disposal quantities have been determined; and calculate the bulk waste DOC value using Equation TT–5 of this section. Use the bulk waste DOC value as DOC_x for all years for which bulk waste disposal quantities are determined according to paragraphs (a)(2)(ii)(C) of this section.

$$DOC_{bulk} = \frac{\sum_{n=1}^{N}\left(DOC_{ave,n} \times W_{ave,n}\right)}{\sum_{n=1}^{N} W_{ave,n}} \qquad \text{(Eq. TT-5)}$$

Where:

DOC_{bulk} = Degradable organic content value for bulk historical waste placed in the landfill (mass fraction).
N = Number of different waste streams placed in the landfill.
n = Index for waste stream.
$DOC_{ave,n}$ = Average degradable organic content value for waste stream ''n'' based on available measurement data (mass fraction).
$W_{ave,n}$ = Average annual quantity of waste stream ''n'' placed in the landfill for years in which waste stream-specific disposal quantities have been determined (metric tons per year, wet basis).

(b) For each landfill, calculate CH_4 generation (adjusted for oxidation in cover materials) and CH_4 emissions (taking into account any CH_4 recovery, if applicable, and oxidation in cover materials) according to the applicable methods in paragraphs (b)(1) through (b)(3) of this section.

(1) For each landfill, calculate CH_4 generation, adjusted for oxidation, from the modeled CH_4 (G_{CH_4} from Equation TT–1 of this section) using Equation TT–6 of this section.

$$MG = G_{CH4} \times (1 - OX) \qquad \text{(Eq. TT-6)}$$

Where:

MG = Methane generation, adjusted for oxidation, from the landfill in the reporting year (metric tons CH_4).
G_{CH_4} = Modeled methane generation rate in reporting year from Equation TT–1 of this section (metric tons CH_4).
OX = Oxidation fraction. Use the default value of 0.1 (10 percent).

(2) For landfills that do not have landfill gas collection systems operating during the reporting year, the CH_4 emissions are equal to the CH_4 generation (MG) calculated in Equation TT–6 of this section.

(3) For landfills with landfill gas collection systems in operation during any portion of the reporting year, perform all of the calculations specified in paragraphs (b)(3)(i) through (iv) of this section.

(i) Calculate the quantity of CH_4 recovered according to the requirements at § 98.343(b).

(ii) Calculate CH_4 emissions using the Equation HH–6 of § 98.343(c)(3)(i), except use G_{CH_4} determined using Equation TT–1 of this section in Equation HH–6 of § 98.343(c)(3)(i).

(iii) Calculate CH_4 generation (MG) from the quantity of CH_4 recovered using Equation HH–7 of § 98.343(c)(3)(ii).

(iv) Calculate CH_4 emissions from the quantity of CH_4 recovered using Equation HH–8 of § 98.343(c)(3)(ii).

[75 FR 39773, July 12, 2010, as amended at 76 FR 73907, Nov. 29, 2011]

§ 98.464 Monitoring and QA/QC requirements.

(a) For calendar year 2011 monitoring, the facility may submit a request to the Administrator to use one or more best available monitoring methods as listed in § 98.3(d)(1)(i) through (iv). The request must be submitted no later than October 12, 2010 and must contain the information in § 98.3(d)(2)(ii). To obtain approval, the request must demonstrate to the Administrator's satisfaction that it is not reasonably feasible to acquire, install, and operate a required piece of monitoring equipment by January 1, 2011. The use of best available monitoring methods will not be approved beyond December 31, 2011.

(b) For each waste stream placed in the landfill during the reporting year for which you choose to determine volatile solids concentration for the purposes of § 98.460(c)(2)(xii) or choose to determine a landfill-specific DOC_X for use in Equation TT–1 of this subpart, you must collect and test a representative sample of that waste stream using the methods specified in paragraphs (b)(1) through (b)(4) of this section.

(1) Develop and follow a sampling plan to collect a representative sample (in terms of composition and moisture content) of each waste stream placed in the landfill for which testing is elected.

(2) Determine the percent total solids and the percent volatile solids of each sample following Standard Method 2540G ''Total, Fixed, and Volatile Solids in Solid and Semisolid Samples'' (incorporated by reference; *see* § 98.7).

(3) For the purposes of § 98.460(c)(2)(xii), the volatile solids concentration (weight percent on a dry basis) is the percent volatile solids determined using Standard Method 2540G ''Total, Fixed, and Volatile Solids in Solid and Semisolid Samples'' (incorporated by reference; see § 98.7).

(4) Determine DOC value of a waste stream by either using at least a 60-day anaerobic biodegradation test as specified in paragraph (b)(4)(i) of this section or by estimating the DOC value based on the total and volatile solids measurements as specified in paragraph (b)(4)(ii) of this section.

(i) Perform an anaerobic biodegradation test and determine the DOC value of a waste stream following the procedures and requirements in paragraphs (b)(4)(i)(A) through (E) of this section.

(A) You may use the procedures published by a consensus-based standards organization to conduct a minimum of a 60-day anaerobic biodegradation test. Consensus-based standards organizations include, but are not limited to, the following: ASTM International (100 Barr Harbor Drive, P.O. Box CB700, West Conshohocken, Pennsylvania 19428–B2959, (800) 262–1373, *http://www.astm.org*), the American National Standards Institute (ANSI, 1819 L Street, NW., 6th floor, Washington, DC 20036, (202) 293–8020, *http://www.ansi.org*), the American Society of Mechanical Engineers (ASME, Three Park Avenue, New York, NY 10016–5990, (800) 843–2763, *http://www.asme.org*), and the North American Energy Standards Board (NAESB, 801 Travis Street, Suite 1675, Houston, TX 77002, (713) 356–0060, *http://www.api.org*).

(B) Use a minimum of four samples: Two waste stream samples, a control sample using a known substrate (such as ethanol), and a digester sludge blank sample. Each waste stream sample must be appropriately ground to ensure the waste material is fully exposed to the anaerobic digester sludge.

(C) Determine the net mass of carbon degraded in the control sample as the difference in the results of the control sample and the digester sludge blank sample. Determine the net mass of carbon degraded in each waste stream sample as the difference in the results of each waste stream sample and the digester sludge blank sample.

(D) Determine the fraction of carbon degraded in the control sample as the net mass of carbon degraded in the control sample divided by the mass of carbon added via the substrate material in the control sample. If less than 50 percent of the theoretical mass of carbon in the control sample is degraded, the test run is invalid.

(E) Determine the DOC of each waste sample using Equation TT–7 of this section. If the DOC values for the two waste stream samples differ by more than 20 percent, the test run is invalid. The DOC of the waste stream is determined as the average DOC value of the two waste stream samples determined during a valid test.

$$DOC_x = \left(\frac{1}{DOC_F}\right)\left(\frac{MCD_{sample,x}}{M_{sample,x}}\right)\Bigg/\left(\frac{MCD_{control}}{MC_{control}}\right) \qquad \text{(Eq. TT-7)}$$

Where:

DOC_X = Degradable organic content of the waste stream in Year X (weight fraction, wet basis)

DOC_F = Fraction of DOC dissimilated (fraction); use the default value of 0.5.

$MCD_{sample,x}$ = Mass of carbon degraded in the waste stream sample in Year X as determined in paragraph (b)(4)(i)(C) of this section [milligrams (mg)].

$M_{sample,x}$ = Mass of waste stream sample used in the anaerobic degradation test in Year X (mg, wet basis).

$MCD_{control}$ = Mass of carbon degraded in the control sample as determined in paragraph (b)(4)(i)(B) of this section (mg).

$MC_{control}$ = Mass of carbon added to the control sample via the substrate material in the anaerobic degradation (mg).

(ii) Calculate the waste stream-specific DOC_X value using Equation TT–8 of this section.

$$DOC_x = F_{DOC} \times \frac{\%\ \text{Volatile Solids}_x}{100\%} \times \frac{\%\ \text{Total Solids}_x}{100\%} \qquad \text{(Eq. TT-8)}$$

Where:

DOC_X = Degradable organic content of waste stream in Year X (weight fraction, wet basis)

F_{DOC} = Fraction of the volatile residue that is degradable organic carbon (weight fraction). Use a default value of 0.6.

% Volatile $Solids_X$ = Percent volatile solids determined using Standard Method 2540G Total, ''Fixed, and Volatile Solids in Solid and Semisolid Samples'' (incorporated by reference; see §98.7) for Year X [milligrams (mg) volatile solids per 100 mg dried solids].

% Total $Solids_X$ = Percent total solids determined using Standard Method 2540G ''Total, Fixed, and Volatile Solids in Solid and Semisolid Samples'' (incorporated by reference; see §98.7) for Year X (mg dried solids per 100 mg wet waste).

(c) For each waste stream for which you choose to determine volatile solids concentration for the purposes of paragraph §98.460(c)(2)(xii), and that was historically managed in the landfill but was not received during the first reporting year, you must determine volatile solids concentration of the waste stream as initially placed in the landfill using the methods specified in paragraph (c)(1) or (c)(2) of this section, as applicable.

(1) If you can identify a similar waste stream to the waste stream that was historically managed in the landfill, you must determine the volatile solids concentration of the similar waste stream using the procedures in paragraphs (b)(1) through (b)(3) of this section.

(2) If you cannot identify a similar waste stream to the waste stream that was historically managed in the landfill, you may determine the volatile solids concentration of the historically managed waste stream using process knowledge. You must document the basis for volatile solids concentration as determined through process knowledge.

(d) For landfills with gas collection systems, operate, maintain, and calibrate a gas composition monitor capable of measuring the concentration of CH_4 according to the requirements specified at §98.344(b).

(e) For landfills with gas collection systems, install, operate, maintain, and calibrate a gas flow meter capable of measuring the volumetric flow rate of the recovered landfill gas according to the requirements specified at §98.344(c).

(f) For landfills with gas collection systems, all temperature, pressure, and if applicable, moisture content monitors must be calibrated using the procedures and frequencies specified by the manufacturer.

(g) For landfills electing to measure the fraction by volume of CH_4 in landfill gas (F), follow the requirements in paragraphs (g)(1) and (g)(2) of this section.

(1) Use a gas composition monitor capable of measuring the concentration of CH_4 on a dry basis that is properly operated, calibrated, and maintained according to the requirements specified at §98.344(b). You must either use a gas composition monitor that is also capable of measuring the O_2 concentration

correcting for excess (infiltration) air or you must operate, maintain, and calibrate a second monitor capable of measuring the O_2 concentration on a dry basis according to the manufacturer's specifications.

(2) Use Equation TT–9 of this section to correct the measured CH_4 concentration to 0% oxygen. If multiple CH_4 concentration measurements are made during the reporting year, determine F separately for each measurement made during the reporting year, and use the results to determine the arithmetic average value of F for use in Equation TT–1 of this part.

$$F = \left(\frac{C_{CH4}}{100\%}\right) \times \left[20.9_c \Big/ \left(20.9 - \%O_2\right)\right] \qquad \text{(Eq. TT-9)}$$

Where:

F = Fraction by volume of CH_4 in landfill gas (fraction, dry basis, corrected to 0% oxygen).

C_{CH4} = Measured CH_4 concentration in landfill gas (volume %, dry basis).

20.9_c = Defined O_2 correction basis, (volume %, dry basis).

20.9 = O_2 concentration in air (volume %, dry basis).

$\%O_2$ = Measured O_2 concentration in landfill gas (volume %, dry basis).

(h) The facility shall document the procedures used to ensure the accuracy of the estimates of disposal quantities and, if the industrial waste landfill has a gas collection system, gas flow rate, gas composition, temperature, pressure, and moisture content measurements. These procedures include, but are not limited to, calibration of weighing equipment, fuel flow meters, and other measurement devices. The estimated accuracy of measurements made with these devices shall also be recorded, and the technical basis for these estimates shall be provided.

[75 FR 39773, July 12, 2010, as amended at 76 FR 73908, Nov. 29, 2011]

§ 98.465 Procedures for estimating missing data.

(a) A complete record of all measured parameters used in the GHG emissions calculations is required. Therefore, whenever a quality-assured value of a required parameter is unavailable (*e.g.*, if a meter malfunctions during unit operation or if a required fuel sample is not taken), a substitute data value for the missing parameter shall be used in the calculations, in accordance with paragraph (b) of this section.

(b) For industrial waste landfills with gas collection systems, follow the procedures for estimating missing data specified in § 98.345(a) and (b).

§ 98.466 Data reporting requirements.

In addition to the information required by § 98.3(c), each annual report must contain the following information for each landfill.

(a) Report the following general landfill information:

(1) A classification of the landfill as ''open'' (actively received waste in the reporting year) or ''closed'' (no longer receiving waste).

(2) The year in which the landfill first started accepting waste for disposal.

(3) The last year the landfill accepted waste (for open landfills, enter the estimated year of landfill closure).

(4) The capacity (in metric tons) of the landfill.

(5) An indication of whether leachate recirculation is used during the reporting year and its typical frequency of use over the past 10 years (*e.g.*, used several times a year for the past 10 years, used at least once a year for the past 10 years, used occasionally but not every year over the past 10 years, not used).

(b) Report the following waste characterization and modeling information:

(1) The number of waste steams (including ''Other Industrial Solid Waste (not otherwise listed)'') for which Equation TT–1 of this subpart is used to calculate modeled CH_4 generation.

(2) A description of each waste stream (including the types of materials in each waste stream) for which