Covanta Energy Corporation
40 Lane Road
Fairfield, NJ 07004
Phone: (973) 882-7236
Fax: (973) 882-4167

Via e-mail to policy@climateregistry.org

July 18, 2008

Ms. Rachel Tornek
Senior Policy Manager
California Climate Action Registry
523 West Sixth Street, Suite 428
Los Angeles, CA 90014

Subject: Local Government Operations Protocol dated June 19, 2008

Dear Ms. Tornek:

Covanta Energy Corporation is pleased to submit comments on the referenced document co-authored by CARB, CCAR, ICLEI and The Climate Registry. Covanta is a Founding Reporter of The Climate Registry and has operations in a variety of relevant activities world-wide. Our objective in submitting comments is to assure that the proposed protocol and the forthcoming community inventory guidance / protocol accurately reflect state-of-the-art information in specific industries and that the best available science is being used in accounting and reporting procedures. We believe that this is consistent with the protocol's stated purposes:

- Enable local governments to develop emissions inventories following internationally recognized accounting and reporting principles;
- Advance the consistent, comparable and relevant quantification of emissions and appropriate, transparent and policy-relevant reporting of emissions;
- Enable measurement towards climate goals;
- Promote an understanding of the role of local governments in combating climate change; and
- Help to create harmonization between GHG inventories developed and reported to multiple programs.

The protocol should be based on applicable international information and the best data; however the current draft includes information from old protocols, assumptions and default values that have not been updated in years. We respectfully request the authors to consider our comments in formulating revisions to the proposed protocol and some of these dated approaches. Climate change solutions require a new perspective on many fronts. In this regard we believe that a protocol designed for local governments must consider the best information and not only what has been previously published.

We strongly support the on-going efforts to develop a community wide GHG inventory protocol as referenced in the proposed Local Government Operations Protocol. Given the unique ability for local governments to affect change far beyond their own operations, a community based inventory is the only method able to accurately capture the full impact of a local government's actions and policies. We look forward to reviewing the draft community protocol and are able to assist with its development and contribute as appropriate.

We thank you for the opportunity to submit these comments and are available to discuss them at your convenience.

Sincerely,

Brian Bahor/bromano

Brian Bahor, QEP
Vice President, Sustainability

cc: Alex Ramel, ICLEI
Ted Michaels, Integrated Waste Services Association
Michael Van Brunt, Covanta Energy Corp.
Jeff Hahn, Covanta Energy Corp.

Covanta Energy Corporation
Comments on the June 19, 2008 Draft Local Government Operations Protocol
Proposed by CARB, CCAR, ICLEI and TCR
July 18, 2008

Section 2.1, GHGs to be Assessed, page 15 and Appendix A, Global Warming Potentials, page 150

Comment #1: The Local Government Operations Protocol should present the newer and more scientifically relevant GWPs as an information item for local government officials to consider when making policy and GHG management decisions.

The Global Warming Potentials (GWP) used throughout the protocol are based on the IPCC's Second Assessment Report (SAR). While we understand that the use of these GWPs has its roots in the Kyoto Protocol, the Local Government operations (LGO) Protocol should present the newer and more scientifically relevant GWPs until the Kyoto Protocol expires in 2012 and its replacement is created. Local governments and their decision-makers should be made aware that the scientific community and in particular, the IPCC, have made adjustments to the GWPs so that these latest GWPs can be considered when making local climate change policy and GHG management decisions. A delay in recognizing these new facts for new policies is an unnecessary loss of time for an issue that does not have time to spare.

Local governments are making policy decisions today to mitigate climate change before 2050, far sooner than the 100 year time horizon that has been conventionally used in inventories. If the shorter time horizon GWP of GHGs like methane is not understood, local government officials responsible for GHG management will not have the best information to enable scientifically-based GHG mitigation decisions. The LGO Protocol should therefore contain the following information to assist in their understanding:

- The latest GWPs, those from the IPCC Fourth Assessment Report (AR4)
- An expanded GWP table including values for 20 and 500 year time horizons so the reader can understand the relative magnitude of the time horizon effect. For example, decision-makers who are concerned about maximizing GHG reductions from waste management before 2050 should realize that the benefits of methane reductions over a 20-year timeframe (GWP = 72) are three times greater than those over a 100-year timeframe (GWP = 25).

This important knowledge can be provided as an information item in a format similar to that provided for biofuels in Box 4.1 on page 28.

Chapter 4 Organizational Boundaries, pages 25-29

Comment #2: In the interest of understanding and accounting the full impact of local government operations, the protocol should require two parallel inventories, one for local government operations and one for emissions from all sectors of the community managed by that local government, using the forthcoming community-

scale guidance referenced in the proposed LGO Protocol. Local governments should be required to report Scope 3 emissions for key GHG-intensive contracted services such as solid waste management, public transportation, and water and wastewater treatment for both inventories.

Local governments can have a much greater impact on GHG emissions than is evident through the traditional GHG direct emissions accounting approach. As examples, issuance of contracts, setting land use policy, and passing ordinances and regulations can all have both short-term and long-term impacts relative to GHG emissions and sustainability in general. The LGO Protocol should recognize this impact and include a requirement for a community inventory that measures the full effect of local government activities and policy on GHG emissions. The organizational boundary of the community inventory shall include all operations within the geopolitical boundary of the jurisdiction. This approach is consistent with the current draft of the *ICLEI International Local Government GHG Emissions Analysis Protocol, Version 1.0*.

The organizational boundaries proposed by the LGO Protocol are consistent with internationally recognized GHG accounting and reporting practices; however, the characterization of subcontracted services as Scope 3 emissions with voluntary reporting may not completely characterize the GHG emissions and reductions from local government policy and practices. This may promote misleading GHG accounting when certain municipal operations are subcontracted to private contractors.

Many local governments contract for key services, including waste management, public transportation, and water and wastewater treatment. Consistent with accepted practices, the LGO Protocol considers contracted emissions to be Scope 3. Since Scope 3 emission reporting is optional, however, significant GHG emissions subject to local government influence and direction may be missed, even under a community inventory. This omission leaves the local government no incentive to reduce, or mechanism to track, GHG emissions from these essential operations.

Take, for example, solid waste management. Currently nationwide about 90% of MSW that is not recycled is disposed in landfills, with the remainder sent to energy-from-waste (EfW) facilities. Landfilling is the least preferred technique according to USEPA's solid waste management hierarchy, resulting in long term methane emissions from the anaerobic decomposition of waste and frequently significant GHG emissions from the long haul transportation of waste to regional landfills. EfW facilities avoid methane emissions, generally require shorter waste transport, and generate sustainable energy, resulting in a net reduction in GHG emissions over the life cycle of waste management. Indeed, the GHG reducing capability of EfW is recognized by the IPCC. Under the proposed protocol, if a local government contracts its waste management services, the reporting of GHG emissions from landfills or the reductions in GHG emissions generated by EfW is not required and waste management may therefore never be recognized as a significant GHG consequence by the local government, the entity which is ultimately responsible for choosing its waste management practice.

In order for a reporting and accounting system to facilitate reductions in GHG emissions, it must include all emissions that are dependant on the policies and activities of the local government. By excluding emissions from GHG-intensive contracted services such as waste management, transportation and water and wastewater treatment, local governments may inadvertently omit significant GHG emissions that result from their actions and be unaware of cost-effective reduction opportunities.

We believe the solution is to *require* that emissions from GHG-intensive contracted services be reported on both a local government and community basis, as Scope 3 emissions. In this way, the local governments' reports will be including the full impact of their decision making. If their decision is generating GHG emissions, they should be inspired to consider more carbon neutral options. Conversely, if their decision making is mitigating or reducing GHG emissions, they should have a mechanism to identify that positive contribution to climate change.

Section 8.1, Stationary Combustion: Measurement-Based Methodology, page 76

Comment #3: The LGO Protocol should recognize the USEPA-mandated continuous emission monitoring systems (CEMS) existing at the nation's 87 EfW facilities as an appropriate measurement-based methodology for quantifying CO_2 emissions from combustion of biomass, MSW, and waste-derived fuels containing biomass.

The proposed measurement-based methodology suggests that there is only one approved USEPA standard for certifying continuous emission monitors, i.e., 40 CFR Part 75. The USEPA has promulgated emissions standards for municipal waste combustors (MWCs, also called EfW facilities) that also contain CEMS requirements. The MWC standards are found in 40 CFR 60, Subpart Cb for existing facilities and Subpart Eb for new facilities. The CEMS requirements pertaining to these standards are found in 40 CFR Part 60, Appendices A, B, and F. These federally approved procedures are presently being followed at all 87 EfW facilities in the U.S. The fact that EfW facilities use USEPA-specified procedures every day for demonstrating compliance with state and federal permit limits directly supports the quality of the measurement system.

Two approaches are possible under this alternative measurement-based approach. In the first case, measured steam production (lb steam/year) and boiler design data (MMBtu input/lb steam output) are used to calculate boiler heat input (MMBtu/year), and CO_2 concentration from CEMS measurements (ppmdv) and the Fc-factor from Appendix 19 (scf/MMBtu) are used to determine the MSW heat input factor (kg CO_2/MMBtu). The product of the two is the annual total CO_2 emission.

The second case is similar except measured MSW throughput (from weighed deliveries to the facility) and measured higher heating value (from ASME test methods (see Comment #11)) are used instead of steam production and boiler efficiency.

CO_2 concentrations can either be measured directly using a CO_2 CEM, or can be calculated from an O_2 CEM where annual source testing has demonstrated that CO_2 concentrations calculated from the O_2 readings meet the Relative Accuracy Test Audit (RATA) requirements in 40 CFR 60, Appendix B, Performance Specification 3.

In summary, the protocol should contain a second measurement-based methodology for EfW facilities and other biomass and waste-derived fuels facilities subject to and meeting the requirements of 40 CFR Part 60, Appendices A, B and F. This would enable many local governments to use existing equipment to meet the more stringent measurement-based criteria. Conversely, requiring local governments to install new and redundant CEMS for Part 75 compliance will be a capital and operating cost burden without any net environmental benefit. Both Part 75 and Part 60 CEMS are required to meet the same relative accuracy, calibration, and annual testing requirements.

Section 8.2, Stationary Combustion: Fuel Use-Based Methodology, page 76-81

Comment #4: For biomass, MSW, and waste-derived fuels containing biomass, the LGO Protocol should allow the use of annual steam production and design boiler efficiency, as is currently contemplated under CARB regulation, in lieu of MSW quantities and carbon content.

Homogeneous solid or liquid fuel such as coal, oil or natural gas can be sampled and tested for carbon content and heating value; however, a heterogeneous fuel such as municipal solid waste cannot be easily tested. Indeed, few local governments have reliable information on MSW composition let alone carbon content, and its sampling and analysis is expensive and error-prone.

The LGO Protocol should discourage the testing of MSW and other heterogeneous fuels in favor of using reliable alternatives such as described in CARB's proposed *Regulation for the Mandatory Reporting of Greenhouse Gas Emissions.*[1] In this alternative, described in Section 95125 (h)(1), boiler steam production (lb steam/year) and design data (MMBtu input/lb steam) are used to calculate boiler heat input (MMBtu/year). Total CO_2 emissions are calculated using the default CO_2 factor (kg CO_2/MMBtu) from Table C.2. As described in Section 95125 (h)(2), biogenic CO_2 emissions are determined using ASTM D-6866.

Box 8.1, Biofuels, Waste Fuels, and Biomass Co-Firing in a Unit with CEMS, page 77

Comment #5: Periodic flue gas testing using ASTM D-6866 should be identified as the superior and recommended method for determining biogenic CO_2 emissions from combustion of waste fuels and from co-firing of mixed biomass and fossil fuels.

[1] California Air Resources Board, "Regulation for the Mandatory Reporting of Greenhouse Gas Emissions", California Code of Regulations, Title 17, Subchapter 10, Article 1, Subarticle 3, Section 95125 (h) (1).

The draft "Waste Fuels" section identifies the preferred option for determining the amount of biogenic CO_2 as a field MSW characterization study, with the ASTM D-6866 methodology given as an alternative. Local governments should be informed that ASTM D-6866 is a superior technical method for determining the amount of biogenic CO_2, and that waste characterizations are not only less accurate but more costly. We are not aware why a field characterization program would be preferred over stack test methods. Indeed CARB regulations require EfW facility operators to report biomass-derived CO_2 emissions using ASTM D-6866.[2] Unless there is a technical reason for the hierarchy as proposed, ASTM D-6866 combined with total CO_2 measurements using either measurement-based or fuel-based methodologies (see Comments #3 and #4), should be cited as the best available method for quantifying fossil versus biogenic CO_2 emissions.

Chapter 9 Solid Waste Facilities, pages 84-94

Comment #6: The citations in Chapter 9 should more inclusive and better referenced.

The draft uses national (largely USEPA) and international (IPCC) default equations and values. Two general comments that apply throughout this chapter:

1. These same references acknowledge that the specific default values are not exact values and that local specific knowledge of MSW is necessary to yield useful results. If the intent is to provided guidance to local governments in the U.S., our recommendation is to use equations and defaults that are representative of the U.S. and that are currently being used by other U.S. efforts such as USEPA's Climate Leaders Program; and,
2. If the goal is to be a complete summary of international information, the general recommendation is to provide a more comprehensive list of values and specific citations including report name, date, page number, authors, etc. For example, sources in Tables 9.3, 9.4, and 9.5 are listed as simply "EPA" or "IPCC" with no specifics. A review of Appendix D references did not find supporting documentation for the cited values in some Chapter 9 tables. Conversely, other default values can be found in the literature but were not mentioned in the draft protocol.

Section 9.1, Organizational Boundary Issues, pages 84-85

Comment #7: Section 9.1 correctly states that many local governments will not have financial or operational control over waste services they have contracted out. As indicated in Comment #2 above, the LGO Protocol should require that emissions from contracted services with significant GHG emissions, including waste management, be reported as Scope 3.

Section 9.3.1, Landfills with No LFG Collection System, pages 85-89

[2] Ibid. Section 95125 (h) (2).

Comment #8: The LGO Protocol should allow local governments to use a default MSW methane generation potential for landfills having no LFG collection system. An appropriate and accepted value used by USEPA is 100 scm CH_4/MT MSW, which corresponds to TDOC (0.2) and DANF (0.5) values that can be used in the IPCC waste model.

For landfills with no LFG collection system, the protocol specifies using the IPCC FOD model. Per Step 2, inputs to this model require knowledge of waste composition as a percentage of each waste type. Ongoing waste composition knowledge is rarely available to local governments since it can only be gained through repeated, expensive waste characterization studies. As a result the user will end up using statewide or nationwide data that may or may not be representative.

Absent local waste characterization data, local governments should be able to use a mixed MSW default methane generation potential (Lo) value as used by USEPA in its nationwide inventories. USEPA's default value is 100 scm CH_4/Mg MSW.[3] This value can be correlated to known characteristics of mixed MSW. MSW contains about 30% carbon, wet basis,[4] of which 65% is biogenic, or potentially degradable, i.e., TDOC = 0.30 x 0.65 = 0.2. Using IPCC data for mixed MSW[5] the decomposable fraction is 0.5, i.e., DANF = 0.5. USEPA's default methane generation potential can be verified using these factors, which are inputs to the IPCC FOD model, as follows:

0.2 MT degradable C/MT MSW x 0.5 MT decomposable C/MT degradable C

= 0.1 MT decomposable C/MT MSW

The methane generated from this decomposable carbon is

(0.10 MT C/MT MSW x 0.5 (16/12) MT CH_4/MT C x 1000 kg CH4/MT CH_4
x 24.0 scm CH4/kg-mole CH4) / 16 kg CH_4/kg-mole

= 100 scm CH_4/MT MSW

This calculation confirms that the mixed MSW Lo approach has a scientific basis as well as precedence in USEPA's inventory calculations, and can be used in the absence of MSW composition data.

<u>Table 9.6, Landfill Cover Oxidation Value, page 89</u>

---

[3] USEPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006, #430-R-08-005, April, 2008, page A-272.

[4] Bahor, B., Weitz, K. and A. Szurgot, "Using a Carbon Balance to Estimate Greenhouse Gas Emissions and Mitigation from Municipal Solid Waste Management", presented at the Air and Waste Management Association's 101st Annual Conference and Exhibition, Portland, OR, June 24-27, 2008, page 9.

[5] IPCC, "2006 IPCC Guidelines for National Greenhouse Gas Inventories", Volume 5, Chapter 3, page 3.13.

Comment #9: Covanta supports the protocol's soil oxidation value of zero for landfills equipped with synthetic covers.

The zero value recognizes that fugitive emissions from such landfills emanate from breeches in the cover and around penetrations and imperfections, where methane gas does not permeate through soil cover materials.

<u>Section 9.3.2, Landfills with Comprehensive LFG Collection Systems, and Section 9.3.3, Landfills with Partial LFG Collection Systems, pages 90-93</u>

Comment #10: The LGO Protocol appropriately identifies that operating landfills with partial LFG collection systems have increased levels of methane emissions; however, the current version of Equation 9.2 results in *lower* emissions and should be corrected to represent real emissions. To more accurately predict methane emissions of an operating landfill, the LGO protocol should require separate calculations for each cell of an operating landfill to account for differences in LFG collection efficiency and methane generation rates.

<u>Landfills with Complete LFG Collection</u>
For landfills with complete LFG collection, we support the simplified approach using actual LFG collection to calculate emissions and fraction of waste in place under extraction. The current wording of the protocol, which defines a comprehensive collection system as any system with over 75% coverage, would omit up to 25% of landfill methane emissions. A definition that inherently allows 25 % leakage does not promote GHG mitigation. We have assumed that "uncovered" areas of the landfill are those that are outside of the demonstrated effective radius of LFG collection wells.

Only fully closed landfills with 100% coverage and operation of the landfill gas collection system should be considered to have a comprehensive collection system.

<u>Landfills with Partial LFG Collection</u>
The proposed methodology for estimating methane emissions from landfills includes several very good ideas that begin to address the true variability that exists at landfills that can be hundreds of acres with a variety of cells in different phases of operation and closure. Most significantly, the protocol accurately recognizes that operating landfills have significant portions that are not covered by a collection system; however, to accurately account for landfill methane, the protocol must consider the impacts of changing methane generation rates over time on overall methane emissions from uncollected regions. The protocol must also account for the multiple phases of landfill gas collection system installation and operation.

The calculation for landfills with partial LFG collection systems uses an "Uncovered Area Factor (AF)" that assumes that methane production per unit area of the landfill is constant. Equation 9.2 multiplies Equation 9.1 by this factor, resulting in a *lower* estimate of methane emissions. To correct this error, Equation 9.2 should be modified as follows:

Equation 9.2	Landfills with Partial LFG Collection Systems
CH_4 emitted (metric tons CO_2E) = $LFG\ Collected \times CH_4\% \times \left\{ \left(\frac{AF}{1-AF} \right) \times \left(\frac{1-OX}{CE} \right) + (1-DE) + \left(\frac{1-CE}{CE} \right) \times (1-OX) \right\} \times unit\ conversion \times GWP$	

In reality, methane production per unit area of the landfill *is not* constant. Methane generation rates are highest for new waste, which is generally in areas *without* LFG collection. For example, using a 1st order decay model and the LGO Protocol default k value of 0.038 / year for landfills with moderate rainfall, 32% of the methane is generated in the first ten years, during which time only an interim LFG collection system may be in place, with significantly lower gas collection efficiencies. Over the next ten years, only 22% of the methane is predicted to be generated. Consequently, non-existent or interim landfill gas collection systems, common in the early stages of waste placement in a landfill, have a disproportionate impact on the methane emissions from the landfill.

The current version of the protocol only recognizes two phases of landfill gas collection: uncollected and collected. In typical landfill operations, however, there are often as many as five distinct phases:

- Phase I – Period after initial placement of waste in an operating cell with no gas collection system in place. May extend for up to *five years* from the date of first placement of waste in a landfill cell.
- Phase II – An interim gas collection system is installed for the active cell.
- Phase III – Final gas collection system installed for previously active cell; however, an impermeable cap may or may not be in place, and the side(s) of the cell adjacent to other operating cell(s) is (are) not closed and are a pathway for horizontal LFG migration and escape.
- Phase IV – Landfill is closed with permanent cap. Gas collection system is in place and assumed to be fully operational. Impermeable cap and landfill gas collection system are assumed to be properly maintained.
- Phase V – Landfill gas collection system turned off.

Without any LFG collection data to rely on, methane emissions during Phases I and V of a landfill cell must be calculated using the procedures in section 9.3.1. Landfill gas emissions from cells in phases II, III, and IV can be approximated using Equation 9.1 as long as landfill gas flow data is available for each individual cell and an appropriate non-optimal (<75%) LFG collection efficiency is applied for phases II and III.

In order to accurately account for emissions over the five phases, the protocol should require a complete status of each operating cell in a landfill including the following information:

- Amount of MSW landfilled and the age of such
- Extent of horizontal and vertical landfill gas collection system
- Field measurement data that includes fugitive emissions and collected methane
- Destruction efficiency data of the flare and/or energy recovery equipment

Landfill emissions can only be estimated after these facts are known. If the above information is not available, then assumed defaults may be the only remaining option but then the results should be labeled as "assumed". An inventory that considers all information to be of the same caliber will mislead readers of the report.

LFG Collection Efficiency

As described above, LFG collection efficiency can vary significantly during the life of the landfill. Consequently, the 75% default value provided in the LGO Protocol in Section 9.2 is not necessarily conservative, given that the value applies to only one phase of the operating landfill. The cited Spokas paper demonstrates LFG collection efficiencies between 35% and 90% based on different collection systems, landfill cover and cell depth (all of which were very shallow). The cited Huitric paper is for a closed cell with 35 year old MSW and a 7 foot clay cap – essentially one short term test for one operating phase.

Uncovered Area

Given the importance of landfill covers in estimating methane emissions, the term "uncovered area" may be misleading. Consider using the term "uncollected area" to represent those areas of a landfill not covered by a LFG collection system. This recognizes that a portion of the landfill may be covered with uncollected LFG.

Summary

Methane emissions from landfills are the largest source of methane emissions in the U.S. Therefore, methane emissions from landfills warrant careful calculation. There are estimated to be over 1600 landfills in the U.S., with a variety of landfills designs and operating phases. Despite the magnitude of this source, there are no state or federal requirements to measure mass methane emissions.

The LGO Protocol currently uses a default LFG collection efficiency that is based on one phase of landfill operation – the fully closed phase with comprehensive LFG collection. The LGO Protocol does take a strong step in quantifying methane emissions from partial collection systems, but the approach assumes equal methane generation rates of *all* portions of the landfill, regardless of the age of waste material and allows a comprehensive collection system to have up to 25% of uncollected area.

The proposed alternative is to require the calculation of LFG emissions from individual cells, based on the operating phase of each cell. Cells with a LFG collection system in place should use a LFG collection efficiency appropriate to the operating phase of the cell. Except for fully closed cells, the appropriate LFG collection efficiency applied would be less than the optimum (75%) landfill gas collection unless the landfill operator has test data that demonstrates actual collection efficiencies. USEPA OTM 0010 is a valid method for measuring methane emissions from area sources and should be used by any landfill that is claiming a specific collection efficiency.

Appendix C Default Emission Factors, Table C.2, page 154

Comment #11: In Table C.2, MSW heat content should be 10.06 MMBtu/short ton.

The stated MSW heat content value of 8.70 MMBtu/Short ton (4350 Btu/lb) is too low. The reference given is the Energy Information Administration's 2004 EIA-906/920 databases for California facilities. Looking at a more recent (2006) EIA-906/920 database there are only three California MSW combustion facilities listed out of 83 facilities nationwide and they are not representative of the nationwide average, largely because of the low heat content reported by the SERRF facility. In the attached Excel file we have sorted the 2006 EIA-906/920 report to show all MSW combustion facilities; the nationwide calculated heat content is 10.06 MMBtu/short ton (5030 Btu/lb). The LGO protocol should use 10.06 MMBtu/short ton as the heat content of MSW in Table C.2.

Covanta Energy, which operates 35 EfW facilities representing over half the installed EfW facility capacity in the U.S., routinely measures and records the higher heating value (HHV) of MSW combusted at its mass burn facilities. The following figure from Bahor et al[6] shows the frequency distribution of annual average HHV measurements from 22 facilities over a ten year period. The average HHV was 10.26 MMBtu/short ton (5131 Btu/lb). These measurements confirm that the draft LGO Protocol's MSW heat content is too low and that the 10.06 MMBtu/short ton value is appropriate.

Testing has shown these routine HHV determinations to be accurate and reliable. During each facility acceptance test, Covanta measured MSW HHV using EfW industry-specific methodologies derived from the widely accepted ASME Power Test Code 4,[7] as well as PTC 33 [8]. These methodologies have since been embodied into PTC-34 [9], a Performance Test Procedure that has been adopted as a test method for Waste Combustors with Energy Recovery. In PTC-34, initial performance tests are made using the boiler as a calorimeter to measure MSW HHV.

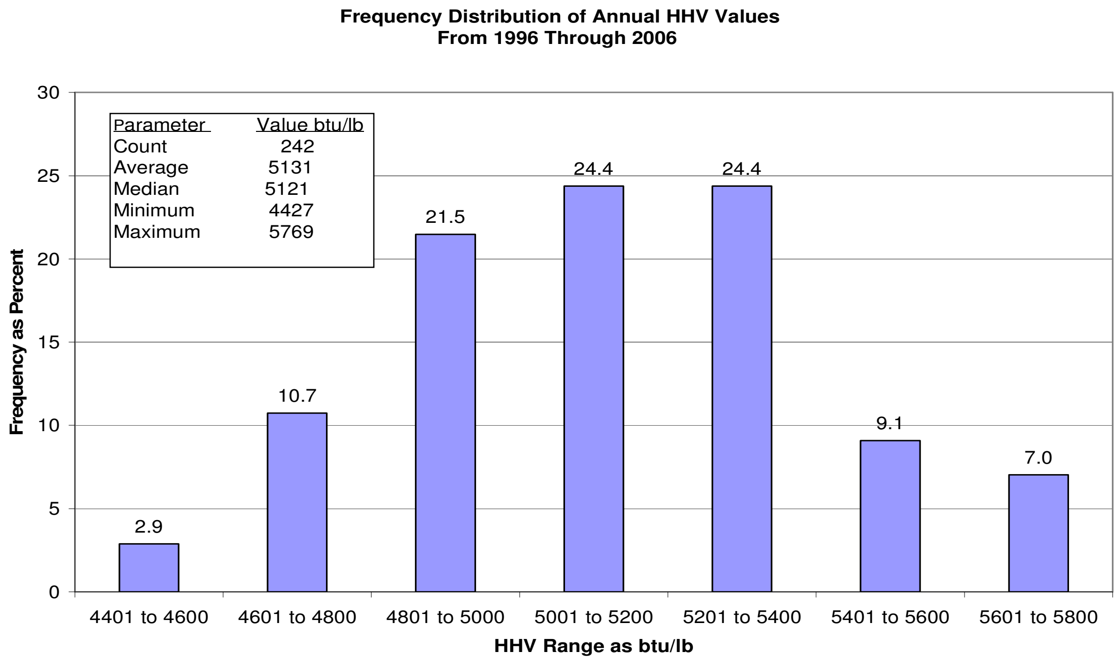
[6] Bahor, B., Weitz, K. and A. Szurgot, "Using a Carbon Balance to Estimate Greenhouse Gas Emissions and Mitigation from Municipal Solid Waste Management", presented at the Air and Waste Management Association's 101st Annual Conference and Exhibition, Portland, OR, June 24-27, 2008, page 10.

[7] American Society of Mechanical Engineers (ASME 1998), "Fired Steam Generators", ASME PTC 4-1998, United Engineering Center, New York, NY, 1998.

[8] American Society of Mechanical Engineers (ASME 1978 – Reaffirmed - 1985), "Large Incinerators", ASME PTC 33, United Engineering Center, New York, NY.

[9] American Society of Mechanical Engineers (ASME 2007), "PTC 34 - 2007 Waste Combustors with Energy Recovery", United Engineering Center, New York, NY.

Relationships established between multiple boiler parameters established during these initial tests can then be used and applied during long term facility operations to calculate HHV on a regular basis. Covanta's HHV correlation(s) has been developed and enhanced over the past 15 yrs using more than 70 individual Boiler as a Calorimeter tests.



<u>Appendix C Default Emission Factors, Table C.2, page 154</u>

Comment #12: In Table C.2, the MSW biogenic carbon content value of 65% is appropriate and supported by field test data.

Table C.2 states the biogenic carbon content of Municipal Solid Waste is 65%. Field testing at EfW facilities nationwide show that this value is representative. In 2007, Covanta conducted a nationwide program to measure biogenic CO_2 content in flue gases at five of its EfW facilities representing all regions of the U.S. The results, shown in the table below, indicate that on average 66% of the total CO_2 emissions are biogenic.[10] These findings are consistent with data reported by others. Castaldi reported on ASTM testing at two resource recovery facilities in the Northeast and Florida, operated by Wheelabrator Technologies. Flue gas biogenic carbon content averaged 66.7%.[11] These data show that the protocol value of 65% is appropriate.

[10] Bahor, B., Weitz, K. and A. Szurgot, "Using a Carbon Balance to Estimate Greenhouse Gas Emissions and Mitigation from Municipal Solid Waste Management", presented at the Air and Waste Management Association's 101st Annual Conference and Exhibition, Portland, OR, June 24-27, 2008, page 7.

[11] Castaldi, Marco J., "Energy from Waste – Sustainable Controlled Thermal Treatment", 26th Annual Conference on Incineration and Thermal Treatment Technologies (IT3), Phoenix, AZ, May 14-18, 2007.

Sample Date	Facility Location					
	Mid-Atlantic	Northeast	Midwest	Southeast	West	Monthly Avg
May-07	73	63	71	67	67	68
Jun-07	71		66	63	69	67
Jul-07					65	65
Aug-07	65	64		65		65
Sep-07			65		65	65
Oct-07	65	64				64
Nov-07				67	68	67
Dec-07	71		64			67
Mean	69	63	66	65	67	66

Appendix Default Emission Factors, Table C.4, page 156

Comment #13: The LGO protocol should clarify that CH_4 and N_2O emission factors be representative of facility-specific technology.

Table C.4 does not include default CH_4 and N_2O emission factors for MSW. While it is not necessary to specify default values, the protocol should make it clear to the user that selected emission factors should be representative of the specific technology employed. For example, Covanta Energy has tested N_2O emissions at its Stanislaus County, California EfW facility, which is similar in combustion and air pollution control systems design to the vast majority of EfW facilities nationwide. Attachment 1 contains the stack test report for that testing. The data show that no N_2O was found at a method detection limit of 1 ppmdv and an average stack oxygen concentration of 11.4% dry, or 1.46 ppmdv @ 7% O_2. The N_2O emission factor is therefore *less than*

1.46 E-6 x 14,389 dscf/MMBtu x 44 lb/mole / 385 scf/mole x 454 g/lb

= 1.1 g/MMBtu

For MSW with a higher heating value of 10.6 MMBtu/ton (see Comment #11) the N_2O emission factor is *less than*

1.1 g/MMBtu x 10.06 MMBtu/short ton MSW x 1.102 MT/short ton

= 12 g/MT MSW

This emission factor is at the lower end of the range of values cited by IPCC[12]and emphasizes the importance of emission factors derived from facility-specific data.

[12] IPCC, "2006 IPCC Guidelines for National Greenhouse Gas Inventories", Volume 5, Chapter 5, Table 5.4.

Chapter 17 Glossary of Terms, page 143

Comment #14: The definition of "Biogenic emissions from combustion" should be expanded to include CO_2 emissions from combusting the biofuel and biomass fraction of mixed fuels and wastes such as MSW.

Chapter 17 Glossary of Terms, page 143

Comment #15: In the definition of "Biomass", delete the phrase "and biodegradable" (3 locations).

All non-fossilized organic material is biogenic whether biodegradable or not. As an example, lignins do not biodegrade under the anaerobic conditions of a landfill but are still of biogenic origin. Conversely, products of fossil origin such as certain solvents may be biodegradable but they are still fossil-based and should not be classified as biomass. The definition of biomass should be solely based on the origin of the carbon and not be subject to a biodegradability criterion.

Attachments

Attachment 1. 2006 EIA-906/920 Database, sorted to show only MSW (MSB+MSN) fuel type codes. (Attached as a separate Excel file)

Attachment 2. Avogadro Group (2007), "Source Test Report, 2007 Nitrous Oxide Emission Test, Solid Waste Fuel Boiler, Unit 1, Covanta Stanislaus, Inc., Crows Landing, California", March 19, 2007. (Attached as a separate pdf file)