

THE IMPACT OF FEDERAL CLIMATE CHANGE LEGISLATION AND REGULATION ON THE SOLID WASTE INDUSTRY

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ABSTRACT

The solid waste industry has been waiting for several years to see how the federal government will attack climate change, and has been bracing for the impact. During this time, several regions, states, and even local jurisdictions have developed some semblance of climate change programs, with California being at the forefront of this movement. It appears, however, that the federal government is finally getting into the greenhouse gas (GHG) game, and that possible impacts on the solid waste industry could be significant.

This paper details various federal climate change regulations and legislation, both final and proposed, that could affect the industry. With the U.S. Supreme Court's ruling that GHGs can be regulated under the Clean Air Act (CAA) and the U.S. Environmental Protection Agency's (EPA's) endangerment finding, groundwork has been laid for extensive regulation of GHGs. New GHG regulations include EPA's mandatory reporting rule as well as proposed climate change and renewable energy legislation, which are currently making their way through the U.S. Congress.

In addition, the potential effect of the Tailoring Rule on the Prevention of Significant Deterioration (PSD) and Title V programs will be substantial.

Specifically, this paper assesses which solid waste facilities, and of what size, are likely to be subject to mandatory reporting; what the reporting requirements will entail; and what additional monitoring and recordkeeping programs will be necessary to comply. The effect of Tailoring Rule provisions on landfills will also be assessed. In addition, the impact of renewable energy legislation, insofar as it has been impacted and/or is driven by climate change issues affecting solid waste facilities, will be considered.

This paper also assesses the likelihood and manner in which EPA (and/or Congress) may utilize climate change as a driver to require additional methane reductions at

landfills, such as the early action rule for landfills under California's AB32. This includes analysis of EPA's possible revisiting of landfill New Source Performance Standards (NSPS).

INTRODUCTION

After many years of speculation as to whether or not climate change would ever become a U.S. priority, it has become clear that climate change is here to stay. From the U.S. Supreme Court ruling that the EPA has authority and the obligation to regulate GHGs under the CAA, to regulations such as the Federal Mandatory Reporting Rule and the California Mandatory Reporting of Greenhouse Gas Emissions Rule, as well as the Tailoring Rule, and from federal legislation in the U.S. House of Representatives and the U.S. Senate, clearly climate change has become a federally controlled program.

BACKGROUND/HISTORY

Over the last 10 years, GHG has come to the forefront of the environmental movement. The United Nation's Intergovernmental Panel on Climate Change (IPCC) has indicated that a concerted and coordinated effort must be made to limit the effects of global warming. Approximately 22 percent of the world's GHG emissions originate in the U.S.

The United Nations Framework Convention on Climate Change (UNFCCC) has aimed at combating global warming with the goal of achieving "stabilization of GHG concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (UNFCCC, 2005). The Kyoto Protocol established the following six substances as recognized GHGs: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). Of these six gases, anthropogenic methane from landfill gas (LFG) is the driver that brings landfills to the forefront of federal climate change legislation and regulation.

REGULATORY/LEGISLATIVE ANALYSIS

Federal Climate Change Regulation/Legislation

In the past year, important steps towards regulating GHG emissions have been taken. These include the EPA's issued endangerment finding that GHG emissions endanger public health and welfare, the federal Mandatory Reporting Rule, climate change legislation, and renewable energy legislation.

Federal climate change regulations have already been developed by federal agencies such as the EPA, and climate change legislation has been debated in Congress. The EPA Mandatory Reporting Rule and the Tailoring Rule are two examples of the EPA creating regulations to enforce climate change. On the other side, Congressional bills, cap and trade programs, and renewable energy programs exemplify legislation that is on the forefront of shaping our nation's future GHG programs and laws.

Climate Change Regulation

The two primary climate change regulations were both formed as a result of the U.S. Supreme Court's endangerment findings on GHGs in 2007.

Supreme Court Case/EPA Endangerment Findings: In the debate over climate change and GHGs, in 2007 the Supreme Court found that GHGs, including carbon dioxide, are air pollutants covered by the CAA (*Massachusetts v. EPA*, 549 U.S. 497 (2007)). The Supreme Court's ruling tasked the EPA with determining whether GHG emissions cause or contribute to air pollution, which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain. In 2009, under its Climate Change Division, Office of Atmospheric Programs, the EPA came out with the "Endangerment and Cause of Contribute Finding for GHGs under Section 202(a) of the CAA."

The endangerment findings were published in the federal register on December 15, 2009, and alleged that the "six greenhouse gases taken in combination endanger both the public health and the public welfare of current and future generations.... [They also found] that the combined emissions of these greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas air pollution that endangers public health and welfare" (CAA section 202(a)). The EPA holds that the endangerment findings are based on careful consideration of the full weight of scientific evidence, and a thorough review of numerous public comments received on April 24, 2009, published the Proposed Findings.

Under Section 111 of the CAA, municipal solid waste (MSW) landfills are listed and regulated under the NSPS. However, the EPA has argued that the NSPS does not

regard health effects resulting from climate change, or those from climate change distressing public health or welfare. In the proposed rule, EPA stated: "The EPA has documented many cases of acute injury and death caused by explosions and fires related to municipal landfill gas emissions. In addition to these health effects, the associated property damage is a welfare effect" (56 Federal Register (FR) 24474). The EPA considers injury and death from landfill fires resulting from LFG to be health effects, though the injury did not result from direct exposure to LFG. As such, the EPA considers the injury to be a human health effect; and landfills are to be regulated by the outcome of the endangerment findings, which led to the creation of the EPA's Mandatory Reporting Rule within which landfills are directly regulated.

EPA Mandatory Reporting Rule: The Final EPA Mandatory Reporting Rule was signed on September 22, 2009, and was published in the FR as 40 Code of Federal Regulations (CFR) Parts 86, 87, 89, et al., "Mandatory Reporting of Greenhouse Gas; Final Rule," on October 30, 2009. The EPA Mandatory Reporting Rule affects GHG sources with over 25,000 metric tons carbon dioxide equivalent (MTCO₂e). In addition to the 25,000 MTCO₂e reporting requirement, the rule includes reporting for 31 source categories, including landfills. Calendar year 2010 is the first year of reporting under the EPA Mandatory Reporting Rule, and the first official reporting deadline is March 31, 2011. The rule will be treated like any other CAA program.

The regulation requires the reporting of GHG emissions from all sectors of the economy in the U.S. The rule requires that specific industries/source categories report, along with any facility that emits 25,000 MTCO₂e from stationary combustion in 2010 or after. Depending on which category trips the reporting requirement, the required gases to report may vary from the six internationally recognized GHGs from the Kyoto Protocol and other fluorinated gases, including nitrogen trifluoride (NF₃) and hydrofluorinated ethers (HFEs). The rule does not require control or destruction of GHGs; rather, it requires only that sources above certain threshold levels monitor and report emissions.

Landfills are directly regulated under 40 CFR Part 98, Subpart HH. Those accepting hazardous waste, industrial waste, and construction and demolition wastes only do not need to report. MSW landfills, which accepted waste after 1980 and generate over 25,000 MTCO₂e, must report methane generation and emissions from landfills, methane destruction resulting from LFG collection and combustion systems, and CO₂, CH₄, and N₂O from all regulated general stationary fuel combustion sources. The 25,000 MTCO₂e generation threshold equates to landfills that generate approximately 270 standard cubic feet of LFG at

50% CH₄. These landfills are required to report under the rule.

Subpart HH triggers new monitoring requirements at applicable landfill sites. Requirements include continuous monitoring of methane, LFG flow, pressure, moisture content, and temperature or weekly testing. When calculating fugitive emissions from LFG, the EPA/IPCC method and site-specific information are required. 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 Mandatory Reporting Rule due to the low threshold. Additional monitoring and reporting can be expensive for sites that do not otherwise require extensive monitoring or expensive equipment.

It is expected that 2,551 MSW landfills will be affected by the EPA Mandatory Reporting Rule out of the 10,000 facilities that are expected to report (EPA Office of Air and Radiation, 2009).

Tailoring Rule: On September 30, 2009, the EPA issued a proposed "Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule (74 FR 55292)" that would establish a transition period for the implementation of PSD and Title V permitting requirements for major stationary sources that emit GHGs.

GHGs have not historically been regulated air pollutants subject to PSD or Title V permit programs, since the emissions were not subject to control requirements from the federal CAA. The EPA intends to promulgate final rules regulating GHG emissions (i.e., upcoming mobile source standards), turning GHGs into regulated air pollutants, thereby forcing an unprecedented number of stationary sources to be subject to new PSD and Title V permits requirements. Tailoring facilities in response to PSD and Title V permitting programs is required so that the number of GHG-emitting facilities regulated under these programs will be administratively manageable and make practical sense. This is the legal basis for changes to the current major source thresholds for GHGs.

When GHGs become regulated pollutants under the CAA, both PSD and Title V programs will automatically apply to all major sources, since these regulations apply to any regulated pollutant emitted above specified thresholds. The CAA states that PSD includes "any...source with the potential to emit two hundred and fifty tons per year (tpy) or more of any air pollutant" (42 U.S.C. §7479(1)).

If the rule is not tailored, EPA's position is, therefore, that small emitters, such as restaurants, would easily exceed the current potential to emit thresholds of 100 tpy or more of regulated pollutant as subject to Title V programs, and any

stationary source that has a potential to emit 250 tpy or more of a regulated pollutant would be subject to the PSD program.

According to the EPA's Tailoring Rule, the EPA estimates that over 41,000 new and modified stationary sources per year would be subject to PSD review, and more than 6 million stationary sources would become newly subject to Title V under the current CAA regulation. GHGs are likely to become a regulated pollutant by the spring of 2010, and the increase would be unmanageable. Every landfill with a destruction device would most likely be applicable under the current standards.

The Tailoring Rule proposes that the GHG major source thresholds and significant levels be temporarily increased to greater than 25,000 MTCO₂e for PSD, and that Title V major sources greater than 10,000 MTCO₂e be increased to 25,000 MTCO₂e for PSD significance levels. This would automatically revise program approvals to implement new thresholds upon the Tailoring Rule's effective date for Title V programs, PSD State Implementation Plan (SIP) programs, PSD EPA programs, and PSD delegated programs. The Tailoring Rule proposes to lift the burden of obtaining a Title V operating permit required by the CAA and PSD requirements for smaller new or modifying sources of GHG sources for a period of 6 years.

If the proposed thresholds change to 25,000 MTCO₂e, there will be an estimated 3,000 new Title V permits and approximately 100 additional PSD permit actions triggered per year. At the proposed increased threshold, 68 percent of CO₂e emissions are covered by the permit programs. Landfills applicable to the EPA Mandatory Reporting Rule would also have to fulfill PSD and Title V requirements. Like the EPA reporting rule, landfills would be disproportionately affected by these thresholds, resulting in many new Title V and PSD landfill sites.

All new or modified PSD sources will have to be evaluated for GHG emission increases as a regulated pollutant. Existing stationary sources will be affected when a modification is proposed which will increase an attainment pollutant or any other regulated pollutant by a significant amount. All newly subject Title V sources will have 12 months after the effective date to submit a Title V application. Existing Title V permits will be affected when PSD permitting is triggered for new and modified sources when an application for Title V renewal is submitted.

In order to accomplish the proposed Tailoring Rule, the EPA is currently developing GHG permitting guidance to assist local agencies. These include estimation methods, control strategies, monitoring, best available control technology (BACT) analysis, and Clean Air Act Advisory

Committee (CAAAC) New Source Review (NSR) and Climate Change workgroups. The EPA plans to identify permit streamlining actions such as issuing general permits. After 5 years, the EPA will evaluate the GHG threshold and revise it if deemed appropriate.

If the preferred interpretation of the regulated pollutant is promulgated, then the final Tailoring Rule must be signed no later than the end of March 2010.

The EPA is attempting to amend the major source threshold for PSD and Title V for GHGs to limit the number of sources impacted and to reduce the administrative burden on permitting agencies. The setting of a new threshold may impact specific industry sectors, including the solid waste sector. In addition, the EPA has not followed its own requirements in issuing the proposed rule. The EPA should have regulated GHGs without the establishment of a National Ambient Air Quality Standard (NAAQS) for GHGs. Also, a satisfactory comprehensive regulatory impact analysis has not been completed. The regulatory impact analysis that was provided for MSW landfills was not transparent, and values presented cannot be replicated. This makes it impossible to effectively and precisely define and analyze the impact of the proposed rule on landfills or other industries in the solid waste sector; however, this impact is likely to be huge.

Climate Change Legislation

Both houses of Congress introduced climate change legislation last year, including the American Clean Energy and Security Act of 2009 (ACES) and the Clean Energy Jobs and American Power Act (CEJAP). Either or both of these bills could shape the future of GHG mandatory reporting in the United States. Both bills look at reducing the six internationally recognized GHGs, NF₃, and NF₂.

American Clean Energy and Security Act of 2009: In late March 2009, Congressmen Henry Waxman (D-CA) and Edward Markey (D-MA) introduced a discussion draft of the ACES. ACES set forth provisions concerning clean energy, energy efficiency, reducing global warming pollution, transitioning to a clean energy economy, and providing for agriculture and forestry related offsets. ACES represents a comprehensive effort to address climate change by promoting alternative energy and establishing a flexible cap-and-trade system for GHGs. The legislation includes sector-specific sources, including refiners and importers of petroleum fuels, and large stationary sources emitting more than 25,000 MTCO₂e per year to be regulated.

ACES sets forth three provisions. The first provision creates combined energy efficiency and renewable electricity standards, and requires that retail electricity suppliers meet 20 percent of their demand through

renewable electricity and electricity savings by 2020. The second provision sets forth a goal of, and requires a strategic plan for, improving overall U.S. energy productivity by at least 2.5 percent per year by 2012, and maintains that improvement rate through 2030. The third provision establishes a cap and trade system for GHG emissions, and sets GHG emissions reduction goals by 83 percent of 2005 levels by 2050. ACESA was approved by the U.S. House of Representatives on June 26, 2009, but the Senate has yet to act on it.

Under ACES, landfills are not included under cap and trade restrictions, and GHGs are not regulated under the CAA. However, the legislation would create a chance for a new NSPS for uncapped methane sources, promotion of renewable LFG-to-energy (LFGTE) projects, and identification of landfill methane reduction as viable credits for cap and trade. In the House's GHG legislation, LFG is considered "other qualifying energy resources," which could open the possibility for LFGTE projects around the nation. However, if a new NSPS-like standard is promulgated for smaller landfills, it is unlikely that projects will occur that can create "additional" reductions beyond what is required to create GHG credits.

Clean Energy Jobs and American Power Act (CEJAP):

On September 30, 2009, Senators John Kerry (D-MA) and Barbara Boxer (D-CA) introduced proposed climate change legislation, CEJAP, to the U.S. Senate. CEJAP's goals were to create clean energy jobs, reduce pollution, and protect American securities by enhancing domestic energy production and combating global climate change by setting GHG emission reductions with market incentives. Entities covered by this proposed bill would be required to hold enough GHG emission allowances to match their emissions. The bill also contains complementary measures, including targeted emission standards, support for research, development and deployment of low carbon energy alternatives, and expanded programs to increase energy and water efficiency. Finally, the bill includes provisions to ease the transition to a clean energy economy by protecting consumers, workers, and energy-intensive industries from the impact of higher energy costs.

This draft legislation sets more stringent reductions targets than the House bill (ACES). CEJAP sets a target to reduce GHG emissions to 20 percent below 2005 targets by 2020, and 83 percent below 2005 targets by 2050. The Senate's draft legislation creates Pollution Reduction and Investment (PRI) targets and uses market incentives to find the most affordable path to achieve them. This approach would still require entities that fall under the proposed legislation to hold one carbon credit for every MTCO₂e they emit, and the total amount of carbon credits would decrease overtime. The bill aims to create a program that

can generate an economy-wide, market-based program for reducing GHGs emissions.

Both the ACES and CEJAP provide the framework for an offsets program. Landfill methane destruction projects would be eligible projects; however, under ACES, additional performance standards on landfill methane emissions would be required. Priority for additional performance standards should be given to the largest emitters, and the Administrator must "take into account the reductions achievable through the application of energy efficiency measures, carbon capture and storage technologies, and measures available to achieve offsets from methane sources listed under Section 733." No action has been taken on this bill to date.

Renewable Energy Legislation: Renewable energy typically depends directly on ambient natural resources such as hydrological resources, wind patterns and intensity, and solar radiation: renewable sources which tend to be more sensitive to climate variables. Fossil fuels or nuclear energy systems tend to rely on geological stores, and are thought to be more reliable. In addition, extreme weather events have adverse effects on energy production, distribution, and fuel transportation (Climate Change Science Program [CCSP], 2007a). Another issue is that renewable energy production tends to be highly susceptible to localized and regional changes in resources. One of the issues facing landfills is whether they qualify as renewable energy.

Section 161 of CEJAP would provide grants to states to help them achieve their renewable energy profiles, which would include both waste-to-energy facilities and LFG as qualified renewable sources under this provision. Like ACES, a specific framework for offset programs is provided; however, specific details are excluded, but landfill methane destruction projects are eligible project types under Section 733.

LFG methane can be captured, converted, and used as an energy source, reducing emissions and providing an important renewable energy source, which is often forgotten. Since MSW landfills account for the second largest source of human-related methane emissions in the U.S., there is a huge potential for harvesting the landfill methane emissions and converting this biogenic source to a renewable energy source. Landfill waste-to-energy projects annually prevent the release of 65.3 million MTCO₂e that would otherwise be emitted to the atmosphere. LFGTE appears to be treated very fairly in the proposed federal renewable energy legislation. Landfills, which are already regulated under federal, state, or local laws, are not currently eligible to become methane reduction products, since it is required by law that LFG be destroyed, making the potential project mandatory. In

situations where a landfill is required to destroy the LFG generated on site, and there is no economic incentive, the site will most likely destroy the LFG in the most inexpensive way (flaring), instead of creating a renewable energy project due to the start-up cost.

California Climate Change Regulation

On September 27, 2006, Governor Arnold Schwarzenegger signed the California Global Warming Act of 2006 (Assembly Bill [AB] 32); Stats. 2006, chapter 488). The California Legislature declared that global warming poses a serious threat to economic well-being, public health, natural resources, and the environment of California. This is the first legislation of its kind, a comprehensive program of regulatory and market mechanisms to achieve real, quantifiable, cost-effective reduction of GHGs. AB32 mandates that California reduce its GHG emissions to 1990 levels by 2020, and 80 percent below 1990 levels by 2050. The regulation requires a statewide cap on GHG emissions, starting in 2012. The California Air Resource Board (CARB) is responsible for establishing a mandatory reporting system, early action measures, and cap and trade programs.

Landfills are not directly regulated under the Mandatory GHG Reporting Rule, but may fall under the general stationary combustion facility requirement of emitting over 25,000 MTCO₂e per year and/or the all electric generating facilities requirement with a name plate capacity over one megawatt. Biomass is included in the calculation to determine if a facility is mandated to report. Many California LFGTE and waste-to-energy projects are required have to report under AB32. Once a facility is subject the regulation, all stationary combustion sources at a facility must be reported.

Due to similarity of their reporting thresholds, landfills subject to AB32 are also likely subject to the EPA Mandatory Reporting Rule. California Landfills are reporting almost identical information to both state and federal agencies. This redundancy may add additional cost to landfill owners and operators. The majority of California landfills which are applicable under AB32 are already reporting under other federal and state programs like NSPS and Title V permits.

AB32 also mandated the creation of early action measures. CARB approved 43 GHG reduction strategies which include nine discrete early actions, 24 other early actions, and ten existing diesel control measures. Landfill methane capture, setting statewide standards for the installation and performance of active GCCS at uncontrolled MSW landfills, is one of the nine discrete early action measures which were created.

In June 2007, CARB identified a measure to reduce

methane from MSW landfills as a desecrate early action, known as the proposed Landfill Methane Rule (LMR). The LMR's goal is to attain required GHG reductions through creation of methane reductions from MSW landfills by improved gas capture measures which include earlier LFG GCCS installation, required GCCS installation at smaller landfills, and increased surface emissions monitoring (SEM) frequency, lower limit, and/or tighter spacing of wells. The proposed LMR would require landfill owners and operators of smaller and other uncontrolled landfills to install GCCS and ensures that existing and newly installed GCCS are operating optimally.

If a landfill is required to report under the proposed LMR, the landfill must be in full compliance 18 months after approval of GCCS Design Plan for active sites and 30 months for closed sites. Enhanced SEM which necessitates instantaneous SEM reading to be below 500 parts per million by volume (ppmv) at three inches from the ground surface, and integrated SEM readings at a limit of 25 ppmv using the South Coast Air Quality Management District (SCAQMD) Rule 1150.1 methodology. Active sites are required to conduct quarterly enhanced SEM testing, and closed sites are required to conduct annual SEM testing as long as there are no exceedances of 500 ppmv for 4 quarters. There are new control system requirements which include, 99 percent control efficiency for methane, annual source testing, enclosed flares only, and temperature and flow monitoring and recording to name a few.

The proposed LMR does not set a limit on generate landfill emissions but requires all applicable California landfills to reduce emissions with improved equipment and increased monitoring. The cost of installing or upgrading a GCCS, or increasing monitoring can be expensive item for a landfill owners and operators. Many of the sites that are required to install new GCCS are older, small landfills which are not regulated by other agencies due to their activity status and potential emissions levels. The rule was adopted in May 2009 and is set to take effect in the spring of 2010.

AB32 also mandated the creation of a Scoping Plan, which was adopted by the CARB on December 11, 2008. The Scoping Plan is a mix of strategies that combine market mechanisms, other regulation, voluntary measures and fees which were incorporated into the early action measures. The Scoping Plan also looked at broad-based cap-and-trade programs, and complementary measures such as energy efficiency, vehicle emissions standards, high global warming potential measures, renewable, and land-use planning. The landfill industry is still waiting to see how it will fare in the upcoming AB32 cap and trade program.

INDUSTRY IMPACTS

Impact on Solid Waste Facilities from Existing/Planned Regulation

The EPA Mandatory Reporting Rule, CARB Mandatory GHG Emissions Reporting Rule, and the proposed AB32 Landfill Methane Rule all have different requirements for applicability, reporting, and monitoring.

Applicability

Below is a summary assessment of the applicability of solid waste facilities that are likely to be subject to reporting under the EPA Mandatory Reporting Rule, CARB Mandatory GHG Emissions Reporting Rule, and the proposed AB32 LMR.

EPA Mandatory Reporting Rule: The EPA Mandatory Reporting Rule applicability assessment for MSW landfills is contained in Subpart HH §98.34 through §98.341 and are summarized below.

- MSW landfills that generate methane in amounts equivalent to 25,000 MTCO₂e or more per year
- MSW landfills which accepted waste after January 1, 1980.
- This source category does not include hazardous waste landfills, construction and demolition landfill, or industrial landfills.
- This source category consists of the following sources at MSW landfills: Landfills, LFG collection systems, and LFG destruction devices (including flares).

Landfills which meet the above criteria and collect about 185 scfm or more LFG at 50 percent methane will be subject to the EPA Mandatory Reporting Rule unless they can demonstrate LFG collection efficiency greater than 75 percent. Landfills which generate approximately 270 scfm of LFG at 50 percent methane per the EPA gas generation model will be subject to the EPA Mandatory Reporting Rule. The EPA methane generation calculations/modeling requires the use of a conservative 10 percent factor to account for methane oxidation as LFG crosses a landfill cover.

CARB Mandatory GHG Emissions Reporting Rule:

Applicability evaluation contained in Subchapter 10 Article 2 §95101 of the CARB Mandatory Reporting of GHG Emissions Reporting Rule and recapped below:

- Operators of other facilities in California that emit greater than or equal to 25,000 MTCO₂e per year from stationary combustion sources or have a nameplate generating capacity greater than or equal to one megawatt (MW) and emit greater than or equal to 2,500 MTCO₂e from stationary

combustion sources in any calendar year after 2007.

Landfills which meet the reporting requirements are primary classified as a general stationary facility or "other" reporter. Applicable LFGTE projects report as cogeneration facilities. Landfills, which qualify under the regulation, must report annual until the landfill reports less than 20,000 MTCO₂e per year for three consecutive years LFGTE project closes, or reports less than 2,000 MTCO₂e per year for three consecutive report years.

Proposed AB32 Landfill Methane Rule: Applicability of the proposed LMR for MSW landfills in California are covered in §95461 and exemptions to the rule are covered in §95462 of the Proposed regulation and are summarized below:

- Solid waste landfills that received solid waste after January 1, 1977.
- This subarticle does apply to landfills that receive only hazardous waste, are currently regulated under the Comprehensive Environmental Response Compensation and Liability Act 42 U.S.C., Chapter 103 (promulgated 12/11/80; Amended 10/17/86), construction and demolition wastes, or non-decomposable wastes.
- Active MSW landfill which reach a size greater than or equal to 450,000 tons of waste-in-place or when the owner or operator submits a Closure Notification pursuant to section 95470(b)(1) of the regulation.
- Landfills with a LFG heat capacity of greater than 3.0 million British thermal units per hour (MMBtu/hr).
- Landfills that cannot demonstrate that after four consecutive quarterly monitoring periods there is no measured concentration of methane of 200 ppmv or greater using the instantaneous surface monitoring procedures.

California landfills which meet the requirements of the proposed regulation will have to will have to comply indefinitely until they no longer meet the applicability requirements.

Monitoring Requirements

Below is a review of solid waste facilities monitoring requirements under the EPA Mandatory Reporting Rule, CARB Mandatory GHG Emissions Reporting Rule, and the proposed AB32 Landfill Methane Rule.

EPA Mandatory Reporting Rule: Monitoring Requirements are reviewed in Section §98.344 of Subpart HH of the EPA Mandatory Reporting Rule and are discussed below:

- Waste disposal amounts (Scale house).
- Continual gas flow monitoring.
- Gas flow correction for temperature, pressure, and moisture.
- Methane Monitoring:
 - Continuous, or
 - At least weekly.
- The owner or operator shall document the procedures used to ensure the accuracy of the estimated of disposal quantities and, if applicable, gas flow rate, gas composition, temperature, and pressure measurements.

The EPA Mandatory reporting Rule provides instructions for missing data points, and includes calibration requirements. In addition to using the EPA model to estimate gas generation, landfills that have GCCS must perform an alternative estimate of collection efficiency and GHG emissions, and must comply with specific gas monitoring requirements by January 1, 2010 with best available methods, and to be in full compliance with the rule by April 1, 2010.

CARB Mandatory GHG Emissions Reporting Rule:

General GHG reporting requirements are evaluated in §95103(a). These requirements are examined below:

- Stationary combustion emissions:
 - CO₂, CH₄, N₂O, and CO₂biomass.
- Fuel information:
 - Fuel consumption by fuel type,
 - Average annual carbon content by fuel type, or
 - Average annual high heat value by fuel type.
- Indirect energy usage purchased from each electricity or energy provider.

The CARB Mandatory GHG Emissions Reporting Rule provides provisions for missing data per fuel source where at less 80 percent but less than 100 percent for any emissions source. Facilities were required to report their 2008 emissions by June 1st, 2009 and every subsequent year until they are no longer applicable. Verification was not required the facilities first year, however every reporting entity is required to have their 2009 emissions inventory verified in 2010. Landfills and LFGTE projects are typically required to obtain a positive verification on a three year cycle starting with their 2009 inventories.

Proposed AB32 Landfill Methane Rule: Proposed monitoring requirements are located in §95469 and of the proposed LMR. These requirements are listed below:

- GCCS Design Plan.
- Monthly wellhead monitoring and requirement to achieve negative pressure at all wellheads, corrective action/re-monitoring
- Quarterly instantaneous SEM at 25-foot spacing with a 500 ppmv methane limit, including testing of all cover penetrations, with corrective action/re-monitoring.
- Quarterly leak testing of GCCS components not under vacuum at a 500 ppmv methane limit, including corrective action/re-monitoring.
- Quarterly integrated surface sampling with a limit of 25 ppmv.
- Monthly cover integrity monitoring.
- Continuous flow and temperature monitoring.
- 99 percent destruction efficiency for methane in LFG control device as demonstrated during annual source testing. Lean burn engines can use alternate limit of 3,000 ppmv methane in the exhaust.
- Enclosed flares required with only limited use of candlestick flares.
- Breakdown and upset notices.
- Specific recordkeeping requirements and limits on GCCS downtime.

The proposed LMR provides test methods and procedures which explicitly inform an owner or operator how to conduct monitoring at a MSW landfill which is applicable to the regulation.

Reporting Requirements

Below is an evaluation of solid waste facilities reporting requirements under the U.S. EPA Mandatory Reporting Rule, CARB Mandatory GHG Emissions Reporting Rule, and the proposed AB32 Landfill Methane Rule.

EPA Mandatory Reporting Rule: Reporting requirements for MSW landfills are reviewed below for §98.346 in Subpart HH of the EPA Mandatory Reporting Rule.

- Landfill Operations (open/closed/year).
- Waste disposal calculations.
- Waste composition.
- Modeling parameters used.
- Methane data.
- Landfill area, cover types by area, and oxidation fractions used.
- Methane generation and methane emissions from landfills modeling.
- Methane destruction resulting from LFG collection and combustion systems.
- Report under subpart C of the part (General Stationary Combustion Sources) the emissions of

CO₂, CH₄, and N₂O from each stationary combustion unit following the requirements of subpart C.

The EPA Mandatory Reporting Rule prescribes specific modeling coefficient values which are different than the AP-42 and NSPS values. All MSW Landfills must use a mathematical model to estimate gas generation. As such, facilities cannot rely on existing site gas models to determine applicability. Landfills with GCCS systems must also calculate the landfill methane generation using a methane recovery model. The EPA Mandatory Reporting Rule requires reporting for the 2010 calendar year by March 31, 2011.

CARB Mandatory GHG Emissions Reporting Rule: GHG Emissions reporting provisions are found in §95104(a) of the CARB Mandatory GHG Emissions Reporting Rule. These provisions are summarized below:

- The operator shall identify, calculate, and report CO₂, N₂O, CH₄, SF₆, HFC, and PFC emissions from stationary combustion, process, and fugitive sources at the facility. The operator shall calculate and report each GHG separately for each fuel type used. The operator shall monitor and report fuel consumption for the facility and for each process unit or group of units where fuel use is separately metered.
- The operator shall separately identify, calculate, and report all direct emissions of CO₂ resulting from combustion of biomass-derived fuels.

Under the CARB Mandatory GHG Emissions Reporting Rule landfills will have to report on an annual basis and receive third party verification on a tri-annual basis. Landfills will fall under the general stationary combustion or cogeneration facility sectors which have a reporting deadline of April 1st of each calendar year and a verification deadline of October 1st of the same calendar year.

CARB Mandatory GHG Emissions Reporting Rule is the only regulation which requires third party verification of emissions reports. Adding another cost to reporting. Although regulation mandates that a facility report their GHG emissions and complete verification, a facility is not required to reduce or implement any changes, unlike the landfill early action measure.

Proposed AB32 Landfill Methane Rule: Reporting requirements are found in §95470 of the proposed LMR. The requirements are summarized below:

- Closure Notification.
- Equipment removal report.

- Annual report:
 - Total volume of LFG collected (reported in standard cubic feet (scf),
 - Average composition of LFG collected over the reporting period (reported in percent methane and percent carbon dioxide by volume),
 - Gas control device type, installation, rating, fuel type, and total LFG combusted in each control device, and
 - Type and amount of supplemental fuels burned with the LFG.
- Waste-in-place report.
- LFG Heat Input Capacity Report.
- Any report, or information submitted pursuant to this sub article must contain certification by a responsible official of truth, accuracy, and completeness. This certification, and any other certification required under this sub article, must state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

The reporting deadline for the proposed AB32 LMR is March 15 of the following year, after facilities first full year of reporting. The proposed Landfill Methane Rule is expected to be promulgated in March 2010.

Possible Impact of Tailoring Regulation

The Tailoring Rule has been drafted to reduce the magnitude of new permits States would be required if the current PSD and Title V programs were not modified for GHG emissions. The proposed Tailoring Rule appears to be a regulatory relief for smaller GHG emission sources for a period of six years.

Solid Waste Association of North America (SWANA) conducted a comparison of combustion units currently operating within PSD regulations for covered pollutants and the proposed Tailoring regulation and found that covered pollutants yield comparable 770,000 MTCO₂e per year. That is over thirty times the EPA proposed major source threshold of 25,000 MTCO₂e per year.

The 2,551 potential MSW landfills subject to Subpart HH of the EPA Mandatory Reporting Rule would also potentially be applicable to the PSD and Title V programs. This would increase the cost of record keeping and reporting for applicable sites.

Possible Impact of a Potentially Modified NSPS

The current NSPS regulations have a applicability requirement for sites with over 50 Mega grams (Mg) to report. If a new NSPS regulation, reminiscent of AB32 LMR was passed, the number of sites required to have

GCCS installed, operated and maintained would potentially dramatically increase. The SEM would become more onerous, as the current SEM reporting limit of 500 ppm could change to as low as 200 ppm. A lower emissions limit would increase the number of exceedance, which would increase the operations and maintenance (O&M), monitoring time onsite, record keeping, and abatement costs.

Increased requirements, such as annual source testing and integrated SEM, would be required for all NSPS sites. At the current moment, NSPS requires an initial source test and does not require integrated SEM. Thus, the augmented requirements would amplify the annual cost of O&M and testing.

In the long run, if an updated NSPS regulation was to be developed similar to the current AB32 LMR, landfills would potentially need to install a GCCS, add/increase the operations and maintenance onsite, and increase reporting. The installation of a GCCS would be a financial burden for closed landfills, as they would also have to implement the entire O&M cost indefinitely. The cost of installing a GCCS at a small landfill will be very high compared to the benefits of destroying an unknown amount of methane. No additional methane reductions will be created for landfills with existing NSPS or equivalent gas systems, yet an additional monitoring cost will be significant.

SUMMARY

Landfills are one of the most regulated industries in the U.S. and have already reduced their GHG emissions footprint below 1990 emissions levels. MSW landfills are also a current necessity in our current society, and many MSW landfills already have active GCCS which destroy GHG emissions under current regulations that are imposed by local air districts, and States and federal governments.

The Supreme Court's Ruling and the associated EPA's Endangerment Finding led way to the EPA mandatory Reporting Rule, which will increase the cost of monitoring and reporting for all landfill sites which are applicable to the regulation. Small and closed landfill sites will be hit especially hard, since they many of them did not previously require extensive monitoring or expensive equipment, unlike larger active sites which are already monitoring and in compliance due to existing regulations.

The proposed Tailoring Rule sets potential regulations of GHG emissions for all industries under the CAA. If the rule is not modified for GHGs, the triggering thresholds for PSD and Title V, would subject hundreds of thousands of facilities to regulate GHG emissions under the same thresholds. The EPA proposes to develop what they consider a more reasonable PSD and Title V threshold for GHGs. However the intent of the PSD and Title V

programs are to capture major sources and the proposed threshold is still too high. Many landfills which were not previously regulated due to their size, status, and low emissions levels, in comparison to the current reporting levels of other criteria pollutants, will be required to report. It will be costly for these landfill sites to have to comply with all of the requirements of PSD and Title V.

Federal GHG reporting is still in its infancy, as calendar year 2010 is the first required year of reporting for qualifying facilities which produce over 25,000 MTCO₂e. Subpart HH of the federal GHG reporting rule specify mandates how landfills shall report, but does not set limits on emissions. The ACES and proposed CEJAP are currently the forefront of prospective GHG and renewable energy legislation. Both bills provide framework for offset programs, however under the ACES stipulations such as additional performance standards on landfill methane emissions are proposed. With increasing GHG regulations which impose mandatory LFG destruction, the number of possible landfill offset projects is decreased. Plus, under cap and trade, landfills which are expanding to accommodate society's growing disposal needs will need an increased number of carbon credits required for growth.

At the state level, AB32 keeps California at the forefront of GHG emissions reporting. Landfills may fall under two reporting requirements, CARB Mandatory Reporting of GHG Emissions Rule and the proposed LMR. The CARB Mandatory Reporting of GHG Emissions Rule requires sites with over 25,000 MTCO₂e to report their annual GHG emissions but it does not directly regulate landfills, however it reports similar information as the EPA Mandatory Reporting Rule, instigating redundancy which may add additional cost to landfill owners and operators. The proposed AB32 LMR does not require the reporting of emission but obliges all applicable landfills to reduce emission with improved equipment and increased monitoring. Many of the sites which were not previously regulated to have a GCCS and which must now install one due to the proposed LMR are older small, inactive sites, where the cost will be compared to the amount of GHG reduced. The LMR could also become the framework for a future new or modified NSPS at the federal level, which would increase compliance cost nationwide.

The significant existing and proposed legislation and regulations will impose a financial burden on the solid waste industry. It is apparent that many older, small landfills, which produce minimal GHG emissions, will have to report under multiple regulations and carry the monetary weight, since there are no alternatives. Increased reporting to multiple enforcement body's which all have unique applicability, monitoring, and reporting requirements is foreseen to be costly and time consuming.

REFERENCES

California Environmental Protection Agency Air Resource Board, 2009, "Initial Statement of Reasons for the Proposed Regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills."

California Air Resources Board, 2009, California Code of Regulations Subchapter 10, Article 2, section 95100 to 95133, title 17, ARB Mandatory Reporting Rule "Regulation for the Mandatory Reporting of Greenhouse Gas Emissions"

California Air Resource Board, 2009, "Adopt new Article 4, Subarticle 6, Methane Emissions from Municipal Solid Waste Landfills, sections 95460 to 95476, California Code of Regulations"

The United Nations Framework Convention on Climate Change.

http://unfccc.int/essential_background/convention/background/items/1353.php. Retrieved 15 November 2005.

U.S. Environmental Protection Agency, 2009, "Federal Register, 40 CFR Parts 86, 87, 89 et al. Mandatory Reporting of Greenhouse Gases; Final Rule," Vol 74, No 209, pp.56475-56481.

U.S. Environmental Protection Agency, 2009, "Federal Register, 40 CFR Parts 51, 52, 70, and 71. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule," RIN 2060-AP86, No 209, pp.50-56, 67-69, 106-107, 199-204.

U.S. Environmental Protection Agency, 2009, "Technical Support Document for the Landfill Sector: Proposed Rule for Mandatory Reporting of Greenhouse Gases."