Solid Waste Industry for Climate Solutions

Allied Waste Services
County Sanitation Districts of Los Angeles County
OC Waste & Recycling
Norcal Waste Systems
Republic Services
Waste Connections
Waste Management

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Subject: Local Government Protocols for Solid Waste Facilities

Dear All:

Thank you for the opportunity to provide comments on the Proposed Protocols for Local Government GHG voluntary reporting related to the Solid Waste Facility Sector. The Solid Waste Industry for Climate Solutions (SWICS) is an informal organization of the solid waste service providers with the common interest of supporting climate change policies affecting our sector that are based sound science and engineering principles. We appreciate the workshops you have held on this draft protocol. We offer the following comments.

Operational Boundaries

We support the draft proposed protocol's consistency with international reporting protocols with respect to the "operational control" framework. This consistent approach is appreciated as well in your other protocols. In particular, we support the 3-tiered scope

system that is consistent with this framework. Direct and Indirect GHG emissions from solid waste facilities that are not owned or operated by local governments but which may provide solid waste services to local governments are appropriately placed in "Scope 3". Emissions from these facilities are most appropriately reported by the entities that exert operational control – which in many cases are not the local government (or governments) that are served by these operations and facilities.

Biogenic Emissions

SWICS recommends that the protocol not require reporting of biogenic emissions, but instead, make biogenic emissions reporting optional. International GHG inventory reporting under the protocols established by the UN Intergovernmental Panel on Climate Change (IPCC) and national inventorying in the U.S. Environmental Protection Agency's (EPA) U.S.GHG Inventory has always been on inventorying anthropogenic GHG emissions and sinks. The draft local government protocol states, "international consensus on the net climate impact from the combustion of these [biogenic] fuel sources has not yet been reached." We recommend that this statement be deleted, as it is incorrect. Both the international and national experts on GHG inventorying (IPCC and EPA) have clearly expressed their views on this topic.

The EPA's 1990-2006 Greenhouse Gas Inventory, which closely follows IPCC guidelines and is annually reviewed approved by IPCC, states, "fuels with biogenic origins are assumed to result in no net CO2 emissions to atmosphere." Furthermore, the IPCC 2006 Guidelines, Chapter 10 on Waste Management states "The CO2 emissions from biomass sources – including the CO2 from landfill gas, the CO2 from composting, and the CO2 from incineration of waste biomass – are not taken into account in GHG inventories as these are covered by [anthropogenic] changes in biomass stocks in the land use and forestry sectors."

http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter10.pdf

Therefore, the draft LGO protocol's insistence on reporting biogenic emissions is inconsistent with both IPCC and EPA practices.

Landfill Gas Fugitive Emissions

The proposed draft protocol uses the landfill gas collection efficiency (75%) that is derived from US EPA documents. However, the technical basis for this collection efficiency is by no means robust.

According to the US EPA's "Compilation of Air Pollutant Emission Factors" (AP-42) (USEPA, 1997), researchers and practitioners estimated collection efficiencies to typically range from 60 to 85%. The most commonly assumed default efficiency has been 75% although higher efficiencies have been demonstrated at some sites, particularly

those engineered to control emissions. A review of available data and industry information regarding LFG collection efficiency was conducted by the USEPA in 2002. Eastern Research Group, Inc. (ERG), a USEPA contractor, conducted this review. In an internal memorandum dated October 24, 2002, the USEPA recommended a 75% default LFG collection efficiency (Leatherwood, 2002).

Most of the published sources cited by the memorandum are at least 15 years old. Consequently, these sources (particularly AP-42) do not reflect LFG system operational experience after implementation of US EPA's New Source Performance Standards (NSPS; 40 CFR Part 60, Subpart WWW). By December 1998, higher efficiencies were necessary for NSPS Subpart WWW compliance. Most of the collection efficiency estimates in the memorandum were based on speculation. ***Significantly, the only specific claims of calculated collection efficiency included in the USEPA memorandum were estimates attributed to work done by Dr. Stan Zison of Pacific Energy. Applying his patented methodologies to three California landfills with energy projects, Dr. Zison measured collection efficiencies at 85%, 90%, and 95%, respectively***. It is expected that gas collection efficiency is higher at NSPS regulated facilities versus sites only designed for energy recovery where applied vacuums are limited to prevent air intrusion and only collect the amount of high quality LFG necessary to meet energy needs. In fact, this is exactly the conclusion reached in both AP-42 and the Leatherwood memo: *Higher collection efficiencies may be achieved at some sites (i.e., those engineered to control gas emissions).*

The default 75% collection efficiency does not take into account the different LFG collection systems that are utilized at landfills. For example, a LFG collection system designed for NSPS compliance is far more capable of higher collection efficiencies than a LFG migration control system. Using a default value of 75% for both of these systems is an assumption that does not have any validity. A default value should take into account the type of collection system employed at the landfill and the regulatory requirements or other drivers for installation and operation.

In July 2007, the Solid Waste Industry for Climate Solutions (SWICS) released its first white paper titled *Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills.* In the 2007 paper, SWICS proposed a revision to the existing California Air Resources Board methodology for calculating methane emissions from landfills. SWICS intent was to create a methodology that would result in more accurate inventories of methane emissions from landfills.

The attached updated SWICS document (July 2008) is a revision and update to the June 2007 SWICS white paper based on the critical review of the previous white paper by several academic experts in the field of waste management. The expert review re-evaluated the existing sources, added several additional sources, and arrived at more supportable conclusions about greenhouse gas (GHG) emissions from landfills.

LFG system owners and operators believe that collection efficiencies greater than 75 percent, the default value now in common use, are commonly achieved at individual landfills with well designed and operated gas collection and control systems (GCCS). LFG system owners and operators believe the use of default values prevents individual landfill sites from demonstrating higher collection efficiency using available site-specific information. The exclusive use of the default value also creates disincentives for those owner/operators to put in the extra effort to achieve greater collection efficiency because those efforts would not be recognized by the default value and may in fact result in higher calculated emissions.

Substituting SWICS protocol for US EPA Default Assumption

The attached protocol developed by SWICS is much more rigorous and, unlike the 75% US EPA default, is up-to-date with respect to state-of-the-art knowledge of landfill gas collection systems. ***SWICS believes that reporters should be able to substitute the landfill GHG emission results of the attached SWICS model with that of the US EPA default assumptions.*** We have no objection for allowing the 75% default to be used for those that wish to do so. Although some reporters may gain an advantage by doing so -- the 75% default may actually result in lower emissions than are actually occurring or which might be predicted by the more site-specific SWICS protocol. However, those reporters that are able to meet the more rigorous data requirements of the SWICS protocol should be allowed to do so.

Alternative Landfill Gas Reporting

In any event, the SWICS protocol should certainly be recognized as a legitimate *alternative* reporting under Section 9.3.4. However, the standard should not be limited to "surface measurements". Rather, the standard should include "state-of-the-art assessments". As stated above, the attached SWICS protocol is much more rigorous and up-to-date with current understanding of landfill gas collection and destruction efficiency. We have attached a suggested revised Section 9.3.4 to this letter with the following changes:

- Change the term "optional" to "alternative".
- Do not limit alternative reporting to only those facilities with site-specific surface measurement data.
- Allow alternative reporting to be based on protocols that are based on data or protocols that are at least as rigorous as the US EPA default assumption (i.e., 2002 Leatherwood memo).

Composting

Many SWICS members operate composting facilities. However, we are concerned that the proposed protocol has chosen to emphasis GHG emissions from landfills while choosing to ignore GHG emissions from composting operations. SWICS believes that the proposed protocol should treat all solid waste management activities with equal objectivity. We are concerned that the protocol has chosen to emphasize the negative with respect to landfills and has chosen to ignore the potential for emissions from composting operations. SWICS previously submitted a letter that is attached to this comment letter along with attachments that raised concerns about the draft protocols failure to objectively evaluate GHG emissions from composting operations.

Attached to that previous letter are three (3) studies of emissions from co-composting and green waste only facilities conducted by the South Coast AQMD including a summary of average methane emissions from all three compost facilities:

EKO	2.23 lbs/ton of compost
Inland Empire	0.83 lbs/ton of compost
San Joaquin	33.49 lbs/ton of compost
Average:	12.18 lbs/ton of compost

Assuming these numbers are representative of methane emissions where anaerobic composting conditions exist and that there is two (2) million tons of compost produced annually using methods that can produce anaerobic conditions, this would equal approximately 240,000 MTCO2e/year. Two million tons of compost is only about 10% of the amount of organic waste disposed in landfills (say, 20 million tons of organic waste are landfilled.) Based on the above numbers, if organic waste were managed at a composting operation where anaerobic conditions existed, the amount of fugitive methane emissions from composting operations would approach that from landfills.

We strongly recommend that GHG emissions and benefits from all solid waste operations be equally evaluated with at least the same degree of attention as the proposed protocol does with solid waste landfills.

Focus of Protocol is Inappropriately Limited to Landfills

The focus of the proposed protocol is almost exclusively on landfills with respect to solid waste GHG emissions. While the GHG emission of fixed facilities and transportation associated with solid waste management may be address in other parts of the protocol, the protocol fails to evaluate the GHG emissions and benefits from:

- Composting,
- Recycling,
- Biogenic Energy from Waste, and

- Carbon storage or sequestration associated with waste management activities.

This is a huge oversight in the proposed protocol. The US EPA has developed extensive documentation of the GHG emissions and benefits of the above activities that appear to be ignored by the proposed protocol -- Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks:

http://www.epa.gov/climatechange/wycd/waste/SWMGHGreport.html

This EPA Assessment can be used to fully assess the GHG emissions and benefits of all solid waste management activities. ***The basis for the EPA assessment cited above is no less rigorous than the default assumptions used by the proposed protocols for landfills.***

Solid Waste Management GHG Impacts

SWICS is extremely concerned that the proposed protocol continues to ignore the evidence of nationally recognized peer reviewed publications that clearly articulate the role of solid waste management with respect to GHG emissions and benefits. We would like to again refer you to two peer reviewed published documents that evaluate overall GHG emissions from the solid waste sector:

- The Impact of Municipal Solid Waste Management on Greenhouse Gas Emissions in the United States, Weitz et al., JAWMA, September 2002.

- Moving from Solid Waste Disposal to Materials Management in the United States, Thorneloe et al., October 2005.

The first of these attached publications clearly documents that; overall, GHG emissions from solid waste management activities have declined dramatically over the last 30 years. There is no other segment of the North American economy that has demonstrated such remarkable reductions.

The second publication clearly documents that the overall solid waste and recycling operations associated with an average sized city that recycles at least 30% of its solid waste and send the residual waste to landfill with a gas collection system (assuming only 75% methane capture and destruction) that recovers the energy value of the capture gas ***is able to achieve virtually a zero carbon footprint***.

SWICS continues to be concerned that this protocol continues to ignore peer reviewed nationally recognized experts in focusing unwarranted attention on landfill emissions. Overall, solid waste management emissions have been declining and, in total, are near carbon neutral nationwide.

Additional Comments

In addition to the above comments relative to landfills and solid waste management and recycling activities, SWICS would like to offer the following specific comments and concerns about the proposed draft protocol:

- Chapter 8, relative to power generation facilities, appears to require the use of 40 CFR Part 75 CEMs for calculating annual CO2 mass emissions. SWIC requests that Part 75 CEMs not be exclusively used. 40 CFR Part 60 CEMs and 40 CFR 60 Appendix A EPA test methods including Method 19 should be included as acceptable alternatives for calculating annual CO2 emissions.

- Table C.2 on Page 154 includes a default biomass CO2 emission factor for MSW. Interestingly, a fossil based default CO2 emission factor is not provided. The final protocol should provide default emission factors for both biomass and fossil based CO2 emissions since the two factors are directly related and derived on the same basis. The proposed default MSW biomass CO2 factor is 788.7 kg/ton or 1739 lbs CO2/ton based on a 65% biomass carbon fraction. The 65% biomass carbon fraction is consistent with the ASTM D-6866 radiocarbon dating results the Waste-to-Energy industry has been obtaining and translates directly to a 35% fossil based carbon fraction. The default biomass CO2 emission factor appears to be based on California MSW specific information retrieved from Energy Information Administration (EIA) Forms EIA-906 and EIA-920 database. National MSW information from EIA Forms EIA-906 and EIA-920 database provides a MSW HHV of 5000 btu/lb. Using EIA national HHV average, the 40 CFR 60 Appendix A EPA Method 19 CO2 F-Factor of 1820 dscf MMBtu and 65% biomass carbon fraction provides a national MSW biomass CO2 emission factor of 614 kg/ton or 1352 lbs/ton and a fossil based CO2 emission factor of 331 kg/ton or 331 lbs/ton.

- In Section 9.2 of Draft, we applaud the statement that "the guidance in this chapter will change considerably in future versions of the Protocol as more information becomes available."
- In Section 9.3, we agree with the statement: "How to estimate the fugitive CH_4 emissions from your landfill is determined by the facility-specific data available to you, the type of landfill you have, and the type of landfill gas (LFG) collection system you have, if any." ***This is why we believe that national default average assumptions of methane capture and destruction should not be used if a site specific evaluation has been conducted that is at least as rigorous as the process to develop the national default information.***
- In Table 9.3, the protocol needs to specify if this is on a dry or wet weight basis; also, if it is on a wet basis, the assumed moisture content.
- With respect to Step 5 of the protocol: The synthetic cover instructions would only apply to areas with final cover. Since much of the landfill will have intermediate

cover, it does not make sense to apply one number to the entire landfill. Please refer to the SWICS protocol document for suggested methane oxidation efficiencies by cover type.

- ***9.3.1 Landfills with no gas collection system.*** Under step 1, determining the annual waste in place at a landfill, the draft LGO protocol suggests that if information about the opening year of the landfill is not available, the reporter should assume the opening date was 60 years prior to the reporting year. There is no basis for such an assumption provided in the protocol. Further, while no information on the opening year may be available, alternative information that points to a more educated assumption than the arbitrary 60 years should be used by the reporter and allowed under the protocol.

- ***Subsections 9.3.2 & 9.3.3***

  Equation. 9.1 appears to be in error as written.

  CH4 emitted (metric tons CO2E) =
  LFG collected x CH4% x {(1 - DE) + [((1 - CE) / CE) x (1 - OX)]} x unit conversion x GWP

  It appears that if the order of operations outlined in equation 9.1 is followed, erroneous results will be obtained.

  The equation should be written as:

  CH4 emitted (metric tons CO2E) =
  [[LFG collected x CH4% x (1 - DE)] + [((LFG collected x CH4%)/CE) x [(1 - CE) x (1 - OX)]]] x unit conversion x GWP

  Equation 9.2 also appears to be in error as written.

  CH4 emitted (metric tons CO2E) =
  LFG collected x CH4% x {(1 - DE) + [((1 - CE) / CE) x (1 - OX)]} x AF x unit conversion x GWP

  This equation has the same issue described for Equation 9.1 above. Additionally, it has the problem that it will not calculate emissions from landfills with partial gas collection as intended. This equation indicates that by multiplying the amount of fugitive methane from areas under LFG control, by the fraction of the area of the landfill not under the influence of gas control, the emissions for the total landfill are obtained. This simply does not work. To illustrate, assume a case where 50% of the landfill area is under gas control, therefore AF=0.5, and compare it to a landfill with 100% cover, or AF=1. According to this equation, less gas control results in fewer emissions.

Under Step 2 of Subsection 9.3.2, the LGO protocol should allow other procedures for determining methane content besides those required by a government agency. Continuous monitoring of LFG entering a flare system should be considered, as should other routine measurements. For example, a Title V exempt facility might measure LFG on a routine basis for other operating reasons. Such data should be acceptable as an alternative to source testing or use of the default 50 percent fraction.

Thank you for the opportunity to provide these comments for your consideration. Please contact any one of the undersigned if you have questions.

Sincerely,

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Attachments:

Leatherwood, C. **2002**. *Review of Available Data and Industry Contacts Regarding Landfill Gas Collection Efficiency*, Draft Memorandum to Brian Guzzone, Meg Victor, U.S. EPA, October 24, 2002.

Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills (Revised) Prepared For: Solid Waste Industry for Climate Solutions (SWICS), Presented by SCS Engineers, July 2008.

Proposed SWICS Revisions to Local Government Protocol 9.3.4 – Alternative Landfill Gas Reporting.

The Impact of Municipal Solid Waste Management on Greenhouse Gas Emissions in the United States, Weitz et al., JAWMA, September 2002

Moving from Solid Waste Disposal to Materials Management in the United States, Thorneloe et al., October, 2005

SWICS Comments on Local Government Protocol, May 30, 2008

CLIMATE LEADERS GREENHOUSE GAS INVENTORY PROTOCOL CORE MODULE GUIDANCE, Direct Emissions from Landfilling Municipal Solid Waste, October 2004

Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills, Prepared For: Solid Waste Industry for Climate Solutions (SWICS)

Landfill X Example GHG calculations using SWICS protocol

SOURCE TEST REPORT 95-0032/96-0003 CONDUCTED AT EKO Systems 8100-100 Chino-Corona Road, Corona, CA, 91720

SOURCE TEST REPORT 01-171 CONDUCTED AT Inland Empire Composting 1951 W. Key Street Colton, CA 92324

SOURCE TEST REPORT 96-0007/96-0008/96-0009 CONDUCTED AT San Joaquin Composting, Inc. Holloway Road Lost Hills, CA.

Landfill Carbon Storage and Greenhouse Gas Inventories, prepared by Randall Freed, Sarah Shapiro, Brad Hurley, ICF International