFR part 62, subpart GGG) to incorporate any changes and other requirements that the EPA promulgates as a result of its review of the emission guidelines. The revised federal plan will apply in states which have not received approval of any necessary revised state plan until such time as the revised state plan is approved.

G. How would changes in applicability affect sources currently subject to subpart WWW?

If the EPA were to revise the landfills emission guidelines to increase their stringency, then a landfill currently subject to 40 CFR part 60, subpart WWW would need to comply with the more stringent requirements in the revised state plan or federal plan implementing the revised emission guidelines (40 CFR part 60, subpart Cc) as such sources would be existing sources with respect to the revised NSPS.[19] States would have to update their inventory of existing landfills to include these landfills. Note that all MSW landfills that are subject to subpart WWW would continue to comply with the requirements found in subpart WWW unless and until they are covered by a more stringent state or federal plan implementing the amended emission guidelines.

III. Why is the EPA concerned about air quality effects from MSW landfills?

The EPA is concerned about LFG emissions because of the public health and welfare effects that result from these emissions. Landfill gas generated from established waste (waste that has been in place for at least a year) is typically composed of roughly 50-percent methane and 50-percent CO_2 by volume, with less than 1 percent NMOC. In promulgating the emission guidelines in 1996, the EPA's concerns regarding the adverse effects of emissions of LFG on human health and welfare were focused primarily on the NMOC portion of LFG. The NMOC portion of LFG can contain a variety of air pollutants, including VOCs and various organic HAP, all of which have various health effects, as discussed in section III.D of this document. In light of the Methane Strategy, the EPA is considering changes to the emission guidelines that are based on reducing emissions of the methane and NMOC components of LFG. Once emitted into the atmosphere, methane contributes to warming of the atmosphere, which over time leads to increased air and ocean temperatures, changes in precipitation patterns, and sea level rise, among other impacts, as discussed in section III.D of this document.

A. Background on the MSW Landfill Sector

Section 111 of the CAA requires the EPA Administrator to list categories of stationary sources that in the Administrator's judgment cause or contribute significantly to air pollution that may reasonably be anticipated to endanger public health or welfare (42 U.S.C. 7411(b)(1)(A)). On March 12, 1996 (61 FR 9905), under the authority of CAA section 111(b)(1)(A), the EPA added the MSW landfills source category to the priority list in 40 CFR 60.16 because, in the judgment of the Administrator, the source category contributes significantly to air pollution that may reasonably be anticipated to endanger public health and welfare. In that same document, the EPA promulgated the NSPS, which apply to new (including modified and reconstructed) landfills under the authority of CAA section 111(b)(1)(B), and emission guidelines, which apply to existing landfills, under the authority of CAA section 111(d).

The EPA also defined the MSW landfills source category, identified municipal solid waste landfill emissions (commonly referred to as LFG) as the pollutant for which standards should be developed, and determined the applicability thresholds and emission level of the standards.

1. Definition

An MSW landfill is defined in the landfills regulations as: ''An entire disposal facility in a contiguous geographical space where household waste is placed in or on land. An MSW landfill may also receive other types of Resource Conservation and Recovery Act (RCRA) subtitle D wastes such as commercial solid waste, nonhazardous sludge, conditionally exempt small quantity generator waste, and industrial solid waste. Portions of an MSW landfill may be separated by access roads. An MSW landfill may be publicly or privately owned. An MSW landfill may be a new MSW landfill, an existing MSW landfill or a lateral expansion'' (40 CFR 60.32c and 60.751).

Household waste is the primary component of MSW, accounting for 55 to 65 percent of total MSW generated, followed by the commercial and institutional sectors.[20] Household waste includes solid waste from single- and multiple-family homes, hotels and motels, ranger stations, crew quarters, campgrounds, picnic grounds and day-use recreation areas.

2. Characterization of Existing Landfills

Many changes have occurred in the landfill industry since the landfill emission guidelines were originally promulgated in 1996. Among the changes are changes in landfill characteristics and population (i.e., size, ownership, age); proliferation of LFG energy projects; and the introduction of

[19] As discussed above, the emission guidelines currently rely on subpart WWW for their substantive requirements. As a result, any increase in the stringency of the emission guidelines would necessarily make them more stringent than the existing requirements in subpart WWW.

[20] U.S. Environmental Protection Agency. 2011. Municipal Solid Waste Generation, Recycling, and Disposal in the United States Tables and Figures for 2010. EPA–530–F–11–005. Washington, DC: U.S. EPA.

new techniques for collecting, reducing, and monitoring LFG emissions.

Size, Ownership, Age. The number and size distribution of MSW landfills in the United States has changed over the last 25 years, with a trend toward fewer active, but larger, landfills. Since 1988, the number of active MSW landfills in the United States has decreased by approximately 75 percent (from approximately 7,900 in 1988 to approximately 1,900 in 2009).[21 22] During this time, the overall disposal capacity has remained fairly constant, indicating a trend towards fewer, but larger landfills.[23]

The data also show a trend away from public ownership. The share of sites that are publicly owned has decreased from 83 percent in 1984 to 64 percent in 2004.[24 25] Instead, large, private companies have used economy of scale for cost expenditures and own multiple sites, many of which have large capacities. To offset the cost of constructing and maintaining landfills, facility owners construct large facilities that attract high volumes of waste from a large geographic area. By maintaining a high volume of incoming waste, landfill owners have the ability to keep tipping fees relatively low, which subsequently attracts more business.[26]

LFG Energy Projects. The number of LFG energy projects has also increased substantially over the last two decades. In 1996, there were approximately 160 operational LFG energy projects and approximately 700 candidate landfills according to data obtained by the EPA LMOP. According to LMOP, as of March 2014, there are 636 operational LFG energy projects and 450 landfills that remain candidates for energy recovery. LMOP is a voluntary assistance program that helps to reduce methane emissions from landfills by encouraging recovery and beneficial use of LFG.

Availability of More Comprehensive Data. In 2010, the EPA GHGRP began collecting information from existing MSW landfills that accepted waste on or after January 1, 1980 and generate methane in amounts equivalent to 25,000 metric tons of carbon dioxide equivalent (CO_2e) or more per year. According to data collected through the GHGRP, approximately 1,200 landfills generated methane in amounts equivalent to 25,000 metric tons of CO_2e or more per year, using a GWP of 25. (CO_2e is an expression of methane in terms of the carbon dioxide equivalents, given the methane GWP of 25.[27]) 25,000 metric tons of CO_2e is equal to about 6.5 megagrams (Mg) NMOC and 1,000 Mg methane per year.[28] (A megagram is also known as a metric ton, which is equal to 1.1 U.S. short tons or about 2,205 pounds.) Reporting includes data elements such as annual modeled methane generation and methane emissions from the landfill, as well as annual methane destruction (for landfills with GCCSs). Beginning with reporting year 2013, the GHGRP data includes additional data elements for which reporting was previously deferred, such as landfill open and closure dates, waste acceptance rates, flow of LFG for destruction, methane concentration and gas collection efficiency; this data will be used to refine the analyses discussed in ''Methodology for Estimating Cost and Emission Impacts of MSW Landfill Regulations. 2014'' and ''Summary of Landfill Dataset Used in the Cost and Emission Reduction Analysis of Landfill Regulations. 2014,'' both of which are available in the docket. The EPA plans to incorporate this new information into the proposal for the emission guidelines review. LMOP has collected information on landfills since the program's inception in 1996 and maintains a database of over 2,000 existing landfills and LFG energy projects. The database includes landfill information provided to LMOP and from publically available sources, including the GHGRP dataset. In addition, the EPA conducted a voluntary landfill survey in 2010 and received information from 167 landfills.

A dataset of approximately 2,400 landfills resulted from the three sources listed above: The GHGRP, the LMOP database and voluntary survey of landfills. Of these 2,400 landfills, approximately 1,800 have sufficient data to use in the preliminary cost and reduction analysis as the EPA begins its review of the emission guidelines. The creation of the landfill dataset is detailed in the docketed memorandum, ''Summary of Landfill Dataset Used in the Cost and Emission Reduction Analysis of Landfills Regulations 2014.'' Based on this dataset, several observations can be made.

Location and Size. The 1,800 landfills are located in all 50 states and two territories and range widely in size from 189 Mg to 129 million Mg of waste-in-place as of 2014. Approximately half of the landfills have a design capacity of at least 2.5 million Mg.

Active vs. Closed. Approximately half of the existing landfills are still accepting waste as of 2014. Approximately 40 percent of the landfills stopped accepting waste prior to 2005. Among landfills that have a design capacity of at least 2.5 million Mg, only 16 percent of the landfills stopped accepting waste prior to 2005.

Leachate Recirculation. Leachate recirculation is used at many landfills to manage on-site leachate. Concurrently, this operational practice accelerates waste decomposition and gas generation rates at the landfills. Under 40 CFR part 98, subpart HH of the GHGRP, landfills must report whether or not they employ leachate recirculation and if so, the frequency of that recirculation. Based on GHGRP data from the 2012 reporting year, over 300 landfills accepting waste after 1987 indicated that leachate recirculation was used. Of those, over 200 landfills indicated the leachate was recirculated several times per year over the past 10 years of operation.

Other Liquids Addition. Since 2004, 14 states have received program approval to issue permits to MSW landfills to add liquids other than leachate under the Research Development and Demonstration provisions of 40 CFR 258.4. This operational practice also accelerates waste decomposition and gas generation rates at the landfills.

Other Trends. The estimated annual quantity of waste placed in MSW landfills increased 26 percent from approximately 205 Tg in 1990 to 284 Tg in 2012.[29] The annual amount of waste generated and subsequently disposed in MSW landfills varies annually and depends on several factors (e.g., the economy, consumer patterns, recycling

[21] U.S. Environmental Protection Agency. 2010. ''Municipal Solid Waste in the United States: 2009 Facts and Figures.''

[22] O'Brien, Jeremy K. 2006. ''Contracting out: Adapting local integrated waste management to regional private landfill ownership.'' Waste Management World.

[23] Solid Waste Association of North America (SWANA). 2007. ''The Regional Privately-Owned Landfill Trend and Its Impact on Integrated Solid Waste Management Systems.'' February 2007.

[24] U.S. Environmental Protection Agency. 2010. ''Municipal Solid Waste in the United States: 2009 Facts and Figures.''

[25] O'Brien, Jeremy K. 2006. ''Contracting out: Adapting local integrated waste management to regional private landfill ownership.'' Waste Management World.

[26] U.S. Environmental Protection Agency. 2002. Solid Waste and Emergency Response. ''Waste Transfer Stations: A Manual for Decision-Making.''

[27] IPCC Fourth Assessment Report (AR4), 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

[28] Calculated using the AP–42 default factor of 595 ppmv and 50 percent methane. U.S. EPA, AP–42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. 1995.

[29] U.S. EPA. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2012. April 2014. See Annex 3.14, Table A–261. *http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html.*

and composting programs, inclusion in a waste collection service and the availability of other alternative options for disposal and their price); but the total amount of MSW generated is expected to continue to increase as the U.S. population continues to grow. The composition of materials disposed of in MSW landfills has also changed significantly since 1990. See section IV.C.3 of this document for additional details on waste composition trends.

B. What emissions are associated with existing MSW landfills?

The EPA estimates that the potential uncontrolled emissions from the approximately 1,800 landfills in its regulatory analysis dataset (as explained in section II.D.2 of this document) are approximately 66,400 Mg NMOC and 10 million Mg methane (258 million Mg CO_2e) in 2014.

Looking beyond the modeled dataset, the 2012 Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2012 shows a growth in uncontrolled emissions from MSW landfills, from 172.6 Tg CO_2e in 1990 to 280.0 Tg CO_2e in 2012.[30] If controls are considered, emissions from landfills have decreased from 147.8 Tg CO_2e in 1990 to 102.8 CO_2e in 2012 from both regulatory and voluntary programs.[31]

C. What emission reductions are currently being achieved from MSW landfills?

1. Emission Reductions Due to Subparts Cc and WWW

To estimate the emission reductions, the EPA applied the current design capacity and NMOC emission rate thresholds in the MSW landfills regulations, and the time allowed for installing, expanding and removing the GCCS to the modeled emission estimates discussed in section IV.B of this document.

Table 2 of this document summarizes the reductions currently being achieved at existing landfills in 2014 as a result of 40 CFR part 60, subpart WWW and the federal and state plans implementing the emission guidelines. This table reflects the current baseline level of control at existing landfills: Landfills greater than or equal to 2.5 million Mg and 2.5 million cubic meters (m^3) must install a GCCS when NMOC emissions reach or exceed 50 megagrams per year (Mg/yr). The table includes emission reductions for NMOC and methane.

TABLE 2—BASELINE EMISSION REDUCTIONS IN 2014 AT EXISTING LANDFILLS

Option	Number of landfills affected	Number of landfills controlling	Number of landfills reporting but not controlling	Annual NMOC reductions (Mg/yr)	Annual methane reductions (million Mg/yr)	Annual methane reductions (million Mg CO_2e/yr)
Baseline	954	559	395	49,600	7.7	193

The emission guidelines in the baseline are estimated to require control at 559 of the 954 affected landfills in 2014 and achieve reductions of 49,600 Mg/yr NMOC and 7.7 million Mg/yr methane (193 million Mg/yr CO_2e). In the baseline we estimate that 30 percent (559/1,832) of these existing landfills will operate emission controls in 2014 (1,832 is the number of landfills in the landfills dataset that had sufficient data to use in the preliminary cost and reduction analysis).

2. Other Programs Achieving Emission Reductions From Existing MSW Landfills

Landfill owners and operators collect LFG for a variety of reasons: To control odor, to minimize fire and explosion hazards, to recover LFG to be used for energy recovery, to sell carbon credits, and to comply with local, state, or federal air quality standards. This section of this document discusses several non-EPA programs of which the EPA is aware. These reductions complement the reductions achieved by the current NSPS and emission guidelines framework.

i. State and Local Ordinances

The EPA is aware that some state or local ordinances require LFG combustion for odor or safety reasons. The number of landfills controlling under local ordinances is unknown. In addition, the state of California recently established methane regulations[32] to require a GCCS to be installed at all landfills accepting waste after January 1, 1977, having at least 450,000 tons of waste-in-place, and having a gas heat input capacity threshold of 3.0 MMBtu/hr or greater.

ii. Market-Based Mechanisms

LMOP maintains a voluntary national database of landfills and LFG energy projects, including information on which landfills have a GCCS in place. The EPA compared the list of landfills that are modeled to have installed a GCCS in 2014 in the NSPS/emission guidelines dataset to the list of landfills that are reported to have a GCCS installed in the LMOP database. While the NSPS/emission guidelines dataset estimates that approximately 550 landfills have installed controls to meet the requirements of the NSPS or an approved state plan or federal plan implementing the emission guidelines, the LMOP database shows approximately 500 additional landfills as having installed controls, resulting in over 1,000 landfills estimated to have a GCCS installed.[33] Approximately half of these 500 landfills exceed the design capacity of 2.5 million Mg and 2.5 million m^3, but as of 2014, are not modeled to exceed the NMOC emission threshold that dictates when a GCCS must be installed. Many of these systems may have been installed to recover energy and generate revenue through the sale of electricity or LFG. The LMOP database estimates that almost 200 of the 500 landfills with voluntary systems have an energy recovery component. Among landfills with larger design capacities, approximately 120 of the 260 landfills with a voluntary GCCS have an energy recovery component. Some landfills with voluntary systems may also receive revenues as a result of the creation of carbon credits. Data from the Climate Action Reserve indicates that more than 100 LFG capture projects in 36 states

[30] Ibid, Table 8–3.

[31] Ibid, Table 8–1.

[32] California Code of Regulations, title 17, subchapter 10, article 4, subarticle 6, sections 95460 to 95476, Methane Emissions from Municipal Solid Waste Landfills.

[33] See Sections II.D.2 and III.C of this document for a detailed discussion of the modeling database and estimated reductions under the current federal regulatory framework.

have been issued credits known as Climate Reserve Tonnes (CRTs).[34]

D. What are the health and welfare effects of LFG emissions?

1. Health Impacts of VOC and Various Organic HAP

The pollutant regulated under the landfills NSPS is ''MSW landfill emissions.'' Municipal solid waste landfill emissions, also commonly referred to as LFG, are a collection of air pollutants, including methane and NMOC, some of which are toxic. LFG generated from established waste (waste that has been in place for at least a year) is typically composed of roughly 50-percent methane and 50-percent CO_2 by volume, with less than 1 percent NMOC. The NMOC portion of LFG can contain a variety of air pollutants, including VOC and various organic HAP. VOC emissions are precursors to both fine particulate matter ($PM_{2.5}$) and ozone formation. Exposure to $PM_{2.5}$ and ozone is associated with significant public health effects.[35] [36] $PM_{2.5}$ is associated with health effects including premature mortality for adults and infants, cardiovascular morbidity such as heart attacks and respiratory morbidity such as asthma attacks, acute and chronic bronchitis, hospital admissions and emergency room visits, work loss days, restricted activity days and respiratory symptoms, as well as visibility impairment.[37] Ozone is associated with health effects including premature mortality, lung damage, asthma aggravation and other respiratory symptoms, hospital and emergency department visits, and school loss days, as well as injury to vegetation and climate effects.[38] Nearly 30 organic HAP have been identified in uncontrolled LFG, including benzene, toluene, ethyl benzene and vinyl chloride.[39]

2. Climate Impacts of Methane Emissions

In addition to the improvements in air quality and resulting benefits to human health and non-climate welfare effects discussed above, reducing emissions from landfills is expected to result in climate co-benefits due to reductions of the methane component of LFG. Methane is a potent GHG with a GWP 25 times greater than CO_2, which accounts for methane's stronger absorption of infrared radiation per ton in the atmosphere but also its shorter lifetime (on the order of a decade compared to centuries or millennia for carbon dioxide).[40] According to the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report, methane is the second leading long-lived climate forcer after CO_2 globally.[41]

As discussed in detail in the 2009 Endangerment Finding, climate change caused by human emissions of GHGs threatens public health in multiple ways. By raising average temperatures, climate change increases the likelihood of heat waves, which are associated with increased deaths and illnesses. While climate change also increases the likelihood of reductions in cold-related mortality, evidence indicates that the increases in heat mortality will be larger than the decreases in cold mortality in the United States. Compared to a future without climate change, climate change is expected to increase ozone pollution over broad areas of the U.S., including in the largest metropolitan areas with the worst ozone problems, and thereby increase the risk of morbidity and mortality. Other public health threats also stem from projected increases in intensity or frequency of extreme weather associated with climate change, such as increased hurricane intensity, increased frequency of intense storms, and heavy precipitation. Increased coastal storms and storm surges due to rising sea levels are expected to cause increased drownings and other health impacts. Children, the elderly, and the poor are among the most vulnerable to these climate-related health effects.

As documented in the 2009 Endangerment Finding, climate change caused by human emissions of GHGs also threatens public welfare in multiple ways. Climate changes are expected to place large areas of the country at serious risk of reduced water supplies, increased water pollution, and increased occurrence of extreme events such as floods and droughts. Coastal areas are expected to face increased risks from storm and flooding damage to property, as well as adverse impacts from rising sea level, such as land loss due to inundation, erosion, wetland submergence and habitat loss. Climate change is expected to result in an increase in peak electricity demand, and extreme weather from climate change threatens energy, transportation, and water resource infrastructure. Climate change may exacerbate ongoing environmental pressures in certain settlements, particularly in Alaskan indigenous communities. Climate change also is very likely to fundamentally rearrange U.S. ecosystems over the 21st century. Though some benefits may balance adverse effects on agriculture and forestry in the next few decades, the body of evidence points towards increasing risks of net adverse impacts on U.S. food production, agriculture and forest productivity as temperature continues to rise. These impacts are global and may exacerbate problems outside the U.S. that raise humanitarian, trade, and national security issues for the U.S.

Methane is also a precursor to ground-level ozone, a health-harmful air pollutant. Additionally, ozone is a short-lived climate forcer that contributes to global warming. In remote areas, methane is a dominant precursor to tropospheric ozone formation.[42] Approximately 50 percent of the global

[34] Climate Action Reserve. Issued List of CRTs as of April 17, 2014. *https://thereserve2.apx.com/myModule/rpt/myrpt.asp?r=112.*

[35] U.S. EPA. 2009. ''Integrated Science Assessment for Particulate Matter (Final Report).'' EPA–600–R–08–139F. National Center for Environmental Assessment—RTP Division. Available at *http://www.epa.gov/ncea/isa/.*

[36] U.S. EPA. 2013. ''Integrated Science Assessment for Ozone and Related Photochemical Oxidents (Final Report).'' EPA–600–R–10–076F. National Center for Environmental Assessment—RTP Division. Available at *http://www.epa.gov/ncea/isa/.*

[37] U.S. EPA. 2009. ''Integrated Science Assessment for Particulate Matter (Final Report).'' EPA–600–R–08–139F. National Center for Environmental Assessment—RTP Division. Available at *http://www.epa.gov/ncea/isa/.*

[38] U.S. EPA. 2013. ''Integrated Science Assessment for Ozone and Related Photochemical Oxidents (Final Report).'' EPA–600–R–10–076F. National Center for Environmental Assessment—RTP Division. Available at *http://www.epa.gov/ncea/isa/.*

[39] U.S. EPA. 1998. Office of Air and Radiation, Office of Air Quality Planning and Standards. ''Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I: Stationary Point and Area Sources, Chapter 2: Solid Waste Disposal, Section 2.4: Municipal Solid Waste Landfills''. Available at: *http://www.epa.gov/ttn/chief/ap42/ch02/final/c02s04.pdf.*

[40] IPCC Fourth Assessment Report (AR4), 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

[41] Stocker, T.F., D. Qin, G.K. Plattner, L.V. Alexander, S.K. Allen, N.L. Bindoff, F.M. Bréon, J.A. Church, U. Cubasch, S. Emori, P. Forster, P. Friedlingstein, N. Gillett, J.M. Gregory, D.L. Hartmann, E. Jansen, B. Kirtman, R. Knutti, K. Krishna Kumar, P. Lemke, J. Marotzke, V. Masson-Delmotte, G.A. Meehl, I.I. Mokhov, S. Piao, V. Ramaswamy, D.Randall, M. Rhein, M. Rojas, C. Sabine, D. Shindell, L.D. Talley, D.G. Vaughan and S.P. Xie. 2013: ''Technical Summary. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change'' [Stocker, T.F., D. Qin, G.K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[42] U.S. EPA. 2013. ''Integrated Science Assessment for Ozone and Related Photochemical Oxidents (Final Report).'' EPA–600–R–10–076F. National Center for Environmental Assessment—

annual mean ozone increase since preindustrial times is believed to be due to anthropogenic methane.[43] Projections of future emissions also indicate that methane is likely to be a key contributor to ozone concentrations in the future.[44] Unlike NO_X and VOC, which affect ozone concentrations regionally and at hourly time scales, methane emissions affect ozone concentrations globally and on decadal time scales given methane's relatively long atmospheric lifetime compared to these other ozone precursors.[45] Reducing methane emissions, therefore, may contribute to efforts to reduce global background ozone concentrations that contribute to the incidence of ozone-related health effects.[46 47] These benefits are global and occur in both urban and rural areas.

IV. Topics for Which the EPA Is Seeking Input

The EPA is considering several alternative approaches for achieving additional LFG emission reductions from existing MSW landfills. The EPA requests data and input regarding each of these approaches, or other alternative frameworks that should be considered for existing landfills. The EPA is specifically interested in input related to new technologies and data on costs and emission reductions for each of these technologies or practices. The EPA is also interested in ideas regarding how these alternatives may be incorporated into a regulatory framework for existing landfills. Sections IV.A through IV.F of this document describe and request input on alternative approaches for achieving additional LFG reductions from existing landfills.

Since the landfills regulations were implemented in 1996, the EPA has become aware of implementation issues for which landfill owners and operators, as well as regulators, need clarification. In this document, the EPA is also soliciting input on the implementation issues. Section IV.G of this document describes and requests input on these implementation issues.

A. Taking Reductions in Methane Emissions Into Account in Reviewing the Emission Guidelines

In light of the Methane Strategy discussed in section II of this document, the EPA is seeking input on the extent to which methane should be addressed under the revised emissions guidelines. The EPA is also requesting input on potential implementation issues associated with any adjustments that could be made to the current rule framework or any alternative regulatory frameworks that may achieve a larger fraction of methane emission reductions from existing landfills than the current performance-based standard of a well-designed and well-operated GCCS.

B. Potential Changes to Regulatory Framework for Existing Sources

The EPA is considering potential changes within the current regulatory framework of the landfills regulations for existing sources that would achieve further emission reductions. This section outlines the current framework and identifies potential adjustments to that framework. The EPA is requesting input on these potential adjustments, the degree of emission reductions that could be achieved, corresponding cost and implementation.

1. Current Framework

The landfills regulations in 40 CFR part 60, subparts Cc and WWW require an MSW landfill with a design capacity of 2.5 million Mg and 2.5 million m^3 or greater to install a GCCS once the emissions from the landfill meet or exceed 50 Mg NMOC per year. The landfill has 30 months to install and begin operating the GCCS. This 30-month ''initial lag time'' is the time period between when the landfill exceeds the NMOC emission rate threshold and when controls are required to be installed and started up. A landfill must expand the GCCS as more waste is added to the landfill. This ''expansion lag time'' is the amount of time allotted for the landfill to expand the GCCS into new areas of the landfill (5 years for active areas and 2 years for areas that are closed or at final grade). When promulgated in 1996, the best system of emission reduction for MSW landfills was determined to be a well-designed and well-operated landfill GCCS with a control device capable of reducing NMOC by 98 percent by weight. Enclosed combustion devices have the option of either reducing NMOC by 98 percent by weight or reducing NMOC emissions to 20 parts per million, dry volume. NMOC was established as a surrogate for LFG in the final rule.

Without any changes to the framework of the rule, over 950 landfills are affected, and 691 are required to install controls on or before 2023. These current requirements are estimated to result in NMOC emission reductions of 55,000 Mg/yr and methane emission reductions of 8.5 million Mg/yr (213 million Mg/yr CO_2e), on average over the next 10-year period (2014–2023). These reductions are expected to be achieved at an average cost effectiveness of approximately $7,200 per Mg NMOC or $46 per Mg methane ($1.8 per Mg CO_2e). Additional information about these estimates can be found in the docketed memo Preliminary Cost and Emissions Impacts Analysis for Review of the MSW Landfills Emission Guidelines 2014.

Within the current framework of 40 CFR part 60, subparts Cc and WWW, several parameters could be adjusted to potentially achieve additional emission reductions. Those parameters are the design capacity, the NMOC emissions threshold, and the timing of installing and expanding the GCCS. The EPA conducted a preliminary analysis as described below to estimate the emissions and cost implications of adjusting rule parameters. Modeling options that varied these parameters showed the following general incremental results as compared to the current regulatory framework over the next 10-year period (2014–2023). These preliminary cost-effectiveness values presented later in this section IV.B include the costs to install and operate GCCS as well as any revenue from energy recovery as discussed in further detail in the docketed memorandum, ''Methodology for Estimating Cost and Emission Impacts of MSW Landfills Regulations. 2014.'' Installation, operation and maintenance of the GCCS represents over 99 percent of the annual costs, and although the costs presented here do not include testing and monitoring costs, those costs are expected to be nominal relative to the control costs.

i. Reducing or Eliminating the Design Capacity Threshold

Options that decrease the design capacity threshold would make more landfills subject to the rule. Such options also would increase the overall reporting burden because more landfills would be required to calculate and report their NMOC emission rates. Landfills that exceed any lower design

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RTP Division. Available at *http://www.epa.gov/ncea/isa/*.

[43] Myhre, G., D. Shindell, F.M. Bréon, W. Collins, J. Fuglestvedt, J. Huang, D. Koch, J.F. Lamarque, D. Lee, B. Mendoza, T. Nakajima, A. Robock, G. Stephens, T. Takemura and H. Zhang, 2013: Anthropogenic and Natural Radiative Forcing. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Pg. 680.

[44] *Ibid.*

[45] *Ibid.*

[46] West, J.J., Fiore, A.M. 2005. ''Management of tropospheric ozone by reducing methane emissions.'' *Environ. Sci. Technol.* 39:4685–4691.

[47] Anenberg, S.C., et al. 2009. ''Intercontinental impacts of ozone pollution on human mortality,'' *Environ. Sci. & Technol.* 43: 6482–6487.

capacity threshold and become subject to subpart XXX would be required to obtain a Title V permit because sources subject to an NSPS must generally obtain a Title V permit. Only a few additional landfills would be required to install controls because landfills still must exceed the NMOC emission rate threshold before such controls are applied, and under the current threshold, about 72 percent of landfills over the design capacity threshold exceed the NMOC emissions rate. Thus, options that decrease the design capacity threshold without also lowering the NMOC emission threshold create additional reporting and permitting burden with minimal additional emission reductions. Modeling showed that if the EPA decreased the design capacity threshold to 2.0 million Mg or 2.0 million m^3, then over 90 additional landfills would be affected by the rule and five additional landfills would require controls, resulting in NMOC reductions of 74 Mg/yr and methane emission reductions of 11,500 Mg/yr (287,000 Mg/yr CO_2e). These reductions could be achieved at a cost effectiveness of approximately $9,900 per Mg NMOC or $64 per Mg methane ($2.6 per Mg CO_2e).

The EPA also explored decreasing the NMOC emission threshold in conjunction with decreasing the design capacity. Modeling showed that if the EPA decreased the design capacity threshold to 2.0 million Mg or 2.0 million m^3 and reduced the NMOC emission threshold to between 34 and 40 Mg/yr, then approximately 90 additional landfills would be affected by the rule and 80 to 160 additional landfills would require controls, resulting in additional NMOC reductions of 2,100 to 3,200 Mg/yr and methane reductions of 328,000 to 494,000 Mg/yr (8.2 to 12.3 million Mg/yr CO_2e). These additional reductions could be achieved at an incremental cost effectiveness of between $16,000 and $18,000 per Mg NMOC or $100 to $115 per Mg methane ($4 to $5 per Mg CO_2e).

In addition, if the EPA were to remove the design capacity threshold, then a significant number of additional landfills would be subject to the rule. Out of the approximately 1,800 existing landfills with sufficient data to include in the preliminary analysis for the review of the emission guidelines, over 850 have a design capacity of less than 2.5 million Mg or 2.5 million m^3. Without a design capacity threshold, the NMOC emission rate would be the only criterion for installing controls. Thus, these landfills would be required to begin calculating and reporting their NMOC emission rate. They would also be required to obtain a Title V permit. A smaller number of additional landfills would be required to install controls, because currently only those landfills below the design capacity threshold that exceed the NMOC emission rate require controls. Note that as landfills continue to add waste and continue to calculate and report the annual NMOC emission rate, over time, more landfills would be required to install controls, which would thus achieve additional emission reductions. The EPA requests input on whether or not adjustments to the design capacity threshold should be considered.

ii. Reducing NMOC Emission Threshold

Decreasing the NMOC emissions threshold would not change the number of landfills subject to the rule or affect the overall reporting burden. However, a lower NMOC emissions threshold would require more landfills to install controls. Although an NMOC emission threshold would continue to use NMOC as a surrogate for LFG, additional methane reductions could be achieved as a result of lowering the NMOC threshold, which is consistent with the President's Methane Strategy as described in section II of this document.

Modeling showed that if the EPA decreased the NMOC threshold to 40 Mg/yr NMOC, then approximately 80 additional landfills would require controls, resulting in additional NMOC reductions of 1,900 Mg/yr and methane reductions of 303,000 Mg/yr (7.6 million Mg/yr CO_2e) as compared to the current rule requirements. These additional reductions could be achieved at an incremental cost effectiveness of approximately $16,000 per Mg NMOC or $100 per Mg methane ($4 per Mg CO_2e). The EPA's preliminary analysis did not include a reduction of NMOC threshold below 40 Mg/yr without also reducing the design capacity threshold. The preliminary emission reduction impacts of reducing both of these parameters are presented in section IV.B.1 of this document. The EPA requests input on whether or not adjustments to the NMOC emission threshold should be considered.

iii. Adjustments to Initial or Expansion Lag Times

As mentioned above, ''lag time'' is the period between when the landfill exceeds the NMOC emission rate threshold and when controls are required to be initially installed (or expanded) and started up. The emission reductions achieved by reducing the initial or expansion lag time are affected by the size of the landfill, waste placement patterns and annual acceptance rates. For example, the size of the landfill and the filling cycle affect how much and when emission reductions would be achieved. Based on input received from commenters,[48] large filling areas at modern landfill designs typically do not close before 7 years. Because the landfills regulations allow two options for expanding the GCCS (2 years after initial waste placement in closed areas and 5 years after initial waste placement in active areas), any reduction to the 2-year lag time for closed areas would not likely achieve any actual additional reductions from larger existing landfills because the majority of landfills are complying with the 5-year deadline instead of the 2-year deadline. Some of the smaller landfills may achieve final grade in a shorter time period. Modeling showed that if the EPA decreased the initial lag time to 2 years, then an additional NMOC reduction of approximately 600 Mg/yr and methane reductions of 88,000 Mg/yr (2.2 million Mg CO_2e/yr) would be achieved as compared to the current rule framework. These additional reductions could be achieved at an incremental cost effectiveness of approximately $4,700 per Mg NMOC or $30 per Mg methane ($1.2 per Mg CO_2e).

Modifying the 5-year provision may also have a limited effect on emission reductions. Many landfills in wet climates are already installing wells ahead of the 5-year schedule for odor or energy recovery purposes. Modeling showed that if the EPA decreased the expansion lag time to 2 years, then an additional NMOC reduction of nearly 1,000 Mg/yr and methane reductions of 152,000 Mg/yr (3.8 million Mg/yr CO_2e) could be achieved as compared to the current rule framework. These additional reductions could be achieved at an incremental cost effectiveness of approximately $17,000 per Mg NMOC or $106 per Mg methane ($4.3 per Mg CO_2e).

The EPA received input from commenters expressing concern about the potential shortening of lag times. The comments indicated that wells located in these areas are more frequently damaged as a result of daily filling operations and the movement of equipment. Damaged wells must be repaired with well extensions and/or re-drilling of wells. In addition, waste in active fill areas undergoes significant settlement. This settlement affects the alignment of gas header equipment,

[48] The EPA conducted outreach with small entities, state and local officials, and representative organizations, hereinafter referred to as commenters.

requiring more frequent repairs, troubleshooting and replacement of equipment. These repairs can add a significant cost to the construction and operation of a GCCS that are not currently accounted for in the LFGcost model estimates and also increase the amount of system down time.

In addition to the implementation concerns, reducing the lag times would require more frequent mobilization of drill rig equipment and purchase of GCCS infrastructure and system repairs, which could lead to higher costs. Note the preliminary cost effectiveness estimates shown above do not include any cost adjustments to repair wells damaged in active areas. We seek input on how to account for these costs.

Commenters also raised several practical concerns with reducing the expansion lag time. Reducing the expansion lag time would result in more wells located in active fill areas because more of the face of the landfill is active after only 2 years of waste acceptance and the landfill owner or operator must add wells into these active areas sooner. In addition, active fill areas are still in the aerobic phase of waste decomposition. Installing wells in areas with high oxygen levels increases the chance of subsurface fires. It also leads to more frequent exceedances of the current wellhead monitoring standards for oxygen. The EPA requests input on the assumptions outlined above and whether or not adjustments to lag times should nonetheless be considered.

Horizontal Collectors. Horizontal LFG collection wells may provide some relief to the implementation concerns that have been raised, while also allowing for the wells to be installed more quickly after the waste is placed in the landfill. These types of wells are used in active fill areas and consist of perforated pipe in gravel-filled trenches constructed within the waste mass as an active area is filled. The wellheads are installed remotely outside of the active fill area to allow landfill owners/operators to monitor the wells. Although the horizontal collection infrastructure is installed as the waste is placed in the fill area, the collectors are not brought online under an active vacuum until a sufficient refuse layer has been placed on top of the collectors. Sufficient refuse is necessary in order to prevent air infiltration in the landfill. The time to accumulate sufficient waste is, however, often shorter than the time needed to install vertical wells, and can be as short as a few months after refuse is buried.[49] As a result, the installation of horizontal collectors could result in LFG being collected sooner.

The EPA is aware of several horizontal collector installations, including several landfills in California [50] and 18 different landfills in the voluntary data collection effort for this rulemaking; see ''Summary of Landfill Dataset Used in the Cost and Emission Reduction Analysis of Landfills Regulations. 2014.''

The shorter length of time associated with bringing horizontal collectors online can be especially important at landfills employing liquids recirculation techniques or located in wetter climates, given the higher LFG generation rates at those sites (as discussed earlier in this section IV.B.1). Quickly bringing these collectors online has added the benefit of proactively addressing odor concerns at landfills. These systems are also useful in landfills that practice ''over-filling,'' where new waste is placed on top of a section of the landfill that was capped temporarily. Some implementation concerns with horizontal collectors have been expressed, particularly regarding their shorter lifetime than vertical wells and the need for more frequent replacement.

The EPA requests input on the assumptions outlined above and whether adjustments to lag times should be considered.

iv. Adjustments to the Length of Time That Control Equipment Must Remain Operational

The EPA is requesting input on the criteria and timing for capping or removing the GCCS. Under 40 CFR part 60, subpart WWW, a landfill may cap or remove the GCCS if the following three criteria are met: (1) The landfill is closed; (2) the GCCS has been in operation for 15 years; and (3) three successive tests for NMOC emissions are below the NMOC emission threshold of 50 Mg/yr. Depending on the waste-in-place of the landfill at closure and other site-specific factors (e.g., waste composition, climate), it may take greater than 30 years after closure for a large modern landfill to emit less than the 50 Mg per year NMOC emission threshold, and in turn qualify for capping or removing the GCCS.

Although some commenters expressed concerns about the quantity of emissions after landfills have closed and the GCCS has ceased to operate, the preliminary analysis the EPA conducted demonstrated that approximately 130 landfills that have closed or will close by 2023 will require a GCCS to be operated for between 15 and nearly 70 years after the landfill has stopped accepting waste. The exact length of the period after landfill closure is commensurate with the size and corresponding emissions profile of each affected landfill. Nonetheless, the EPA is requesting input on whether there are other ways to ensure emissions are minimized in the later stages of a landfill's lifecycle. Specifically, the EPA is seeking input on whether the three criteria listed above are appropriate. We also seek input on alternative approaches, such as consecutive quarterly measurements below a surface emission threshold. Note that RCRA, specifically subpart F of part 258, also requires supplemental basic post-closure care to maintain cover integrity, which includes cover material requirements, design criteria for final cover systems, and post-closure care such as maintaining the integrity of the final cover and maintaining and operating a gas monitoring system. The California landfill methane regulation [51] requires that systems stay in place until the landfill has operated the equipment for at least 15 years and the surface methane concentration measurement (instead of the measured NMOC emission cutoff rate) does not exceed a 500 parts per million (ppm) instantaneous reading or a 25 ppm integrated reading.

v. Other Potential Adjustments

The California landfill methane regulation [52] uses a combination of waste-in-place and gas heat input capacity in lieu of design capacity and NMOC thresholds to determine which landfills are subject to GCCS requirements. Under the California regulation, a GCCS must be installed at all landfills accepting waste after January 1, 1977, having at least 450,000 tons of waste-in-place, and having a gas heat input capacity threshold of 3.0 MMBtu/hr or greater.

The Climate Action Reserve also incorporated waste-in-place criteria in

[49] Barlaz et al., Controls on Landfill Gas Collection Efficiency: Instantaneous and Lifetime Performance. 59 J. Air & Waste Mgmt. Ass'n 1399, 1402–03 (Dec. 2009).

[50] SCS Engineers, Technology and Management Options for Reducing Greenhouse Gas Emissions. Prepared for California Integrated Waste Management Board.

[51] California Code of Regulations, title 17, subchapter 10, article 4, subarticle 6, section 95467, Methane Emissions from Municipal Solid Waste Landfills.

[52] California Code of Regulations, title 17, subchapter 10, article 4, subarticle 6, sections 95460 to 95476, Methane Emissions from Municipal Solid Waste Landfills.

version 4.0 of its Landfill Protocol.[53] This protocol includes waste-in-place thresholds for landfills that recover energy and those thresholds vary from 0.72 million Mg for landfills located in a non-arid area (receiving 25 inches or greater precipitation per year) to 2.17 million Mg for landfills located in an arid area (receiving less than 25 inches of precipitation per year) to determine what offset projects are eligible. Coupling a precipitation indicator with a waste-in-place threshold recognizes that LFG emission generation rates are affected by the quantity of waste disposed as well as the moisture present in the landfill, either due to the local climate, or other liquids added to a landfill, as discussed earlier in this section IV.B.1.

The EPA requests input on whether it should pursue an alternative set of thresholds to determine which landfills are subject to the revised emission guidelines and what criteria trigger the installation of a GCCS.

vi. Potential Unique Treatment of Landfills Located in Wet Climates or Those Employing Leachate Recirculation or Other Liquids Addition

The EPA also seeks input on whether it should consider reducing the design capacity thresholds or initial and expansion lag times for landfills that are located in a wet climate or that recirculate leachate or add other liquids to the landfills to accelerate decomposition of the waste. Wetter wastes decompose more quickly than drier wastes and as a result generate more LFG in the short term. Therefore, it may be appropriate to require these landfills to install and expand the gas collection system sooner. Similarly, smaller landfills in wetter climates, or those employing leachate recirculation (or other liquids addition), may also generate earlier spikes in LFG emissions that could exceed the NMOC threshold. Although these landfills are not affected by the current design capacity threshold of 2.5 million Mg and 2.5 million m^3, if a smaller design capacity threshold or an alternative waste-in-place based threshold were adopted for these wet landfills, more emission reductions may be achieved.

If a separate set of thresholds and/or lag times were to apply to these wet landfills, or if an adjusted modeling provision were adopted (see section IV.E.1 of this document), the EPA requests input on how a wet landfill might be defined. For example, a wet landfill could be defined as a landfill that has precipitation of greater than 25 inches per year and/or recirculates leachate or adds other liquids to the landfill.

vii. Definition of Modification

The EPA in this ANPRM is seeking input on options to achieve additional emissions reductions from existing landfills under CAA section 111(d). In light of our interest in reducing the methane and NMOC components of LFG, the EPA is also seeking input on whether it is reasonable to review the definition of modification for landfills. The EPA solicits input on changes that may be appropriate and whether these changes should be enacted to achieve additional emission reductions.

C. Emission Reduction Techniques and GCCS Best Management Practices

As mentioned previously, the EPA is considering potential changes within the current regulatory framework of the landfills regulations for existing sources that would achieve further emission reductions. This section discusses specific LFG control technologies and BMPs for GCCS and landfill operations to improve gas collection efficiencies.

The EPA is soliciting input to evaluate the emission reductions achieved by the specific technologies and BMPs discussed later in this section to assess whether any technologies and practices could be applied to the landfills regulations for existing sources to achieve further reductions of LFG.

The EPA will review the performance data, practical application, and cost of these BMPs or technologies to determine if and how they could be incorporated in conjunction with the current performance-based standard. Promotion of technologies and practices to achieve reductions of GHG from landfills complements the recently issued Methane Action Plan discussed in section II of this document.

The EPA is also requesting input on other technologies or BMPs that might be appropriate to encourage under the emission guidelines, the cost and emission reduction potential of each of these alternatives, and how each of these other approaches might be incorporated into the current rule framework or a new alternative rule framework.

1. Oxidation Technologies

The EPA is considering whether any emerging technologies may achieve additional emission reductions for existing landfills. As part of its consideration, the EPA will evaluate the extent to which the technology is adequately demonstrated for existing landfills.

The EPA is aware of several technologies that increase the methane oxidation rate, thereby reducing the amount of methane that could escape through the surface of the landfill. The principle of these technologies is the use of methanotrophic bacteria, commonly found in most soils and compost, to oxidize methane into water, carbon dioxide, and biomass.

A biocover is a cover material designed to enhance methane oxidation and is typically made of two layers—a permeable layer that consists of gravel, broken glass, sand or other media to evenly distribute the LFG to the oxidation media and an oxidation layer that typically consists of soil, compost, mulch or other organic media. The oxidation media contains methanotrophic bacteria from the waste decomposition process. One disadvantage of alternative cover technologies is their sensitivity to environmental conditions because the productivity of methanotrophic bacteria is highly dependent on the bacteria's surroundings. Certain conditions, including temperature, moisture and pH, must be maintained to optimize methane oxidation rates.[54]

Methane oxidation occurs to some degree in various types of traditional landfill covers, including simple soil covers. Some landfills use compost, yard waste and other organic wastes and materials as a type of naturally occurring biocover. Chipped rubber tires, Styrofoam and yard waste are other common types of waste that could serve as good methanotrophic media when mixed with soil or compost.[55]

The most common biocover in use at landfills is shredded yard waste used as alternative daily cover.[56] Biocovers consisting of naturally occurring and often readily available materials may provide a cost effective method to increase methane oxidation, thus decreasing methane emissions, at the surface of existing landfills. The EPA is requesting information to characterize the prevalence of the practice of using these types of naturally occurring biocovers at existing U.S. landfills and

[53] Climate Action Reserve. Landfill Project Protocol. Version 4.0. June 29, 2011.

[54] BAAQMD. Greenhouse Gas Mitigation: Landfill Gas and Industrial, Institutional and Commercial Boilers, Steam Generators and Process Heaters. Bay Area Air Quality Management District, prepared by URS Corporation. April 2008.

[55] BAAQMD. Greenhouse Gas Mitigation: Landfill Gas and Industrial, Institutional and Commercial Boilers, Steam Generators and Process Heaters. Bay Area Air Quality Management District, prepared by URS Corporation. April 2008.

[56] Sullivan, P. The Importance of Landfill Gas Capture and Utilization in the U.S. April 6, 2010.

the costs to manage and apply these materials.

The MSW landfills subpart of the GHGRP (40 CFR part 98, subpart HH) had used a default value of 10 percent for the amount of methane oxidized when calculating methane emissions from MSW landfills. However, recent research studies indicate that a default value of 10 percent may be underestimating the level of oxidation occurring at existing landfills and the amount of methane oxidized may be considerably higher, depending on cover type and other site-specific conditions.[57] A 2009 literature review found an average value of 35 percent for traditional landfill cover methane oxidation rates.[58] A 2011 article documents a 4-year research study of over 37 seasonal sampling events at 20 landfills across the United States with intermediate covers reported up to 37 percent average oxidation for soil covers.[59] In addition, recent research demonstrates that daily soil covers oxidize methane to a greater degree than many low permeability final soil covers, suggesting oxidation rates of 20 to 55 percent.[60] As a result, recent final revisions to the GHGRP published in the **Federal Register** on November 29, 2013 (78 FR 71904), now allow for the use of higher oxidation values (25 percent and 35 percent), in addition to the 10 percent value, if methane flux through the soil cover is of a certain amount and there is 24 inches or more of soil cover.[61] Co-oxidation of NMOC has been observed during use of these alternative landfill cover materials, which has the potential to reduce odors and toxic air pollutants.[62]

Biocover application costs may vary widely depending upon availability of material and the level of monitoring, and many materials would most likely be on site or easily obtained for free or for a nominal cost associated with transporting the materials from a nearby or co-located yard waste or compost facility.[63]

RCRA Subtitle D addresses cover and capping requirements for MSW landfills. Specific requirements address the frequency and type of covers allowed, including provisions for requesting the use of alternative materials (40 part 258, subpart C). These operating parameters are in place to control disease vectors, fires, odors, blowing litter and scavenging at the landfill, but are not covers that specifically promote oxidation of LFG. Design criteria for final cover systems (40 part 258, subpart F) were also established to minimize water infiltration and erosion of the landfill, rather than release of LFG or its constituents. Rules regarding the use of daily, intermediate and final cover are governed by RCRA Subtitle D; however, research indicates that biocovers may help to reduce emissions of methane, a primary constituent of LFG.

Another method for increasing the oxidation rate is to route passively vented LFG through a vessel containing methane-oxidizing media, commonly referred to as a biofiltration beds or biofilters. Biofilter media have included compost or chipped yard waste mixed with recycled shredded tires or Styrofoam peanuts as well as sand and soil mixtures. Choosing the proper media with sufficient gas conductivity is important to reduce the possibility of back pressure in the landfill.[64] Biofilters have been tested for use at landfills over only the past 10 to 15 years. Studies of passively-aerated methane biofilters have shown methane oxidation rates vary widely by type of biofilter media but could reach values between 19 and 98 percent.[65 66]

Biofilters are likely feasible for use at small existing landfills or existing landfills with passive gas collection systems due to the size of the biofiltration bed required to treat the mixture of air and LFG. Due to the nature of passive gas collection systems, this technology lacks the ability to control and monitor the oxidation of methane in the LFG.[67] In general, biofilter costs are expected to be lower than biocover costs due to their smaller scale and utilization of existing passive vents.

No data exist on the long-term performance, effectiveness, or maintenance requirements of biocovers or biofilters.[68 69 70] Therefore, the EPA is requesting information about application of these technologies to better understand these characteristics for full-scale use of biocovers and biofilters. The EPA is also seeking input on biocover parameters and their effect on oxidation. Such parameters may include depth, soil characteristics, measurement and their affect on percent oxidation. The EPA is also seeking input on appropriate mechanisms to monitor the performance of these alternatives.

2. Best Management Practices

The EPA is considering how certain BMPs that achieve additional emission reductions for existing landfills may be encouraged under a revised regulatory framework. The EPA seeks input on how to demonstrate that the BMPs are properly implemented and what additional maintenance records or other requirements might demonstrate that the BMPs can ensure the same level of environmental protection as the current framework. The EPA also invites input on other requirements that could be adjusted to encourage BMPs.

i. LFG Collection From Leachate Removal Systems

The EPA is aware of landfills that have connected the LFG collection system and leachate collection system; however, references suggest that connection of these systems is not common at landfills that do not employ leachate recirculation.[71] The efficiency

[57] Sullivan, P. The Importance of Landfill Gas Capture and Utilization in the U.S. April 6, 2010.

[58] Chanton, J.; Powelson, D.; Green, R. Methane oxidation in landfill cover soils, is a 10% default value reasonable? *Journal of Environmental Quality.* 38, 654–663 (2009).

[59] Chanton, J.; Abichou, T.; Langford, C.; Hater, G.; Green, R.; Goldsmith, D.; Swan, N. Landfill Methane Oxidation Across Climate Types in the U.S. *Environmental Science And Technology.* 45, 313–319 (2011).

[60] Sullivan, P. The Importance of Landfill Gas Capture and Utilization in the U.S. April 6, 2010.

[61] If methane flux is less than 10 grams per square meter per day, then a 35 percent oxidation fraction can be used. If methane flux is between 10 to 70 grams per square meter per day, then a 25 percent oxidation fraction can be used. If methane flux is greater than 70 grams per square meter per day, then a 25 percent oxidation fraction can be used.

[62] U.S. EPA. Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from Municipal Solid Waste Landfills. June 2011.

[63] BAAQMD. Greenhouse Gas Mitigation: Landfill Gas and Industrial, Institutional and Commercial Boilers, Steam Generators and Process Heaters. Bay Area Air Quality Management District, prepared by URS Corporation. April 2008.

[64] BAAQMD. Greenhouse Gas Mitigation: Landfill Gas and Industrial, Institutional and Commercial Boilers, Steam Generators and Process Heaters. Bay Area Air Quality Management District, prepared by URS Corporation. April 2008.

[65] Abichou, T.; Chanton, J.; Powelson, D. Field Performance of Biocells, Biocovers, and Biofilters to Mitigate Greenhouse Gas Emissions from Landfills. Florida Center for Solid and Hazardous Waste Management, University of Florida. March 2006.

[66] Morales, J.J. Mitigation of Landfill Methane Emissions from Passive Vents by Use of Oxidizing Biofilters. Fall 2006.

[67] U.S. EPA. Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from Municipal Solid Waste Landfills. June 2011.

[68] U.S. EPA. Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from Municipal Solid Waste Landfills. June 2011.

[69] Abichou, T.; Chanton, J.; Powelson, D. Field Performance of Biocells, Biocovers, and Biofilters to Mitigate Greenhouse Gas Emissions from Landfills. Florida Center for Solid and Hazardous Waste Management, University of Florida. March 2006.

[70] Yazdani, R, and Imhoff, P. Contractor's report to CalRecycle: Biocovers at Landfills for Methane Emissions Reduction Demonstration. October 2010.

[71] SCS Engineers, Technology and Management Options for Reducing Greenhouse Gas Emissions. Prepared for California Integrated Waste Management Board. Prepared by SCS Engineers. April 2008.

of capturing LFG emissions through this BMP depends on the efficiency of both the LFG collection system and the leachate recirculation system. Section 60.752(b)(2)(i)(D) of subpart WWW recognizes that leachate collection components may be part of a site-specific collection and control system design plan. Because the design plan is not prescriptive and instead contains design and operational standards that are site-specific, the design plan has the flexibility to include collection of LFG from leachate collection systems.

The cost of each connection of GCCS to a leachate removal system would include $400 to $650 for a LFG wellhead and $10 to $15 per foot for a 3- or 4-inch HDPE pipe (2008 cost estimates).[72] However, there are currently no broad mandates for requiring gas collection from leachate removal systems. The EPA requests input on the efficacy and costs of enhancing gas collection systems to collect LFG from leachate removal or storage systems. The EPA also requests information on the types of landfills currently collecting gas from leachate removal systems and the specifics of the gas collection systems used in practice. The EPA will use this information to evaluate if and when the use of an enhanced gas collection system that collects LFG from the leachate removal system may be appropriate.

ii. Preventing Waterlogged Wells

The EPA also seeks input on requiring a gas collection system to more proactively prevent waterlogged wells, perhaps through the use of leachate removal pumps or alternative GCCS infrastructure. Leachate and condensate can accumulate in collection wells, blocking LFG capture. Because a flooded well cannot collect gas, fixing a flooded well would have a high emission reduction potential.

The most practical and cost effective method for keeping liquid out of gas extraction wells is to prevent its entry in the first place by ensuring proper sealing and grading at the surface. Infiltration of leachate from within the waste mass is more difficult to control. Once liquid is inside the well, it often must be removed via pumping to restore the gas collection capability of the well. When performed in conjunction with effective leachate removal, it may be possible to dewater wells with a portable pump and a mobile storage tank that can be used to transport liquid removed from the well to a suitable leachate disposal point. Multiple iterations of dewatering could be required at each well because liquid often seeps back into the well after pumping. While labor intensive, this approach alleviates the need for a dedicated pump and piping at multiple wells. If liquid accumulation in wells is an ongoing issue, then a dedicated pumping system may be suitable. Long term costs for a dedicated pumping system are still high, including the initial cost of pumps and piping, as well as ongoing operation and maintenance costs and disposal of the leachate. A single well dewatering pump system could cost over $3,000,[73] but could also improve LFG collection and GHG emission reduction.

Another method for reducing GHG emissions at landfills with waterlogged wells is to install a surface collector. A surface collector usually consists of perforated pipes laid across the top of the waste mass and covered by an impermeable geomembrane or by final cover. Surface collectors can be used to collect gas from a wet landfill where traditional horizontal and vertical wells fail due to water infiltration. Surface collectors can be used with or instead of horizontal collector systems.[74] Because surface collectors are installed after final waste acceptance, they are not effective in controlling LFG emissions while the landfill is open and accepting waste. Surface collectors also do not apply a vacuum into the waste so they are only effective at controlling gas that has escaped other collection systems. Their impact on emissions is therefore expected to be low in cases where a well-designed and well-operated LFG collection system already exists. The overall cost of surface collectors is comparatively high due to additional geomembrane material costs, if they are not already required by regulations. One 2008 study estimates the cost of installing a geomembrane to be $40,000 to $50,000 per acre of landfill surface. If a landfill already has a geomembrane, the added cost would be $25 to $35 per linear foot for a 6-foot deep trench and gravel backfill.[75]

Wellhead operating parameters in 40 CFR part 60, subpart WWW require that each owner or operator of an MSW landfill either operate the collection system with a negative pressure at each wellhead or, in areas with a geomembrane or synthetic cover, establish acceptable pressure limits in the design plan. These performance standards help identify any inoperable wells resulting from flooding. Surface emissions monitoring would also help identify any elevated methane levels resulting from an inoperable well. Because some of the wells at existing landfills may have been installed for 15 years or more, the EPA requests input on whether the current combination of wellhead monitoring and surface emission monitoring is sufficient for identifying inoperable wells, especially in cases where wells have been installed for a significant amount of time. If the monitoring systems in 40 CFR part 60, subpart WWW are deficient for identifying flooded wells, the EPA also asks for input on whether any additional recordkeeping, such as periodic measurement of liquid levels in gas wells, might be useful to identify flooded wells that are not collecting gas. The EPA requests input on whether any more specific corrective action guidance should be developed, such as the need to dewater the well or employ alternative GCCS technologies such as surface collectors if a flooded well is identified.

iii. Redundant Seals

The EPA is also considering a BMP of requiring redundant seals and the use of enhanced sealing materials on wellheads. One study includes a survey using a forward-looking infrared camera suggesting that LFG wellheads and other surface penetrations present high potential for concentrated leaks of organic compounds.[76] The use of advanced seals at wellheads may help to ensure that the well can apply sufficient vacuum to the landfill to facilitate gas extraction while preventing leaks of LFG to the atmosphere. The design for vertical wells typically includes the use of bentonite or bentonite soil mixtures near the surface as part of the well boring backfill to reduce the potential for air to be pulled into the well.[77] Compacted backfill soil can also be considered, but may not be practicable and adds risk of damaging the well casing pipe. A well's connecting pipes

[72] California Integrated Waste Management Board, Technologies and Management Options for Reducing Greenhouse Gas Emissions From Landfills, April 2008.

[73] Kaminski, D. and M. Varljen. Increasing LFG Collection Rates Using Gas Well Dewatering Systems: Lessons Learned. 15th Annual LMOP Conference. January 2012.

[74] California Integrated Waste Management Board, Technologies and Management Options for Reducing Greenhouse Gas Emissions From Landfills, April 2008.

[75] California Integrated Waste Management Board, Technologies and Management Options for Reducing Greenhouse Gas Emissions From Landfills, April 2008.

[76] ARCADIS. Quantifying Methane Abatement Efficiency at Three Municipal Solid Waste Landfills. Prepared for U.S. EPA/ORD. January 2012.

[77] California Integrated Waste Management Board, Technologies and Management Options for Reducing Greenhouse Gas Emissions From Landfills, April 2008.

are typically sealed using three different techniques: (1) Bentonite clay seal, (2) compacted clay seal or (3) plastic well bore seal.

Because a good seal is critical for proper well performance, multiple seals are often used. Many engineers already require two and sometimes three seals in a well when preparing design plans for GCCS.[78] However, for wells that are not properly sealed, their zone of influence is likely reduced, resulting in LFG between wells not being collected. Costs can range from $500 to $2500 per well based on 2008 estimates depending on the type of seal used.[79]

Because the design plan is not prescriptive and instead contains design and operational standards that are site-specific, the design plan has the flexibility to determine the number or type of seals in order to accommodate the conditions and climates at different landfills. This site-specific approach also provides for continued flexibility for future design plans to incorporate new sealing materials that may be more efficient than those currently available. The design plan, coupled with wellhead and surface monitoring requirements, ensures that leaks from wells are minimized. The EPA is soliciting input on what mechanisms, if any, might be appropriate to further promote or mandate enhanced seals in this emission guidelines review.

iv. Early Installation of Final Cover

Early installation of final cover systems can also reduce methane emissions. Current rules for landfills under RCRA Subtitle D require intermediate cover (typically at least 12 inches of native soil) to be installed in areas of the landfill that are no longer receiving waste or will not be used for over 12 months within 180 days of final waste placement (40 CFR part 258, subpart C). The final cover system must consist of an infiltration layer of at least 18 inches of earthen material covered by an erosion layer of at least 6 inches of earthen material that is capable of sustaining native plant growth. An alternative cover design may be used as long as it provides equivalent protection against infiltration and erosion (40 CFR part 258, subpart F). Once a landfill has received its final shipment of waste, it must begin closure operations within 30 days. A landfill, however, may delay closure for up to 1 year if additional capacity remains. Any further delays after 1 year require approval from the appropriate state agency. After beginning, all closure activities must be completed within 180 days.

Despite these rules, landfill operators often leave intermediate cover in place for years or even decades and intermediate cover frequently is the only cover on the majority of the landfill surface. Recent studies indicate that installation of intermediate and final cover has a direct and significant effect on LFG emissions.[80] Intermediate cover significantly reduces emissions compared to daily cover on working faces. Final cover has the ability to reduce emissions even further compared to intermediate cover. By installing these more rigorous cover systems sooner, significant emissions may be prevented from being released. Furthermore, final cover has been shown to increase LFG collection efficiency at landfills with a gas collection system.[81] Early installation of cover should not incur any additional cost to the landfill as long as waste acceptance or placement plans do not change after the cover (particularly final cover) is installed. Early installation of cover could result in a cost savings due to the general increase in the cost of materials over time and the added gas collection realized when more rigorous cover systems are installed—especially if the gas is collected for beneficial use.

3. Organics Diversion and Source Separation

LFG is a by-product of the decomposition of organic material in MSW under anaerobic conditions in landfills. The amount of LFG created primarily depends on the quantity of waste and its composition and moisture content, as well as the design and management practices at the site. Decreasing the amount of organics disposed in landfills would decrease the generation of LFG.

Organic materials are historically the largest component of materials discarded in the MSW stream, constituting nearly 49 percent of discarded material in 2012. Food waste is the largest portion of the organic materials, followed by paper and paperboard, yard trimmings and wood wastes.[82] Material recovery, including composting and recycling, has been increasing over time for all materials, except rubber and leather. For example, the percent of paper and paperboard that is recovered has increased from 16.9 percent in 1960 to 62.5 percent in 2012. The amount of recovered yard trimmings has increased from negligible amount in 1960 to 57.7 percent in 2012. Recovered food waste has increased less significantly from negligible amounts in 1960 to 4.8 percent in 2012.[83]

Although material recovery has increased over time, states and cities with vigorous recovery programs have proven that a greater percentage recovery is possible. Organic waste diversion regulations and zero waste programs are currently in effect in multiple U.S. states and cities, with 183 municipalities providing separate curbside collection of residential food waste.[84] For example, state programs in California, Connecticut, and Massachusetts focus on diversion from commercial or certain multifamily residential waste generators.[85] [86] [87] Vermont's Universal Recycling Law implements a phased material ban beginning in 2016 for leaf and yard debris and food waste in 2020. City ordinances in New York City and Portland, Oregon, mandate materials separation from commercial and multifamily generators.[88] [89] Ordinances in Seattle and San Francisco extend the separation mandate to single family dwellings.[90] [91]

[78] *Ibid.*

[79] *Ibid.*

[80] Goldsmith et al., Methane Emissions from 20 Landfills Across the United States Using Vertical Radial Plume Mapping, *Journal of the Air & Waste Mgmt. Association,* 62:2, 183–197 (2012).

[81] Barlaz et al., Controls on Landfill Gas Collection Efficiency: Instantaneous and Lifetime Performance, *Journal of the Air & Waste Mgmt. Association,* 59, 1399–1404 (2009).

[82] U.S. EPA, Municipal Solid Waste Generation, Recycling, and Disposal in the United States Tables and Figures for 2012. February 2014. *http://www.epa.gov/waste/nonhaz/municipal/pubs/2012_msw_dat_tbls.pdf.*

[83] U.S. EPA, Municipal Solid Waste Generation, Recycling, and Disposal in the United States Tables and Figures for 2012. February 2014. *http://www.epa.gov/waste/nonhaz/municipal/pubs/2012_msw_dat_tbls.pdf.*

[84] Residential Food Waste Collection in the U.S. *Biocycle.* 54:3, 23, March 2013.

[85] California Code of Regulations, title 14, division 7, chapter 9.1, article 4, subarticle 6, section 18835, Mandatory Commercial Recycling. *http://www.calrecycle.ca.gov/recycle/commercial/*

[86] General Statutes of Connecticut, title 22a, chapter 446d, sections 22a–226e, Recycling of Source-Separated Organic Materials. *http://cga.ct.gov/2014/sup/chap_446d.htm#sec_22a-226e*

[87] Code of Massachusetts Regulations, title 310 CMR 19.000. January 2014 amendments. *http://www.mass.gov/eea/docs/dep/service/regulations/wbreg14.pdf*

[88] City of Portland Administrative Rules, Business Solid Waste, Recycling and Composting, ENN–2.06 *http://www.portlandonline.com/auditor/?c=27430&a=294923.*

[89] Administrative Code of the city of New York. Title 16, chapter 3, subchapter 2, section 1 (16–306.1). *http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=1482542&GUID=DDD94082-C0E5-4BF9-976B-BBE0CD858F8F.*

[90] San Francisco Environment Code. Chapter 19, sections 1901–1912. Mandatory Recycling and Composting Ordinance. *http://www.sfenvironment.org/sites/default/files/policy/sfe_zw_sf_mandatory_recycling_composting_ord_100-09.pdf.*

Continued

In the 1996 Landfills NSPS Background Information Document (page 1–25) the EPA ''decided not to include materials separation requirements within the final rules because the EPA continues to believe RCRA and local regulations are the most appropriate vehicle to address wide-ranging issues associated with solid waste management for landfills.''

Although the EPA is not requesting input on mandating source separation under the upcoming emission guidelines review, the EPA is soliciting input and ideas for encouraging organic waste diversion under the revised emission guidelines, including the specific mechanisms described below and in section IV.E of this document or other ideas in general.

One method to encourage organic waste diversion under the revised emission guidelines is to provide rule exemptions for landfills diverting 100 percent of organic wastes. The emission threshold determination provisions currently in 40 CFR part 60, subpart WWW allow non-degradable wastes to be excluded from the total waste mass when computing the NMOC emission rate. If only non-degradable wastes were accepted, then the waste inputs for the model would be zero, the emission thresholds would not be exceeded, and thus GCCS would not be required. The EPA solicits input on the methane emission reductions from organic and inorganic waste diversion and whether adjustments should be made to the annual NMOC reporting requirements for landfills not accepting organic materials.

4. Encouraging New Technologies and Practices

The EPA understands that the technologies, BMPs, and source separation practices discussed above can achieve reductions in emissions from landfills. The EPA is seeking input on whether the use of any of the technologies or practices discussed in this section in conjunction with a well-designed and well-operated GCCS should be considered as the EPA reviews the emission guidelines.

Section IV.E of this document discusses other mechanisms to encourage wider use of these technologies and practices such as emission threshold determination flexibilities.

[91] Seattle Municipal Code. Chapters 21.40 and 21.76. *http://www.seattle.gov/util/MyServices/FoodYard/BldgOwnersManagers_FoodYard/index.htm.*

5. Gas Control System Technology

Subpart WWW of 40 CFR part 60 currently requires all control devices other than enclosed combustion devices to demonstrate 98-percent reduction by weight of NMOC. Enclosed combustion devices have the option of reducing emissions to 20 ppm, dry volume of NMOC, as hexane. Both enclosed and non-enclosed flares as well as a suite of other energy recovery devices are used to meet the control requirements under the current regulatory framework.

Non-enclosed flares used at landfills meeting the criteria in 40 CFR 60.18(b) are thought to have destruction efficiencies similar to enclosed flares and incinerators, and devices that burn LFG to recover energy, such as boilers, turbines and internal combustion engines.

However, in April 2012 the EPA conducted an external peer review on flaring efficiency and made available to the public a draft technical report, ''Parameters for Properly Designed and Operated Flares.''[92] In the draft report, the EPA evaluated test data and identified a variety of parameters that may affect flare performance and that could be monitored to help assure good combustion efficiency. None of the flare performance data used in the report comes from flares used at MSW landfills, however, and the report does not provide any new test data on non-assisted flare types, which to our knowledge, are the only non-enclosed flare type found in this source category. Thus, while we have no new information to suggest that flares at MSW landfills complying with 40 CFR 60.18(b) will not achieve at least 98-percent destruction, we solicit input and additional information on flare performance specifically for this source category. Examples of information requested for this source category include: Prevalence of flaring; number and types of flares used; waste gas characteristics such as flow rate, composition and heat content; use of flare gas recovery and other flare minimization practices; and existing flare monitoring systems.

D. Alternative Monitoring, Reporting, and Other Requirements

In addition to the technologies, BMPs, and other approaches discussed in section IV.C of this document, the EPA is considering whether alternative monitoring and reporting requirements would be appropriate for existing landfills. These alternative approaches address concerns that have arisen in implementation of subpart WWW and state and federal plans implementing subpart Cc and provide an opportunity to increase the effectiveness of the regulation.

[92] U.S. EPA, Parameters for Properly Designed and Operated Flares, Report for Flare Review Panel, April 2012.

1. Wellhead Monitoring

The EPA is requesting public input on alternative wellhead monitoring requirements. Commenters have expressed concerns about the ability to consistently meet these parameters. One alternative monitoring provision could be in the form of an exclusion from the temperature and oxygen/nitrogen monitoring requirements, or a reduction in the frequency of monitoring. For example, the EPA could reduce the frequency of wellhead monitoring for these three parameters (temperature and oxygen/nitrogen) from monthly to a quarterly or semi-annual schedule. Owners or operators would continue to monitor the wellhead for negative pressure.

The EPA is specifically requesting input on whether any such adjustment should apply only to landfills that beneficially use LFG, and if so whether there should be a threshold for the quantity of LFG put to beneficial use above which sources would qualify for alternative wellhead monitoring (and below which they would not), or whether the beneficial use of any quantity of the recovered LFG should qualify for alternative wellhead monitoring. Alternatively, the EPA is requesting input on whether it would be more appropriate to require a certain percentage of the overall recovered LFG to be beneficially used in order to exempt landfills from or reduce the frequency of the wellhead monitoring requirements.

If EPA were to limit adjusted monitoring to landfills that beneficially use LFG, these alternatives could encourage new landfills to beneficially use LFG. Both of these alternative options (exclusion or reduced monitoring frequency) would provide monitoring relief to these landfills. Landfill owners and operators must continue to operate their GCCS in a manner that collects the most LFG and minimizes losses of LFG through the surface of the landfill. In addition, landfills would still have to prepare and submit to the regulating authority a gas collection design plan, prepared by a professional engineer.

Subparts Cc and WWW of 40 CFR part 60 require landfill owners and operators to operate each interior wellhead in the collection system with a LFG temperature less than 55°C and with either a nitrogen level less than 20 percent or an oxygen level less than 5 percent. Compliance with these requirements is demonstrated through monthly monitoring. Instead of having the landfill owner or operator conduct monthly monitoring of temperature and nitrogen/oxygen at the wellheads, the EPA is requesting input on relying on landfill surface emission monitoring requirements in combination with maintenance of negative pressure at wellheads to indicate proper operation of the GCCS and minimization of surface emissions. The potential removal of the temperature and nitrogen/oxygen operational standards and associated wellhead monitoring requirements for these three parameters would be complemented by the addition of the surface monitoring provisions discussed in section IV.D.2 of this document.

Given recent technological advancements in data storage and transmission, the EPA is also considering an alternative to automate the wellhead monthly monitoring provisions. Automation could reduce long-term burden on landfill owner/operators as well as state authorities by allowing for more frequent, but less labor-intensive, data collection through the use of a system consisting of remote wellhead sensors (i.e., thermistors, electronic pressure transducers, oxygen cells) and a centralized data logger.

The use of continuous monitoring would allow more immediate detection and repair. This would eliminate the time between when the exceedance of the parameter occurs and when it is detected. It could also improve enforceability of the rule by allowing inspectors to review information on the data logger in real time during a site visit. Another advantage to automating the monitoring is that it could provide flexibility for incorporating additional parameters into the monitoring program. The EPA is soliciting input on this alternative in general, including: (1) The types of parameters that are best suited for an automated monitoring alternative; (2) examples of successful automated monitoring programs at MSW landfills and their associated costs; (3) additional considerations for equipment calibration; and (4) input on any averaging times that might be appropriate to determine when one or more monitored parameters have been exceeded.

2. Surface Emissions Monitoring

The EPA is requesting input on potential alternative approaches to the surface emission monitoring specified in 40 CFR part 60, subpart WWW. Subpart WWW collection and control requirements are intended for landfills to maintain a tight cover that minimizes any emissions of LFG through the surface. The surface emissions monitoring procedures in subpart WWW require quarterly surface emissions monitoring to demonstrate that the cover and gas collection system are working properly. The operational requirements in subpart WWW (40 CFR 60.753(d)) specify that the landfill must ''. . . operate the collection system so that the methane concentration is less than 500 parts per million above background at the surface of the landfill. To determine if this level is exceeded, the owner or operator shall conduct surface testing around the perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals and where visual observations indicate elevated concentrations of LFG, such as distressed vegetation and cracks or seeps in the cover.''

Subpart WWW of 40 CFR part 60 includes provisions for increased monitoring and corrective procedures if readings above 500 ppm are detected. Instrumentation specifications, monitoring frequencies, and monitoring patterns are structured to provide clear and straightforward procedures that are the minimum necessary to assure compliance.

We are requesting public input on potential alternatives to the surface monitoring procedures in 40 CFR part 60, subparts Cc and WWW. Potential alternatives could include provisions such as those in the California landfill methane regulation [93] and include changing the walking pattern for inspecting the surface of the landfill, adding an integrated methane concentration measurement, and allowing sampling only when wind is below a certain speed.

We are requesting input on reducing the interval for the walking pattern that traverses the landfill from 30 meters (98 ft.) to 25 ft. We are also requesting input on the addition of an average methane concentration limit of 25 ppm as determined by integrated surface emissions monitoring. This would be in addition to the 500 ppm emission concentration as determined by instantaneous surface emissions monitoring. Integrated surface emissions monitoring provides an average surface emission concentration across a specified area. For integrated surface emissions monitoring, the specified area would be individually identified 50,000 square foot grids. A tighter walking pattern and the addition of an integrated methane concentration would more thoroughly ensure that the collection system is being operated properly, that the landfill cover and cover material are adequate, and that methane emissions from the landfill surface are minimized. As part of these potential changes, the EPA is also requesting input on not allowing surface monitoring when the average wind speed exceeds 5 miles per hour or the instantaneous wind speed exceeds 10 miles per hour because air movement can affect whether the monitor is accurately reading the methane concentration during surface monitoring. We are considering this change because measurements during windy periods are usually not representative of emissions.

We are also soliciting information and associated data on the cost and assumptions for conducting enhanced surface monitoring as described here. Several factors contribute to the cost of enhanced surface monitoring. Monitoring along a traverse with a 25 ft. interval would increase monitoring time, and, thus, the labor costs, compared to monitoring along a 30 meter (98 ft.) interval. Monitoring along the tighter traverse pattern would take approximately four times as long, because the distance is approximately four times when covering a 50,000 square foot grid. For a landfill to conduct the integrated surface emissions monitoring, the EPA assumes the landfill would rent a handheld portable vapor analyzer with a data logger. The data logger would be necessary to obtain an integrated reading over a single 50,000 square foot grid. However, the EPA does not expect that requiring an integrated methane concentration would add significant cost because landfills could use the same instrument that they currently use for the instantaneous readings. These instruments can be programmed to provide an integrated value as well as an instantaneous value.

The EPA recognizes that while these provisions could minimize surface emissions, the actual reduction in emissions is difficult to quantify. Surface monitoring is a labor intensive process and tightening the grid pattern would increase costs. Thus, the EPA is soliciting input on techniques and data to estimate the reductions associated with enhanced surface monitoring.

The EPA is also requesting input on allowing the use of alternative remote measurement and monitoring techniques for landfills that exceed the surface monitoring concentrations in 40 CFR part 60, subpart Cc. The EPA

[93] California Code of Regulations, title 17, subchapter 10, article 4, subarticle 6, sections 95460 to 95476, Methane Emissions from Municipal Solid Waste Landfills.

would like information to determine whether to allow these alternative techniques to be used to demonstrate that surface emissions are below the specified methane surface concentrations. Alternative remote measurement and monitoring techniques may include radial plume mapping (RPM), optical remote sensing, Fourier Transform Infrared (FTIR) spectroscopy, cavity ringdown spectroscopy (CRDS), tunable diode laser (TDL), tracer correlation, micrometeorological eddy-covariance, static flux chamber or differential absorption. The EPA is also seeking input on the frequency of testing and the format of the standard if we allow the use of these technologies as an alternative to average surface concentrations as measured by Method 21. Incorporation of these technologies would require a change in format of the standard to be consistent with the technology.

3. Alternative Monitoring Provisions for LFG Treatment

The EPA is requesting input on defining treatment system as a system that filters, dewaters and compresses LFG. This alternative approach would be consistent with public commenters on previous landfills documents (67 FR 36475, May 23, 2002; 71 FR 53271, September 8, 2006). It is also consistent with input from participants in governmental outreach, who stated that the extent of filtration, de-watering and compression can be site dependent, and that different sites require different levels of gas treatment to protect the combustion devices that use treated LFG as a fuel and ensure good combustion. The alternative definition of treatment system would allow the level of treatment to be tailored to the type and design of the specific combustion equipment in which the LFG is used. If treatment system was defined in this manner, owners/operators would need to identify monitoring parameters and keep records that demonstrate that such parameters effectively monitor filtration, de-watering or compression system performance necessary for the end use of the treated LFG.

Owners/operators would also need to develop a site-specific treatment system monitoring plan that would not only accommodate site-specific and end-use specific treatment requirements for different energy recovery technologies, but would also ensure environmental protection. Preparing the monitoring plan would document procedures that landfills are likely already following to ensure that the LFG has been adequately treated for its intended use.

The plan would be required to include monitoring parameters addressing all three elements of treatment (filtration, de-watering, and compression) to ensure the treatment system is operating properly for the intended end use of the treated LFG. The plan would be required to include monitoring methods, frequencies and operating ranges for each monitored operating parameter based on manufacturer's recommendations or engineering analysis for the intended end use of the treated LFG. Documentation of the monitoring methods and ranges, along with justification for their use, would need to be included in the site-specific monitoring plan. In the plan, the owner/operator would also need to identify who is responsible (by job title) for data collection, explain the processes and methods used to collect the necessary data, and describe the procedures and methods that are used for quality assurance, maintenance, and repair of all continuous monitoring systems.

The owner or operator would be required to revise the monitoring plan to reflect changes in processes, monitoring instrumentation and quality assurance procedures; or to improve procedures for the maintenance and repair of monitoring systems to reduce the frequency of monitoring equipment downtime. The EPA requests input on the definition of treatment system and the creation of site-specific treatment system monitoring plans.

4. Monitoring and Reporting Flexibility

Regulatory agencies and landfill owners and operators have expressed concerns about the burden and response time of agencies responsible for reviewing and approving design plans, Alternative Compliance Timeline (ACT) requests, alternative remedies and higher operating value (HOV) requests.

One way to minimize the need for such reviews would be to provide more flexibility in wellhead monitoring provisions, as described in section IV.D.1 of this document.

The EPA also solicits input on other ways to streamline the monitoring, reporting and notification provisions as part of its review of the emission guidelines. For example, currently the subparts Cc and WWW of 40 CFR part 60 require site-specific design plan review and approval procedures, recognizing the unique site-specific topography, climate and other factors affecting the design of a GCCS. However, the EPA solicits input on ways to streamline the design plan submission and approval procedures as part of its review of the emissions guidelines. Examples of streamlining may include the potential development of a process by which approved alternative operating parameters could be automatically linked to updates of design plans or development of a process by which alternative operating parameters and updated design plans could be approved on a similar schedule.

The EPA is also seeking input on the possibility of establishing a third-party design plan certification program. The third-party program would supplement or replace the current approach of requiring the EPA or state review and approval of site-specific design plans and plan revisions with a program by which independent third parties would review the design plans, determine whether they conform to applicable regulatory criteria, and report their findings to the approved state programs or the EPA (for states without approved programs). The program would be designed to ensure that the third-party reviewers are competent, independent, and accredited, apply clear and objective criteria to their design plan reviews, and report appropriate information to regulators. Additionally, there would need to be mechanisms to ensure regular and effective oversight of third-party reviewers by the EPA and/or states that may include public disclosure of information concerning the third parties and their performance and determinations. Utilizing a third-party certification program could help to standardize and expedite design plan reviews, and reduce the burden on state regulators. The EPA is considering a broad range of possible design features for such a program. Such features include those discussed or included in several articles,[94] [95] [96] rules [97] [98] [99] and programs.[100] [101]

[94] McAllister, Lesley K., Third-Party Programs to Assess Regulatory Compliance, Presented at the Administrative Conference of the United States, October 22, 2012.

[95] Esther Duflo, et al., Truth-Telling By Third-Party Auditors and the Response of Polluting Firms: Experimental Evidence From India, 128 Quarterly Journal of Economics 4 at 1499–1545 (2013).

[96] First Annual Oversight Report of the Decentralized Gateway Vehicle Inspection Program, Missouri Department of Natural Resources and the Missouri State Highway Patrol, 2008. *http://www.dnr.mo.gov/gatewayvip/docs/enforcementrpt.pdf*.

[97] Renewable Fuel Standard program. *http://www.epa.gov/OTAQ/fuels/renewablefuels/*.

[98] Wood Heater Compliance Monitoring Program. *http://www.epa.gov/compliance/monitoring/programs/caa/woodheaters.html*.

[99] Mandatory Greenhouse Gas Emissions Reporting, California Environmental Protection Agency. *http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm*.

[100] Massachusetts Department of Environmental Protection, Third-Party Underground Storage Tank

We are considering the possibility of requiring sources to make design plans (including revisions) available online and easily accessible to the public as well as any impediment to doing so. We are also seeking input on what constitutes a reasonable time period for sources to make the design plans available online.

In addition to electronic storage of design plans, the EPA also plans to include electronic reporting in the forthcoming proposal that could amend subparts Cc and WWW of 40 CFR part 60 as a result of this review.

E. Alternative Emission Threshold Determination Techniques

The EPA is considering adjusting the emission threshold determinations that dictate when a GCCS must be installed, including variations in the modeling parameters as well as adding site-specific emission threshold determination. These alternatives may provide additional reporting and compliance flexibilities for owners and operators of affected landfills, including those that use new technologies to increase oxidation of emissions, employ BMPs to increase the effectiveness of GCCS, or increase organics diversion and source separation practices.

1. Modeling Adjustments

An affected landfill currently has three different options (tiers) for estimating whether the landfill exceeds the NMOC emission threshold of 50 Mg per year. The simplest of these, the Tier 1 calculation method, uses default values for the potential methane generation capacity (L_0) and methane generation rate (k) to determine when the landfill exceeds the 50 Mg NMOC per year emission threshold. The default L_0 is 170 m^3 per Mg of waste (equal to 5,458 cubic feet methane per ton of waste) and the k values are 0.05 per year for areas receiving 25 inches or more of rainfall per year and 0.02 per year for areas receiving less than 25 inches of rainfall. The Tier 1 default NMOC concentration is 4,000 parts per million by volume (ppmv) as hexane. If the Tier 1 calculated NMOC exceeds 50 Mg per year, the landfill must install controls or demonstrate, using more complex Tier 2 or 3 procedures, that NMOC emissions are less than 50 Mg per year.

A revised rule could allow for alternative Tier 1 default values and modeling techniques based on the amount of organics in the waste. For example, the L_0 is a function of the moisture content and organic content of the waste and L_0 decreases as the amount of organic matter decreases. Recent studies have shown that average U.S. landfill L_0 values have decreased 22 percent between 1990 and 2012 (from 102.6 m^3 per Mg of waste to 79.8 m^3 per Mg of waste) due to increased recovery of organic materials.[102] A revised rule could allow for landfill-specific L_0 values to be calculated based on the amount of degradable organic carbon (DOC), similar to components of Equation HH–1 in the GHGRP for MSW landfills (40 CFR part 98, subpart HH).

Subpart HH of the GHGRP also provides separate k-values for different types of materials, which could be used as alternate Tier 1 default values in revised emission guidelines. Sewage sludge and food waste have the highest k values, followed by garden waste, diapers, paper, textiles and wood and straw.[11]

The IPCC model employs a modeling method to accommodate separate k and DOC modeling parameters as well as separate calculations for six different categories of organic wastes.[103]

If the EPA pursues incorporating alternative Tier 1 modeling values in any revised emission guidelines, the EPA would also need to allow for an alternative first-order decay model structure to compute a total methane generation rate for the landfill based on the sum of the methane generated from each separate waste stream. This alternative model may incorporate material-specific k and L_0 values, instead of a single pair of k and L_0 values applied to bulk MSW. The EPA requests input on whether the alternative modeling parameters and model structure in subpart HH of 40 CFR part 98, or other default parameters or modeling procedures would be appropriate to use for emission threshold determinations in revised emission guidelines.

The EPA also requests input on whether such an alternative modeling procedure would be limited to only those landfills that are employing organic diversion or source separation.

2. Site-Specific Measurements

As indicated above, under the current emission guidelines, there are three different tiers available to an affected landfill to estimate whether the landfill exceeds the NMOC emission threshold of 50 Mg/yr. If an affected landfill fails a Tier 2 test (i.e., the calculated NMOC emissions are greater than 50 Mg/yr), then the landfill must conduct Tier 3 testing or install and operate an active GCCS.

The EPA received input recommending the addition of a new Tier 4 surface emission monitoring (SEM) demonstration to allow increased flexibility for landfills that exceed modeled NMOC emission rates if they can demonstrate that site-specific methane emissions are actually low. This SEM demonstration would be conducted using procedures similar to those currently in 40 CFR part 60, subpart WWW (see 40 CFR 60.755(d)). If the monitoring finds that methane emissions are below a level that the EPA adopts in the revised emission guidelines, then installation of a GCCS could be delayed.

As an example, the California Air Resources Board (ARB) adopted the Methane Emissions from MSW Landfills regulation in 2009.[104] Under this rule, if a landfill exceeds the waste-in-place and heat input thresholds, the landfill may conduct an SEM demonstration prior to being required to install a GCCS. If the measured surface methane emissions exceed 200 ppm, the landfill must install a GCCS. This SEM demonstration is similar to the Tier 4 option being considered by EPA.

The EPA is soliciting input about this new Tier 4 option or other ideas for more flexible emission threshold determination ''Tiers'' and what implementation procedures may be appropriate for each determination. As the EPA takes this new Tier 4 option under consideration, there are some implementation procedures that would need to be established. The EPA requests input on all aspects of implementing a new Tier 4 option, including the following specific items: (1) Which areas of the landfill would be subject to SEM requirements because these areas would no longer be limited to areas with GCCS installed; (2) what number of exceedances over a specified time period would require GCCS installation (40 CFR part 60, subpart WWW specifies a new well must be installed at three or more exceedances

Inspection Program. *http://www.mass.gov/eea/agencies/massdep/toxics/ust/third-party-ust-inspection-program.html.*

[101] Massachusetts Licensed Hazardous Waste Site Cleanup Professional Program, *http://www.mass.gov/eea/agencies/massdep/cleanup/licensed-site-professionals.html.*

[102] Stege, Alex. The Effects of Organic Waste Diversion on LFG Generation and Recovery from U.S. Landfills. SWANA's 37th Annual Landfill Gas Symposium. 2014.

[103] Intergovernmental Panel on Climate Change (IPCC), *IPCC Guidelines for National Greenhouse Gas Inventories.* Volume 5 (Waste), Chapter 3 (Solid Waste Disposal). 2006.

[104] California Code of Regulations, title 17, subchapter 10, article 4, subarticle 6, section 95463, Methane Emissions from Municipal Solid Waste Landfills.

in a quarter); (3) what frequency of SEM demonstration (e.g., quarterly monitoring for landfills accepting waste, annual monitoring for closed landfills) is appropriate; (4) what exceedance level is appropriate for determining if a GCCS must be installed (200 ppm or some other level); and (5) whether the Tier 4 option would apply to all landfills that could demonstrate surface emissions less than the determined exceedance level, regardless of how this level was achieved; or, whether this option would be made available to only those landfills employing and maintaining oxidative cover practices, utilizing biofiltration cells, or implementing other established best practices or organics diversion programs as discussed later in this section.

F. Considerations for Implementation at Closed vs. Active Landfills

The landfills included as part of this review include landfills that have accepted waste since November 8, 1987, and that commenced construction, reconstruction or modification before July 17, 2014. Table 3 of this document summarizes the closure patterns of the approximately 1,800 landfills potentially affected by 40 CFR part 60, subparts Cc and WWW.[105]

TABLE 3—AGE DISTRIBUTION OF EXISTING LANDFILLS

When did landfill stop accepting waste?	All landfills		Landfills with design capacity of 2.5 million Mg or greater	
	Number of landfills	Cumulative waste-in-place (tons) in 2014	Number of landfills	Cumulative waste-in-place (tons) in 2014
Before 1990[a]	33	84,300,000	10	63,200,000
Between 1990 and 1995	335	662,300,000	62	465,500,000
Between 1995 and 2000	242	583,300,000	56	429,500,000
Between 2000 and 2005	97	402,300,000	29	343,000,000
Between 2005 and 2010	82	310,900,000	27	250,500,000
Between 2010 and 2013	77	469,800,000	31	408,400,000
N/A. Active as of 2014[b]	966	6,695,300,000	739	6,493,000,000
Total	1,832	9,208,200,000	954	8,453,100,000

[a] But accepted waste after November 8, 1987.
[b] Excludes model landfills that began operating in 2014 and are expected to be subject to the proposed subpart XXX NSPS for MSW Landfills.

The EPA recognizes that existing landfills represent a wide range of points in the life cycle of a typical landfill. Approximately 39 percent of the existing landfills (707/1,832) closed prior to 2005 and those landfills collectively account for approximately 19 percent of the total waste disposed through 2014. Because these wastes were disposed of between 10 and 25 years ago, the LFG emission rates from these older sites are decreasing and have a significantly smaller contribution to emissions from this source category.

Given the wide range of points within a lifecycle that are represented by potentially affected existing landfills, and recognizing that some of the affected sites have not disposed of waste in over 25 years, the EPA believes that the implementation of any adjustments to the current framework or incorporation of alternative control frameworks or monitoring requirements may affect active landfills differently than inactive landfills. Therefore, the EPA requests input on how adjusting the current framework, selecting an alternative framework or modifying the monitoring requirements should be evaluated in terms of practicality, cost and emission reductions as these adjustments affect landfills of various ages and activity levels.

G. Implementation Issues

Since the landfills emission guidelines were promulgated in 1996, the EPA has become aware of a number of implementation issues for which landfill owners and operators, as well as regulators, need clarification. This section presents those issues and requests input on those clarifications and potential resolutions.

1. LFG Treatment

In this document, the EPA is soliciting input on what constitutes sufficient LFG treatment. In the **Federal Register** document proposing a new subpart resulting from its review of the landfills NSPS (40 CFR part 60, subpart XXX), the EPA refined a numeric definition of LFG treatment and solicited input on a non-numeric definition that required compression, dewatering, and filtration of LFG, as well as the creation of a site-specific monitoring plan. The EPA requests input on whether a non-numeric or numeric treatment requirement is appropriate for landfills subject to the emission guidelines. Further, the EPA requests input on whether previously proposed definitions of LFG treatment should be adopted or if other approaches to LFG treatment should be explored. We are also requesting input on expanding the use of treated LFG fuel for a stationary combustion device, as some people have previously interpreted this compliance option, but also include other uses such as the production of vehicle fuel, production of high-Btu gas for pipeline injection, or use as a raw material in a chemical manufacturing process.

2. Closed Areas

To determine whether NMOC emissions from nonproductive areas of a landfill are less than 1 percent of the total landfill NMOC emissions (and hence controls are not required), the landfills regulations (40 CFR part 60, subparts Cc and WWW) rely on

[105] See Docketed Memorandum ''Summary of Landfill Dataset Used in the Cost and Emission Reduction Analysis of Landfills Regulations. 2014.''

modeled NMOC rates. To refine the measurements of these nonproductive areas, the EPA is requesting input on allowing landfill owners or operators to use either the measured *or* modeled flow of LFG to determine if an area is nonproductive. The EPA is also requesting input on what criteria and procedures would be considered acceptable for making these estimates. The provisions would apply to physically separated, closed areas of landfills.

3. Submitting Corrective Action Timeline Requests

If a landfill exceeds a wellhead operating parameter, the landfill owner or operator must initiate corrective action within 5 days and follow the timeline in 40 CFR part 60, subpart WWW for correcting the exceedance. During implementation of subpart WWW, the question has been raised whether a landfill needs agency approval of corrective action timelines that exceed 15 calendar days but are less than the 120 days allowed for installing a GCCS.

The EPA is seeking input on whether a specific schedule for submitting these requests for alternative corrective action timelines is appropriate because investigating and determining the appropriate corrective action, as well as the schedule for implementing the corrective action, will be site specific and depend on the reason for the exceedance. We also solicit input on whether any clarifications should be included in the revised emission guidelines to expedite the submission of any alternative time line requests (i.e., as soon as they know that they would not be able to correct the exceedance in 15 days or expand the system in 120 days) to avoid being in violation of the rule.

To address implementation concerns associated with the time allowed for corrective action, the EPA requests input on an approach that extends the requirement for notification from 15 days to as soon as practicable, but no later than 60 days. Many requests for an alternative compliance timeline express the need for additional time to make necessary repairs to a well that requires significant construction activities. Extending the time period to as soon as practicable but no later than 60 days may reduce the burden and ensure sufficient time for correction. If the EPA were to extend the time period, then the EPA also would consider removing the requirement to submit an alternative timeline for correcting the exceedance. Thus, by no later than day 60, the landfill would have to either have completed the adjustments and repairs necessary to correct the exceedance, or be prepared to have the system expansion completed by day 120. The EPA is also requesting input on whether 60 days is the appropriate amount of time that would allow owners or operators to make the necessary a repairs.

V. Statutory and Executive Order Reviews

Under Executive Order 12866, titled Regulatory Planning and Review (58 FR 51735, October 4, 1993), this is a ''significant regulatory action'' because the action raises novel legal or policy issues. Accordingly, the EPA submitted this action to the Office of Management and Budget (OMB) for review under Executive Order 12866 and any changes made in response to OMB recommendations have been documented in the docket for this action. Because this action does not propose or impose any requirements, other statutory and Executive Order reviews that apply to rulemaking do not apply. Should the EPA subsequently determine to pursue a rulemaking, the EPA will address the statues and Executive Orders as applicable to that rulemaking.

Nevertheless, the EPA welcomes input and/or information that would help the EPA to assess any of the following: The potential impact of a rule on small entities pursuant to the Regulatory Flexibility Act (RFA) (5 U.S.C. 601 *et seq.*); potential impacts on federal, state, or local governments pursuant to the Unfunded Mandates Reform Act ((UMRA) (2 U.S.C. 1531–1538); federalism implications pursuant to Executive Order 13132, titled Federalism (64 FR 43255, November 2, 1999); availability of voluntary consensus standards pursuant to section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law 104–113; tribal implications pursuant to Executive Order 13175, titled Consultation and Coordination with Indian Tribal Governments (65 FR 67249, November 6, 2000); environmental health or safety effects on children pursuant to Executive Order 13045, titled Protection of Children from Environmental Health Risks and Safety Risks (62 FR 19885, April 23, 1997); energy effects pursuant to Executive Order 13211, titled Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (66 FR 28355, May 22,2001); paperwork burdens pursuant to the Paperwork Reduction Act (PRA) (44 U.S.C. § 3501); or human health or environmental effects on minority or low-income populations pursuant to Executive Order 12898, titled Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 7629, February 16, 1994). The EPA will consider such comments during the development of any subsequent rulemaking.

List of Subjects in 40 CFR Part 60

Environmental protection, Administrative practice and procedure, Air pollution control, Reporting and recordkeeping requirements.

Dated: June 30, 2014.

Gina McCarthy,

Administrator.

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