



## The Changing Picture of Greenhouse Gas Reporting for Landfills

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With all of these GHG reporting and permitting programs in place or in development, GHG-related requirements have quickly become one of the most prominent issues affecting landfills today.



**WITH THE IMPLEMENTATION OF FEDERAL MANDATORY Greenhouse Gas (GHG) reporting in 2010,** landfill owners can find themselves subject to GHG reporting regulations at the federal level, and in some cases, also at the state or local level.

This article will review the Federal Mandatory Reporting Rule (MRR) requirements for municipal solid waste (MSW) landfills subject to mandatory reporting under 40 Code of Federal Regulations (CFR), Part 98, Subpart HH, including recent changes to the reporting rule, reporting and monitoring requirements for those landfills subject to reporting, and what landfills need to do to prepare for reporting. The rule will be treated like any other Clean Air Act (CAA) program with self-reporting and fines for non-compliance, so non-compliance could be a very serious issue.

### Who Does the Rule Affect?

The final Federal MRR was signed on September 22, 2009, and was published as 40 CFR Parts 86, 87, 89, et al., "Mandatory Reporting of Greenhouse Gas; Final Rule," on October 30, 2009. It has undergone continuous changes throughout 2009 and 2010 as the U.S. EPA has issued Frequently Asked Questions (FAQs) and modifications to the rule. On October 7, 2010, the EPA finalized technical corrections to the MRR. The FAQs are now available in a searchable tool on the EPA Web site. The technical corrections and FAQs did not substantially change the reporting requirements of the Federal MRR for landfills, but they addressed several common practices and may require modification of required Monitoring Plans.

The Federal MRR affects GHG sources with more than 25,000 metric tons carbon dioxide (CO<sub>2</sub>) equivalent (MTCO<sub>2</sub>e) emissions. The rule includes reporting for 31 source categories, including MSW landfills in Subpart HH and industrial landfills in Subpart TT. This article will focus on MSW landfills. It is expected that 2,551 MSW landfills will be affected by the EPA MRR out of the 10,000 facilities that are

expected to report (EPA Office of Air and Radiation, 2009), which means landfills are disproportionately impacted compared to the other 30 source categories.

### Monitoring and Reporting

Subpart HH includes new monitoring requirements at applicable landfill facilities. Requirements include continuous or weekly monitoring of methane (CH<sub>4</sub>), landfill gas (LFG) flow, pressure, moisture content and temperature. The Federal MRR also requires calculation of fugitive emissions from LFG. In addition to these new monitoring requirements, a Monitoring Plan is also required. Small and closed landfills are likely to be subject to the EPA MRR due to the low applicability threshold and the fact that applicability is based on CH<sub>4</sub> generation, not actual CH<sub>4</sub> emissions. Additional monitoring and reporting can be expensive for facilities that do not otherwise require extensive monitoring or have the required monitoring equipment in place.

Before the promulgation of the Federal MRR, air emissions from MSW landfills were primarily regulated under Federal New Source Performance Standards (NSPS) rules. Under the NSPS, landfills could be required to collect and destroy their non-methane organic compound (NMOC) emissions. As part of that collection and destruction, landfills subject to the NSPS would monitor LFG flow and composition, but no stringent metering requirements were imposed. The Federal MRR includes metering and calibration requirements that exceed requirements of the NSPS.

The Federal MRR requires the monitoring and reporting of the parameters used to calculate GHG emissions. The facility is also required to create and maintain a GHG Monitoring Plan, which includes identification of the personnel responsible for collecting the emissions data, the processes used to collect the data and quality assurance/quality control (QA/QC) procedures used to ensure the data are accurate. The Monitoring Plan was to be in place at

all facilities subject to the Federal MRR no later than April 1, 2010, but the Monitoring Plan must be modified to address changes to the Federal MRR or the facility as needed. All facilities required to report under the Federal MRR must monitor and report the mass of waste landfilled, the operational status of the landfill, the modeling parameters, the LFG modeling results and the waste composition if composition data were used in modeling.

Sites with an active gas collection and control system (GCCS) have additional reporting requirements under the Federal MRR. While many facilities with a GCCS already monitor some of these parameters, the Federal MRR specifies instrument requirements, monitoring frequency and calibration requirements which may be new or different. **Table 1** summarizes the additional landfill parameters that must be monitored and reported along with their minimum measurement frequency and the minimum calibration frequency.

In addition to the landfill and LFG monitoring requirements, the facility must document any other parameters used to report using general stationary combustion emissions required under Subpart C of the Federal MRR. Frequently the fuels used for stationary combustion can be reported using billing data and Tier 1 emission factors included in the regulation.

### Technical Corrections

The EPA finalized revisions to Subpart HH of the Federal MRR on October 7, 2010, which the EPA characterized as “technical corrections” that it did not expect to significantly change the reporting requirements for landfills.

The regulation now specifically excludes passive LFG collection systems and systems where LFG flows to the surface of the landfill through an opening or pipe naturally, from the definition of

Monitoring Parameter	Measurement Frequency	Calibration Frequency
LFG Flow	Continuous	Biennial <sup>1</sup>
CH <sub>4</sub> Content	Weekly	Annual <sup>1</sup>
Moisture Content <sup>2</sup>	Weekly	Per Manufacturer
Cover Type <sup>3</sup>	Annually	N/A
LFG Temperature <sup>4</sup>	Weekly	Per Manufacturer
LFG Pressure <sup>4</sup>	Weekly	Per Manufacturer
NMOC Correction Factor	Annually	N/A
Destruction Device Operating Time	Annually	N/A
GCCS Operating Time	Annually	N/A

**Table 1**

Landfill and LFG parameters to be monitored under Federal MRR.

*Table Notes:*

1. Or per manufacturer, whichever is more frequent.
2. Not required if CH<sub>4</sub> measurements are done on the same wet/dry basis as volumetric flow.
3. If site-specific cover parameters are used.
4. Not required if LFG flow rate is corrected for temperature and pressure by flow meter.

Table courtesy of SCS Engineers.

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a GCCS. The technical corrections further refined the definition of a dedicated construction and demolition landfill and added a definition of the working capacity.

The technical correction also addressed common practices for the estimating the weight of waste from passenger and light trucks. The regulation now explicitly states that passenger vehicles and light trucks are not required to use scales. The method used to determine the mass of waste from small vehicles and light trucks must be specified in the Monitoring Plan.

The technical changes also included a change in annual calculations for leap years, to address the extra day, explicitly allowed the use of cumulative volumetric flow of LFG. The changes removed the moisture content measurement requirement when the CH<sub>4</sub> content and volumetric flow measurements were both made on the same wet or dry basis. The EPA also defined how weekly measurements of CH<sub>4</sub> concentration should be taken “once each calendar week, with at least three days between measurements.” The technical correction required that the annual sample collected for the NMOC correction factor determination must be collected at the routine sampling location.

The EPA removed the requirement that gas flow meters be calibrated before the first year of reporting, 2010, if the meter was on schedule for calibration per the manufacturer. The technical correction added a requirement that the facility report whether it had used leachate recirculation within the past 10 years and the typical frequency of the use of leachate recirculation. Sites are also required to report whether scales are present at the facility. Facilities are also required to report whether passive vents or passive flares are present on the site. Sites are no longer required to report the oxidation fraction of CH<sub>4</sub> in the landfill cover and the cover data used to calculate the oxidation.

The technical corrections now require facilities that recirculate leachate to calculate the amount of rainfall plus leachate to determine the refuse decay rate (k value) to use in modeling. Previously, all landfills with leachate recirculation were required to use the highest k value, even if the recirculated leachate was only equal to a few inches of annual rainfall. The technical corrections also require areas of landfills with final cover that is less than three feet of clay to use the intermediate cover collection efficiency.

These technical corrections will not significantly impact the requirements of the Federal MRR, but sites should be sure their Monitoring Plans address the changes.

### Examples of State GHG Reporting Programs

In addition to the Federal MRR, several states have instituted their own GHG reporting programs. The following briefly discusses the existing reporting programs in California and Massachusetts as examples.

#### California

Governor Arnold Schwarzenegger signed the California Global Warming Act of 2006 (Assembly Bill [AB] 32; Stats. 2006, Chapter 488), on September 27, 2006. As part of AB23, the California Air Resources Board (CARB) required the reporting of GHG emissions under a state program starting with the 2008 calendar year. Unlike the Federal MRR, the California program requires the verification of reported emissions by third-party verifiers.

Landfills are not categorically regulated under the AB32 Mandatory GHG Reporting Rule, but may fall under the general stationary combustion facility reporting threshold of 25,000 MTCO<sub>2</sub>e per year from combustion or the electric generating facilities threshold of a total facility nameplate generation capacity of 1 Megawatt (MW) and combustion emissions greater than 2,500 MTCO<sub>2</sub>e per year. The 25,000 MTCO<sub>2</sub>e threshold for general combustion

is equivalent to approximately 1,700 standard cubic feet per minute (scfm) at 50 percent CH<sub>4</sub> of LFG combusted, which is significantly higher than the approximately 270 scfm LFG generation rate that triggers the Federal MRR, and it is based on actual CH<sub>4</sub> combustion, not modeled emissions. Except for some microturbine projects, facilities with power generation are likely to exceed the 2,500 MTCO<sub>2</sub>e threshold which is approximately 170 scfm of LFG.

The monitoring requirements in the California program are less specific than those in the Federal MRR. The accuracy requirement in the California Code of Regulations (CCR), Title 17, §95103(a)(9), requires that “data measurements (mass or volume flow) used to calculate GHG emissions that quantify fuel use with an accuracy within ±5 percent. All fuel use measurement devices shall be maintained and calibrated in a manner and at a frequency required to maintain this level of accuracy.” While the calibration requirements are less specific than the Federal MRR, the accuracy and calibration of the meters is subject to verification. The California program also requires the capture of 80 percent of the data required for reporting, which allows for some equipment downtime.

CARB has indicated that it will be revising the reporting rule to bring reporting and monitoring requirements more in line with the Federal MRR, and draft changes have been released for public comment with a vote scheduled for December 16, 2010 by the CARB Board. Facilities are required to report under the existing rule, as well as the Federal MRR. The revisions proposed by CARB are in part intended to jibe with CARB’s proposed Cap and Trade program under AB 32, which has also been released for public comment.

#### Massachusetts

The Massachusetts legislature passed the Global Warming Solutions Act, which was approved by Governor Deval Patrick on August 7, 2008. The Global Warming Solution Act required that the Massachusetts Department of Environmental Protection (MDEP) pass regulations requiring that facilities emitting more than 5,000 short tons of CO<sub>2</sub> equivalent (STCO<sub>2</sub>e) or with a Title V permit to report their GHG emissions to the MDEP. In December, 2008, MDEP promulgated the new reporting regulation as 310 Code of Massachusetts Regulation (CMR) 7.71, which was amended in March, 2009. Even small landfills are likely to be subject to the GHG reporting required by the Global Warming Solutions Act due to the low reporting threshold.

Title V facilities and facilities with GHG emissions greater than 5,000 STCO<sub>2</sub>e are subject to the Massachusetts program. Landfills are not categorically required to report GHG emissions, but many landfills will be subject to the program because they have emissions over the reporting threshold or have Title V permits due to NSPS status. It is expected that most landfills with Title V permits will have emissions greater than 5,000 STCO<sub>2</sub>e.

GHG emissions are reported to the MDEP using the The Climate Registry’s (TCR’s) General Reporting Protocol (GRP), but MDEP requires reporting at the facility level rather than the entity level. TCR does not have methodologies approved for landfills, but landfill emissions are included in the TCR Local Government Operations (LGO) Protocol. Landfills that are part of a LGO may be required to report using the LGO protocol. Emissions from private landfills can be reported using any verifiable methodology. The Massachusetts program does not detail what parameters must be monitored and retained, but the documentation must be sufficient to satisfy the verifier.

The Massachusetts program requires the reporting of GHG emissions from mobile sources associated with a facility, which are not required by the Federal MRR or AB32 in California. Landfills are likely to have several mobile sources at the facility, such as compactors, forklifts, tippers and other equipment.

Other states with GHG reporting programs in place or in development that may impact landfills include Washington, Oregon and New Mexico.

## Putting Programs Into Place

Landfills are finding themselves subject to both state and federal mandatory GHG reporting requirements, and those requirements are changing as programs develop. Those reporting programs have addressed landfills in a variety of ways and a single evaluation or tool is unlikely to suffice for most landfills. Facilities subject to NSPS requirements are likely to have the basic configuration, equipment and procedures in place for reporting under most GHG reporting programs, but each site will have to conduct its own evaluation. At the bare minimum, facilities subject to mandatory GHG reporting will have to create monitoring plans and programs for each program to which they find themselves subject.

Some reporting programs, such as California's AB32, have reporting thresholds that are generally higher than the Federal MRR threshold. These states will have fewer facilities subject to state GHG reporting programs that are not already subject to the Federal MRR, but higher reporting thresholds can result in small landfills being subject to the rule if they have special circumstances such as power generation or neighboring facilities under common control. Facilities must also evaluate the correct parameters for each reporting program, which may be different. The Federal MRR applicability is triggered by CH<sub>4</sub> generation, but states may use actual combustion emissions or fugitive CH<sub>4</sub> emissions in their applicability threshold.

Finally, each delegated CAA agency, which would include most states and various local air pollution control agencies, have the authority to require GHG reporting under their existing permitting programs, such as Title V. Each landfill or LFG to energy (LFGTE) facility should determine whether this is the case in their jurisdiction, which could result in yet another duplicate set of GHG reporting requirements. With the promulgation of the "Tailoring Rule" for GHG by the EPA, Title V as well as Prevention of Serious Deterioration (PSD) permitting programs will likely require GHG reporting, among other things, if GHG, Title V, and/or PSD applicability is triggered. With all of these GHG reporting and permitting programs in place or in development, GHG-related requirements have quickly become one of the most prominent issues affecting landfills today. | WA

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