

2018 MANDATORY GREENHOUSE GAS REPORT

*Lebanon Regional Solid Waste Facility
Lebanon, New Hampshire*

*Prepared for City of Lebanon
File No. 3264.10
March 2019*

Mr. Marc Morgan
Lebanon Regional Solid Waste Facility
193 Dartmouth College Highway
Lebanon, NH 03766

March 29, 2019
File No. 3264.10

Re: Mandatory Greenhouse Gas Reporting
Lebanon Regional Solid Waste Facility
Lebanon, New Hampshire

Dear Marc:

Sanborn, Head & Associates, Inc. (Sanborn Head) prepared this 2018 USEPA Mandatory Greenhouse Gas (GHG) Report on behalf of the City of Lebanon (City) for the Lebanon Regional Solid Waste Facility (Facility) in Lebanon, New Hampshire. As required, we prepared the report using an online registry, the Electronic Greenhouse Gas Reporting Tool (e-GGRT), which is used by the U.S. Environmental Protection Agency (USEPA) as a tool for reporting GHG emissions.

BACKGROUND

According to 40 Code of Federal Regulations (40 CFR) Part 98, Subpart A, Mandatory Greenhouse Gas Reporting, any owner or operator of a municipal solid waste landfill that generates methane (CH₄) in amounts equivalent to 25,000 metric tons of carbon dioxide equivalent (CO₂e) or more per year must report GHG emissions.

PHYSICAL INVENTORY

The following sources have been accounted for in the e-GGRT registry:

- Volume of collected landfill gas (LFG);
- Volume of fugitively emitted LFG;
- Oil Furnaces (2); and
- Propane Heaters/Furnaces (2).

EMISSIONS INVENTORY

Subpart HH, Municipal Solid Waste Landfills

In accordance with Subpart HH of the USEPA Mandatory Reporting Rule (MRR), Sanborn Head prepared estimates for the following using the appropriate Subpart HH equations within the e-GGRT system:

- Annual modeled CH₄ generation rate (equations HH-1 and HH-3);
- Annual CH₄ generation rate adjusted for oxidation in cover materials (equations HH-5 and HH-7);
- Annual quantity of recovered CH₄ (equation HH-4); and
- Annual CH₄ emission rate (equations HH-6 and HH-8).

Equation HH-2, which is used to estimate historical waste acceptance based on population data, was not required for this site.

The annual modeled CH₄ generation of the landfill was calculated within the e-GGRT system using historical waste acceptance data provided by the City, default values provided in the MRR, and Equation HH-1. For 2018, the average measured methane concentration was used for the methane fraction in the gas instead of a default value. The methane generation rate was corrected for oxidation in cover materials using an oxidation factor (based on Condition C3 in Table HH-4) provided in the MRR.

The calculations require waste quantities received on an annual basis. Waste quantities from 1971 through 2018 were input based on scale records provided by the City. For the years that GHG reporting has been required, (i.e., 2010-2018), the modified bulk waste characterization method was used, which separates the waste into two categories; modified bulk waste and construction and demolition (C&D) waste (see Table 1). Each of these waste types has a specific degradable organic carbon (DOC) fraction and rate of decay (k) factor, which were applied to the calculations for the specified years. Prior to 1971, an average yearly waste acceptance rate was assumed based upon data provided by the City in the December 23, 2009 Request for Proposals for Landfill Gas Development and Energy Recovery Project. Table 1 summarizes historical waste acceptance data from the landfill.

At the landfill, there is a separate cell that contains only C&D waste. Based on Part 98.340 (b) of the MRR, C&D waste landfills are not included as a source category for GHG emissions. Therefore, the C&D landfill cell was excluded as a source in our calculations.

The CH₄ recovery from the gas collection system at the landfill was calculated using monthly total LFG flow measurements, monthly average CH₄ concentrations, default values provided in the MRR, and Equation HH-4. Table 2 summarizes monthly flow and methane data from the landfill. Methane emissions were calculated in e-GGRT using this estimate for the quantity of recovered CH₄, the modeled generation rate of CH₄ from equation HH-1, default values provided in the MRR, and Equation HH-6 which adjusts CH₄ emissions for oxidation in cover materials. The fraction of hours the destruction device was operating is based on the downtime of the on-site flare; as summarized in Table 2. We assumed the flare has a destruction efficiency of 98 percent.

The estimated annual CH₄ generation and emissions were also calculated in e-GGRT using the calculated CH₄ recovery, collection efficiency of the landfill, default values provided in the MRR, and Equations HH-7 and HH-8. The collection efficiency of the landfill was based on the classification of the cover materials and the associated gas collection efficiencies

included in the MRR. The fraction of hours the recovery system was operating is based on the downtime of the on-site flare; as summarized in Table 2.

The calculation spreadsheet for equation HH-4 is enclosed with this report; all other calculations were performed internally by the e-GGRT system. A summary of the values are included in the table below. Two methane emission values were calculated by e-GGRT, however, only the larger value is used by the e-GGRT system for reporting. For 2018, the emission rate calculated using the modeled generation rate of CH₄ and recovered CH₄ quantity (i.e., the estimate based on equation HH-6) was reported.

Subpart HH Equations	CH₄ (metric tons)
Modeled CH ₄ Generation (Eq. HH-1)	2,393.4
Modeled CH ₄ Generation, adjusted for oxidation (Eq. HH-5)	2,154.1
Measured CH ₄ Recovery (Eq. HH-4)	1,472.2
Measured CH ₄ Generation (Eq. HH-7)	1,684.5
CH₄ Emissions (Eq. HH-6)	858.53
CH ₄ Emissions (Eq. HH-8)	388.9

Subpart C, Stationary Fuel Combustion Sources

Four levels of emissions quantification methodologies can be used in the e-GGRT system for Subpart C calculations. They are Tier 1, Tier 2, Tier 3, and Tier 4, in order of increasing preference. In accordance with Subpart C of the MRR, Tier 1 may be used if the combustion unit has a maximum rated heat input capacity of 250 million metric British thermal units (MMBtu) per hour or less. Sanborn Head used Tier 1 to quantify GHG emissions from the furnaces and heaters as it was the highest tier of data accuracy possible based on the available data.

The total amount of fuel combusted during 2018 and default values for higher heat content and carbon dioxide (CO₂), CH₄, and nitrous oxide (N₂O) emission factors were used in equations C-1 and C-8 of the MRR. Fuel usage volumes and fuel type (No. 2 fuel oil and propane) for 2018 were provided by the City. Calculation spreadsheets for equations C-1 and C-8 are enclosed with this report for the two fuel types. The resulting emission estimates are summarized below.

Greenhouse Gas	Oil Furnaces CO₂e Emissions (metric tons)	Propane Furnace/Heater CO₂e Emissions (metric tons)
CO ₂	64.0	20.1
CH ₄	0.1	0.0
N ₂ O	0.2	0.1

CONCLUSION

Estimated GHG emissions from the Facility during 2018 are shown below and in the attached 2018 USEPA Annual GHG Report generated by the e-GGRT system. The e-GGRT

system converts emissions into CO₂ equivalent (CO₂e) emissions based on the following assumptions:

- The global warming potential (GWP) for CH₄ is 25 times greater than the GWP for CO₂; and
- The GWP for N₂O is 298 times greater than the GWP for CO₂.

Emission Source	CO₂e (metric tons)
Landfill Gas (uncollected)	21,463.3
Furnaces	84.5
Total	21,548

We received a confirmation email from the USEPA stating that the 2018 USEPA GHG Report for the Facility was submitted by the City before the reporting deadline, using the e-GGRT system. A copy of the report generated by the e-GGRT system is enclosed. To satisfy the requirements of the USEPA GHG reporting regulation (40 CFR Subpart 98), a copy of this letter and the attached records should be retained at the Facility.

For next year, the 2019 USEPA GHG Report should be submitted using the e-GGRT system by March 31, 2020.

Thank you for the opportunity to prepare this report. We look forward to working with you on future projects. Please contact us with any questions.

Sincerely,
SANBORN, HEAD & ASSOCIATES, INC.



Lisa Damiano, P.E.
Project Manager



David E. Adams, P.E.
Senior Vice President/Principal

LLD/HHL/DEA: lld

- Encl. Table 1 - Waste Acceptance Rates
Table 2 - Monthly Landfill Gas Flow and Methane Concentration Data
2018 USEPA Greenhouse Gas Report
USEPA Subpart C: Equations C-1 and C-8 Calculation Spreadsheets
USEPA Subpart HH: Equation HH-4 Calculation Spreadsheet

TABLES

Table 1
Waste Acceptance Rates

Lebanon Regional Solid Waste Facility
Lebanon, New Hampshire

Closed MSW Landfill

Year	Bulk MSW k = 0.038, DOC = 0.2		
	Total Waste Acceptance Rate (ton)	Average Waste Acceptance Rate (tons)	Total Waste Acceptance Rate (Mg)
1950	8,000	9,822	8,909
1951	8,160	9,822	8,909
1952	8,323	9,822	8,909
1953	8,490	9,822	8,909
1954	8,659	9,822	8,909
1955	8,833	9,822	8,909
1956	9,009	9,822	8,909
1957	9,189	9,822	8,909
1958	9,373	9,822	8,909
1959	9,561	9,822	8,909
1960	9,752	9,822	8,909
1961	9,947	9,822	8,909
1962	10,146	9,822	8,909
1963	10,349	9,822	8,909
1964	10,556	9,822	8,909
1965	10,767	9,822	8,909
1966	10,982	9,822	8,909
1967	11,202	9,822	8,909
1968	11,426	9,822	8,909
1969	11,654	9,822	8,909
1970	11,888	9,822	8,909
1971	12,125	--	10,997
1972	15,637	--	14,183
1973	16,340	--	14,820
1974	17,105	--	15,514
1975	18,798	--	17,050
1976	19,654	--	17,826
1977	20,655	--	18,734
1978	20,985	--	19,033
1979	21,105	--	19,142
1980	21,328	--	19,344
1981	21,940	--	19,900
1982	22,930	--	20,798
1983	23,657	--	21,457
1984	24,500	--	22,222
1985	25,074	--	22,742
1986	27,680	--	25,106
1987	27,418	--	24,868
1988	25,469	--	23,100
1989	26,152	--	23,720
1990	27,255	--	24,720
1991	17,003	--	15,422
1992	17,396	--	15,778
Total	--	--	613,561

Phases I and II Landfill

Year	Total Waste Acceptance (Bulk MSW) k = 0.038, DOC = 0.2		Modified Bulk MSW k = 0.039, DOC = 0.31		C&D Waste k = 0.03, DOC = 0.08	
	(tons)	(megagrams) (Mg)	(Mg)	Fraction of Total Waste	(Mg)	Fraction of Total Waste
1993	31,804	28,846	--	--	--	--
1994	34,404	31,204	--	--	--	--
1995	33,856	30,707	--	--	--	--
1996	36,424	33,037	--	--	--	--
1997	34,496	31,288	--	--	--	--
1998	39,004	35,377	--	--	--	--
1999	41,809	37,921	--	--	--	--
2000	44,871	40,698	--	--	--	--
2001	48,754	44,220	--	--	--	--
2002	49,086	44,521	--	--	--	--
2003	50,773	46,051	--	--	--	--
2004	50,940	46,203	--	--	--	--
2005	49,637	45,021	--	--	--	--
2006	49,716	45,092	--	--	--	--
2007	48,029	43,562	--	--	--	--
2008	46,568	42,237	--	--	--	--
2009	50,146	45,482	--	--	--	--
2010	49,203	44,627	36,371	0.815	8,256	0.185
2011	55,698	50,519	35,717	0.707	14,802	0.293
2012	55,811	50,621	38,118	0.753	12,503	0.247
2013	56,277	51,044	36,905	0.723	14,139	0.277
2014	61,466	55,750	36,795	0.660	18,955	0.340
2015	59,970	54,392	37,476	0.689	16,916	0.311
2016	61,419	55,707	38,772	0.696	16,935	0.304
2017	58,347	52,921	38,950	0.736	13,971	0.264
2018	60,915	55,250	39,614	0.717	15,636	0.283
Total	1,198,509	1,087,048	--	--	--	--

Notes:

- Annual waste acceptance from 1950 to 1992 was provided by the City of Lebanon and pertains to the closed municipal solid waste (MSW) landfill. No waste composition was recorded; therefore, we assumed that the waste was bulk MSW.
 - Based on the uncertainty of the methods used in recorded waste acceptance tonnage from 1950 to 1970, an average yearly waste acceptance was calculated based on the waste in place through 1970.
 - Based on discussions with the City of Lebanon and analysis of waste acceptance data, the estimated date that a landfill scale was installed on site is 1971.
- Annual waste acceptance from 1993 through 2018 was provided by the City of Lebanon and pertains to the lined landfill (i.e., Phases I and II). The assumed waste type from 1993 through 2009 is bulk MSW.
- The waste category of sludge was excluded from waste accepted in 2010 and 2011 because the sludge was segregated and composted for use as daily cover soil. Composting was suspended in 2012; therefore, sludge was included in the bulk MSW category for 2012 through 2018.
- For the reporting years 2010 through 2018, the waste was separated into two categories under the modified bulk waste option: modified bulk MSW and construction and demolition (C&D) debris. The C&D category includes waste designated as alternate daily cover. Separate DOC and k values were applied for the modified bulk MSW and the C&D debris.
- Megagrams (Mg) = tons x 0.907

Table 2
Monthly Landfill Gas Flow and Methane Concentration Data

Lebanon Regional Solid Waste Facility
Lebanon, New Hampshire

Date	Flare Downtime (hrs)	Operating Hours of Flare (hrs)	Total Flow (scf/month)	Methane (%)
January	106.3	637.7	13,312,974	46.1
February	1.5	670.5	11,353,743	41.3
March	0.2	743.8	15,074,770	46.3
April	2.2	717.8	14,562,408	42.8
May	0.0	744.0	16,198,088	41.1
June	14.2	705.8	15,462,052	41.3
July	4.5	739.5	14,083,415	57.0
August	43.0	701.0	21,587,281	36.3
September	117.8	602.2	14,249,369	38.6
October	123.5	620.5	11,299,397	45.4
November	23.0	697.0	13,387,580	46.1
December	13.2	730.8	14,786,440	46.8
2018 Total	449	8,311	175,357,517	-
2018 Average	-	-	-	44.1

Notes:

1. We assumed that the GCCS was operating for the same number of hours each month as the flare.
2. Monthly volumes of LFG delivered to the flare are based on data recorder readings from the LFG flow meter/totalizer.
3. The methane content of LFG delivered to the flare is based on monthly readings using a GEM-2000 or GEM-5000.

2018 USEPA GREENHOUSE GAS REPORT

Certification Statement:

The designated representative or alternate designated representative must sign (i.e., agree to) this certification statement. If you are an agent and you click on "SUBMIT", you are not agreeing to the certification statement, but are submitting the certification statement on behalf of the designated representative or alternate designated representative who is agreeing to the certification statement. An agent is only authorized to make the electronic submission on behalf of the designated representative, not to sign (i.e., agree to) the certification statement.

Facility Name: LEBANON LANDFILL AND RECYCLING CENTER

Facility Identifier: 529899

Facility Reporting Year: 2018

Facility Location:

Address: 370 PLAINFIELD ROAD, RTE 12-A

City: WEST LEBANON

State: NH

Postal Code: 03784

Facility Site Details:

CO2 equivalent emissions from facility subparts C-II, SS, and TT (metric tons): 21,547.6

CO2 equivalent emissions from supplier subparts LL-QQ (metric tons): 0

Biogenic CO2 emissions from facility subparts C-II, SS, and TT (metric tons): 0

Cogeneration Unit Emissions Indicator: N

GHG Report Start Date: 2018-01-01

GHG Report End Date: 2018-12-31

Description of Changes to Calculation Methodology:

Plant Code Indicator: N

Primary NAICS Code: 562212

Second Primary NAICS Code:

Parent Company Details:

Parent Company Name: CITY OF LEBANON

Address: 370 Plainfield Road, West Lebanon, NH 03784

Percent Ownership Interest: 100

Subpart C: General Stationary Fuel Combustion

Gas Information Details

Gas Name	Carbon Dioxide
Gas Quantity	84.1 (Metric Tons)
Own Result?	

Gas Name	Biogenic Carbon dioxide
Gas Quantity	0 (Metric Tons)
Own Result?	

Gas Name	Methane
Gas Quantity	0 (Metric Tons)
Own Result?	

Gas Name	Nitrous Oxide
Gas Quantity	0.001 (Metric Tons)
Own Result?	

Unit Details:

Unit Name : GP-Furnace/Heater

Unit Type : OCS (Other combustion source)

Unit Description : (1) Rinnai EX22C Direct Vent Wall Furnace, (1) Sunstar Infrared Gas Heater

Other Unit Name :

Small Unit Aggregation Details:

Use Ivt Indicator: N

Highest Maximum Rated Heat Input Capacity: 0.15

Cumulative Maximum Rated Heat Input Capacity:

Emission Details:

Annual CO₂ mass emissions from sorbent: 0 (Metric Tons)

Annual Biogenic CO₂ Emissions: 0 (metric tons)

Annual Fossil fuel based CO₂ Emissions: 20.2 (metric tons)

Tier Fuel Details:

Fuel : Propane

Tier Name : Tier 1 (Equation C-1)

Tier Methodology Start Date : 2018-01-01

Tier Methodology End Date : 2018-12-31

Fuel Emission Details :

Total CO ₂ emissions	Total CH ₄ emissions	Total N ₂ O emissions	Total CH ₄ emissions CO ₂ e	Total N ₂ O emissions CO ₂ e
20.1 (Metric Tons)	0.00 (Metric Tons)	0.000 (Metric Tons)	0 (Metric Tons)	0.1 (Metric Tons)

Equation C1/C8 Inputs :

Fuel Quantity : 3512 (gallons/year)

Unit Name : GP-Boiler and Furnace

Unit Type : OCS (Other combustion source)

Unit Description : (1) Weil Mclain hot water boiler and (1) Williamson Temp-O-Matic Hi Boy, Model No. 1167-18

Other Unit Name :

Small Unit Aggregation Details:

Use Ivt Indicator: N

Highest Maximum Rated Heat Input Capacity: 0.886

Cumulative Maximum Rated Heat Input Capacity:

Emission Details:

Annual CO₂ mass emissions from sorbent: 0 (Metric Tons)

Annual Biogenic CO₂ Emissions: 0 (metric tons)

Annual Fossil fuel based CO₂ Emissions: 64.3 (metric tons)

Tier Fuel Details:

Fuel : Distillate Fuel Oil No. 2

Tier Name : Tier 1 (Equation C-1)

Tier Methodology Start Date : 2018-01-01

Tier Methodology End Date : 2018-12-31

Fuel Emission Details :

Total CO ₂ emissions	Total CH ₄ emissions	Total N ₂ O emissions	Total CH ₄ emissions CO ₂ e	Total N ₂ O emissions CO ₂ e
64.0 (Metric Tons)	0.00 (Metric Tons)	0.001 (Metric Tons)	0.1 (Metric Tons)	0.2 (Metric Tons)

Equation C1/C8 Inputs :

Fuel Quantity : 6271 (gallons/year)

Subpart HH: Municipal Solid Waste Landfills

Gas Information Details

Gas Name	Methane
Gas Quantity	858.53 (Metric Tons)
Own Result?	

Landfill Details

Is the landfill open?	Y
Estimated Year LandFill Closure	2027
Starting Year for Accepting Waste	1950
First year of emissions reporting	2010
Leachate recirculation was used during the reporting year	N
Typical frequency of use for leachate recirculation system	Not used for the past 10 years
Scales are present at the landfill in the reporting year	Y
Does the landfill have a landfill gas collection system?	Y
Passive vents and/or flares are present	N
Landfill Capacity	2082763 (Metric Tons)
Total surface area of the landfill containing waste	172924 (Square Meters)
Covertypes Details	Other soil mixture ()

Aeration Details

Aeration Blower Capacity	()
Landfill Fraction Affected by Aeration	()
Aeration Blower Operations Hours	()
Other MCF Factors	
Additional Description	

Current Waste Disposal Quantity Determination Details

First Year to Current Year Annual Waste Quantity Method

Reporting Year	2018
Total Annual Waste Disposal Quantity	55250 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	55250 (Metric Tons)
Reporting Year	2017
Total Annual Waste Disposal Quantity	52921 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	52921 (Metric Tons)
Reporting Year	2016

Total Annual Waste Disposal Quantity	55707 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	55707 (Metric Tons)
Reporting Year	2015
Total Annual Waste Disposal Quantity	54392 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	54392 (Metric Tons)
Reporting Year	2014
Total Annual Waste Disposal Quantity	55750 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	55750 (Metric Tons)
Reporting Year	2013
Total Annual Waste Disposal Quantity	51044 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	51044 (Metric Tons)
Reporting Year	2012
Total Annual Waste Disposal Quantity	50621 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	50621 (Metric Tons)
Reporting Year	2011
Total Annual Waste Disposal Quantity	50519 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	50519 (Metric Tons)
Reporting Year	2010
Total Annual Waste Disposal	44627 (Metric Tons)

Quantity	
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	44627 (Metric Tons)

Waste Type Details

Year Waste Disposed	2018					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Modified bulk MSW	bulk MSW waste (excluding inerts and C&D waste)	0.717	0.31	0.5	0.039
	Modified bulk MSW	bulk C&D waste	0.283	0.08	0.5	0.03
Year Waste Disposed	2017					
Missing data procedure used?	N					
Number of Times Substituted	0					
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Modified bulk MSW	bulk MSW waste (excluding inerts and C&D waste)	0.736	0.31	0.5	0.039
	Modified bulk MSW	bulk C&D waste	0.264	0.08	0.5	0.03
Year Waste Disposed	2016					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Modified bulk MSW	bulk MSW waste (excluding inerts and C&D waste)	0.696	0.31	0.5	0.039

	Modified bulk MSW	bulk C&D waste	0.304	0.08	0.5	0.03
Year Waste Disposed	2015					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Modified bulk MSW	bulk MSW waste (excluding inerts and C&D waste)	0.689	0.31	0.5	0.039
	Modified bulk MSW	bulk C&D waste	0.311	0.08	0.5	0.03
Year Waste Disposed	2014					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Modified bulk MSW	bulk MSW waste (excluding inerts and C&D waste)	0.660	0.31	0.5	0.039
	Modified bulk MSW	bulk C&D waste	0.340	0.08	0.5	0.03
Year Waste Disposed	2013					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Modified bulk MSW	bulk MSW waste (excluding inerts and C&D waste)	0.723	0.31	0.5	0.039
	Modified bulk MSW	bulk C&D waste	0.277	0.08	0.5	0.03
Year Waste Disposed	2012					

Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Modified bulk MSW	bulk MSW waste (excluding inerts and C&D waste)	0.753	0.31	0.5	0.039
	Modified bulk MSW	bulk C&D waste	0.247	0.08	0.5	0.03
Year Waste Disposed	2011					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Modified bulk MSW	bulk MSW waste (excluding inerts and C&D waste)	0.707	0.31	0.5	0.039
	Modified bulk MSW	bulk C&D waste	0.293	0.08	0.5	0.03
Year Waste Disposed	2010					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Modified bulk MSW	bulk MSW waste (excluding inerts and C&D waste)	0.815	0.31	0.5	0.039
	Modified bulk MSW	bulk C&D waste	0.185	0.08	0.5	0.03

Historical Waste Disposal Quantity Estimation Details

Method used to determine the annual waste quantity for any prior years

Were scales used to determine the annual waste quantity	Y
Start Year	1971
End Year	2009

Prior Year Annual Waste Quantity Method

Reporting Year	2009
Total Annual Waste Disposal Quantity	45482 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	45482 (Metric Tons)
Reporting Year	2008
Total Annual Waste Disposal Quantity	42237 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	42237 (Metric Tons)
Reporting Year	2007
Total Annual Waste Disposal Quantity	43562 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	43562 (Metric Tons)
Reporting Year	2006
Total Annual Waste Disposal Quantity	45092 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	45092 (Metric Tons)
Reporting Year	2005
Total Annual Waste Disposal Quantity	45021 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	45021 (Metric Tons)
Reporting Year	2004
Total Annual Waste Disposal Quantity	46203 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	46203 (Metric Tons)

Reporting Year	2003
Total Annual Waste Disposal Quantity	46051 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	46051 (Metric Tons)
Reporting Year	2002
Total Annual Waste Disposal Quantity	44521 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	44521 (Metric Tons)
Reporting Year	2001
Total Annual Waste Disposal Quantity	44220 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	44220 (Metric Tons)
Reporting Year	2000
Total Annual Waste Disposal Quantity	40698 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	40698 (Metric Tons)
Reporting Year	1999
Total Annual Waste Disposal Quantity	37921 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	37921 (Metric Tons)
Reporting Year	1998
Total Annual Waste Disposal Quantity	35377 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	35377 (Metric Tons)
Reporting Year	1997
Total Annual	31288 (Metric Tons)

Waste Disposal Quantity	
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	31288 (Metric Tons)
Reporting Year	1996
Total Annual Waste Disposal Quantity	33037 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	33037 (Metric Tons)
Reporting Year	1995
Total Annual Waste Disposal Quantity	30707 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	30707 (Metric Tons)
Reporting Year	1994
Total Annual Waste Disposal Quantity	31204 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	31204 (Metric Tons)
Reporting Year	1993
Total Annual Waste Disposal Quantity	28846 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	28846 (Metric Tons)
Reporting Year	1992
Total Annual Waste Disposal Quantity	15778 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	15778 (Metric Tons)
Reporting Year	1991
Total Annual Waste Disposal Quantity	15422 (Metric Tons)

Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	15422 (Metric Tons)
Reporting Year	1990
Total Annual Waste Disposal Quantity	24720 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	24720 (Metric Tons)
Reporting Year	1989
Total Annual Waste Disposal Quantity	23720 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	23720 (Metric Tons)
Reporting Year	1988
Total Annual Waste Disposal Quantity	23100 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	23100 (Metric Tons)
Reporting Year	1987
Total Annual Waste Disposal Quantity	24868 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	24868 (Metric Tons)
Reporting Year	1986
Total Annual Waste Disposal Quantity	25106 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	25106 (Metric Tons)
Reporting Year	1985
Total Annual Waste Disposal Quantity	22742 (Metric Tons)
Method Used to Determine	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container

Quantity	weights
Annual Waste Disposal Quantity	22742 (Metric Tons)
Reporting Year	1984
Total Annual Waste Disposal Quantity	22222 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	22222 (Metric Tons)
Reporting Year	1983
Total Annual Waste Disposal Quantity	21457 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	21457 (Metric Tons)
Reporting Year	1982
Total Annual Waste Disposal Quantity	20798 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	20798 (Metric Tons)
Reporting Year	1981
Total Annual Waste Disposal Quantity	19900 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	19900 (Metric Tons)
Reporting Year	1980
Total Annual Waste Disposal Quantity	19344 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	19344 (Metric Tons)
Reporting Year	1979
Total Annual Waste Disposal Quantity	19142 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste	19142 (Metric Tons)

Disposal Quantity	
Reporting Year	1978
Total Annual Waste Disposal Quantity	19033 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	19033 (Metric Tons)
Reporting Year	1977
Total Annual Waste Disposal Quantity	18734 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	18734 (Metric Tons)
Reporting Year	1976
Total Annual Waste Disposal Quantity	17826 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	17826 (Metric Tons)
Reporting Year	1975
Total Annual Waste Disposal Quantity	17050 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	17050 (Metric Tons)
Reporting Year	1974
Total Annual Waste Disposal Quantity	15514 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	15514 (Metric Tons)
Reporting Year	1973
Total Annual Waste Disposal Quantity	14820 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	14820 (Metric Tons)
Reporting Year	1972

Total Annual Waste Disposal Quantity	14183 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	14183 (Metric Tons)
Reporting Year	1971
Total Annual Waste Disposal Quantity	10997 (Metric Tons)
Method Used to Determine Quantity	Used scales to weigh loads before off-loading and either used scales to weigh individual loads after off-loading or used representative tare vehicle/container weights
Annual Waste Disposal Quantity	10997 (Metric Tons)
Reporting Year	1970
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1969
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1968
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1967
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1966
Total Annual Waste Disposal	8909 (Metric Tons)

Quantity	
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1965
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1964
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1963
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1962
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1961
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1960
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to	other

Determine Quantity	
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1959
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1958
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1957
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1956
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1955
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1954
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other

Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1953
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1952
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1951
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)
Reporting Year	1950
Total Annual Waste Disposal Quantity	8909 (Metric Tons)
Method Used to Determine Quantity	other
Annual Waste Disposal Quantity	8909 (Metric Tons)

Waste Type Details

Year Waste Disposed	2009					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	2008					
Missing data procedure used?	N					
Number of Times Substituted						

Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	2007					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	2006					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	2005					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	2004					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	2003					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038

Year Waste Disposed	2002					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	2001					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	2000					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1999					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1998					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1997					
Missing data procedure used?	N					

Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1996					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1995					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1994					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1993					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1992					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate

	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1991					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1990					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1989					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1988					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1987					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1986					

Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1985					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1984					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1983					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1982					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1981					
Missing data procedure used?	N					
Number of Times Substituted						

Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1980					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1979					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1978					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1977					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1976					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038

Year Waste Disposed	1975					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1974					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1973					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1972					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1971					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1970					
Missing data procedure used?	N					

Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1969					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1968					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1967					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1966					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1965					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate

	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1964					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1963					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1962					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1961					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1960					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1959					

Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1958					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1957					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1956					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1955					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1954					
Missing data procedure used?	N					
Number of Times Substituted						

Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1953					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1952					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1951					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038
Year Waste Disposed	1950					
Missing data procedure used?	N					
Number of Times Substituted						
Waste Type Details	Option	Waste Type	Percent by Weight	Degradable Organic Carbon Value	Fraction Of DOC Dissimilated	Decay Rate
	Bulk Waste	Bulk waste	1	0.2	0.5	0.038

Working Capacity Details

Were working capacities used to determine waste disposal quantities	N
---	---

Tipping Receipt Details

Were tipping receipts or company records used to determine waste disposal quantities	N
--	---

Method used for estimating all annual waste quantities that are not determined with the methods above

Method	Method #3: Use the landfill capacity or, for operating landfills, the amount of waste-in-place to estimate a constant average waste disposal quantity (Equation HH-3).
--------	--

Method Start Year	1950
Method End Year	1970

Historical Estimation Population Details

Historical landfill Capacity	187084 Metric Tons
Reason	Best Available Method

Methane Generation and Emissions for Landfills with LFG Collection Systems

Gas Collection System Information

System Manufacturer	John Zinc Co. LLC
System Capacity	700 (acfm)
Number of Wells	52

Methane Oxidation Fractions

Methane Oxidation Fraction HH-5	0.10
Methane Oxidation Fraction HH-6	0.10
Methane Oxidation Fraction HH-7	0.10
Methane Oxidation Fraction HH-8	0.10

Measurement Locations

Name	Utility Flare		
Description			
Annual Operating Hours	8311 (Hours)		
Quantity of Recovered Methane	1472.18 (Metric Tons)		
Destruction Devices	Name	Annual Operating Hours	Destruction Efficiency
	Utility Flare	8311 (Hours)	0.98 (fraction (number between 0 and 1))

Methane Generation and Emissions values

Estimated Gas Collection Efficiency HH3	0.83 (decimal fraction)
Is Override Indicator?	N
Methane Generation Equation HH5	2154.05 (Metric Tons)
Is Override Indicator?	N
Methane Emissions Equation HH6	858.53 (Metric Tons)
Is Override Indicator?	N
Methane Generation Equation HH7	1684.45 (Metric Tons)
Is Override Indicator?	N
Basis for Input Methane Generation Value	Equation HH-1
Methane Emission from Equation HH8	388.93 (Metric Tons)
Is Override Indicator?	N

Gas Collection Systems details

Annual Volume FG Collected Gas Volumetric Flow	Measured Value	175357517 (scf)
	Is Substituted Indicator?	N
	Number of Times Substituted	
Annual Average Methane Concentration	Measured Value	44.1 (Number (between 0 and 100))
	Is Substituted Indicator?	N

	Number of Days Substituted	
	Number of Weeks Substituted	
	Number of Months Substituted	
	Number of Times Substituted	
Temperature Incorporated Indicator	Y	
Pressure Incorporated Indicator	Y	
LFG Flow Wet Basis Indicator	Y	
Methane Concentration Wet Basis Indicator	Y	
Site Destruction Location	On-site	
Annual Quantity Of Recovered MethaneHH4	1472.18 (Metric Tons)	

Waste Depth Details

Area Type	Waste Depth	Surface Area
A1	0 (Meters)	0 (Square Meters)
A2	0 (Meters)	0 (Square Meters)
A3	20.4 (Meters)	3954 (Square Meters)
A4	34.4 (Meters)	97630 (Square Meters)
A5	23.5 (Meters)	71340 (Square Meters)

Equation HH-1 Details:

The fraction of CH4 in landfill gas (F), is it based on a measured value or default value	default
Fraction by volume of CH4 in landfill gas	0.5
An MCF value other than the default of 1 was used	N
Annual MCF Value	1.0

Annual Modeled Methane Generation	2393.39 (Metric Tons)
Annual Modeled Methane Generation User Overridden value?	N

USEPA SUBPART C

EQUATIONS C-1 AND C-8

CALCULATION SPREADSHEETS

Subpart C - General Stationary Fuel Combustion - Tier 1 Calculation Methodology Using Equations C-1 and C-8

OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES

Version e-GGRT RY2013.R.01
 Today's date 3/27/2019

Use one spreadsheet for each fuel. Make additional copies as needed.

This spreadsheet is protected and contains locked cells to ensure that you do not inadvertently alter any of the included formulas and/or calculations. To remove this protection and alter this spreadsheet, right-click the "worksheet" tab near the bottom of the screen and select "Unprotect Sheet." When prompted for the password, type "GHG" and click "OK." Please note that making changes to an unprotected sheet could result in incorrect calculations and that you are responsible for the accuracy of the data you report to EPA. For additional help, visit the Microsoft Excel Support website (<http://office.microsoft.com/en-us/excel-help>).

Equation C-1:

$$CO_2 = 1 \times 10^{-3} * Fuel * HHV * EF$$

Equation C-8:

$$CH_4 \text{ or } N_2O = 1 \times 10^{-3} * Fuel * HHV * EF$$

Facility Name:	Lebanon Regional Solid Waste Facility
Reporter Name:	City of Lebanon, New Hampshire
Unit or Group Name/ ID:	Furnaces-Maintenance Building
Configuration Type:	Type #3: aggregation of small units
Fuel/ Fuel Type:	No. 2 Fuel Oil
Reporting Period:	January through December 2018
Comments:	Prepared by Sanborn Head and Associates, Inc.
Unit Type:	General Stationary Fuel Combustion

Fuel Input Data

[Fuel] = Mass or volume of fuel combusted per year, from company records as defined in §98.6 (express mass in short tons for solid fuel, volume in standard cubic feet for gaseous fuel, and volume in gallons for liquid fuel)	6,271.
[HHV] = Default High heat value of the fuel, from Table C-1 (mmBtu/mass or mmBtu/volume)	0.138

Constants

[1 x 10 ⁻³] = Conversion Factor from kg to metric tons (constant)	0.001
---	-------

Annual CO₂ Mass Emissions For the Specific Fuel Type (metric tons) from Equation C-1

[EF] = Fuel-Specific Default CO ₂ Emission Factor, from Table C-1 (kg CO ₂ /mmBtu)	73.96
[CO ₂] = Annual CO ₂ emissions from combustion of the specified fuel (metric tons)	64.0048361

 Enter this value in e-GGRT

Subpart C - General Stationary Fuel Combustion - Tier 1 Calculation Methodology Using Equations C-1 and C-8

OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES

Version e-GGRT RY2013.R.01
 Today's date 3/27/2019

Annual CH₄ Mass Emissions For the Specific Fuel Type (metric tons) from Equation C-8

[EF] = Fuel-Specific Default Emission Factor for CH ₄ , from Table C-2 (kg CH ₄ /mmBtu)	0.003
[CH ₄] = Annual CH ₄ emissions from combustion of the specified fuel (metric tons)	0.0025962

Note: If you are reporting CH₄ emissions from a pulp mill lime kiln located at a kraft or soda facility under subpart AA, you are required to use the emission factors in Table AA-2 per 98.273(c)(2).

Enter this value in e-GGRT

Annual N₂O Mass Emissions For the Specific Fuel Type (metric tons) from Equation C-8

[EF] = Fuel-Specific Default Emission Factor for N ₂ O, from Table C-2 (kg N ₂ O/mmBtu)	0.0006
[N ₂ O] = Annual N ₂ O emissions from combustion of the specified fuel (metric tons)	0.0005192

Note: If you are reporting N₂O emissions from a pulp mill lime kiln located at a kraft or soda facility under subpart AA, you are required to use the emission factors in Table AA-2 per 98.273(c)(2).

Enter this value in e-GGRT

INFORMATION ONLY: Annual CH₄ Mass Emissions For the Specific Fuel Type Converted to Carbon Dioxide Equivalent (metric tons CO₂e)

[GWP _{CH4}] = Global Warming Potential for CH ₄	25
[CH ₄] = Annual CH ₄ emissions from combustion of the specified fuel (metric tons CO ₂ e)	0.06490485

Note: 25 is the GWP effective 1/1/14. The new GWP will affect reports for the 2013 reporting year (submitted to EPA by March 2014) with the exception of reporters who are newly required to report to the GHGRP due to changes to the GWP. Prior to this date, the GWP to use is 21.

INFORMATION ONLY: Annual N₂O Mass Emissions For the Specific Fuel Type Converted to Carbon Dioxide Equivalent (metric tons CO₂e)

[GWP _{N2o}] = Global Warming Potential for N ₂ O	298
[N ₂ O] = Annual N ₂ O emissions from combustion of the specified fuel (metric tons CO ₂ e)	0.154733162

Note: 298 is the GWP effective 1/1/14. The new GWP will affect reports for the 2013 reporting year (submitted to EPA by March 2014) with the exception of reporters who are newly required to report to the GHGRP due to changes to the GWP. Prior to this date, the GWP to use is 310.

Subpart C - General Stationary Fuel Combustion - Tier 1 Calculation Methodology Using Equations C-1 and C-8

OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES

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Equation C-1:

$$CO_2 = 1 \times 10^{-3} * Fuel * HHV * EF$$

Equation C-8:

$$CH_4 \text{ or } N_2O = 1 \times 10^{-3} * Fuel * HHV * EF$$

Facility Name:	Lebanon Regional Solid Waste Facility
Reporter Name:	City of Lebanon, New Hampshire
Unit or Group Name/ ID:	Furnace and Heater-Recycling Building
Configuration Type:	Type #3: aggregation of small units
Fuel/ Fuel Type:	Propane
Reporting Period:	January through December 2018
Comments:	Prepared by Sanborn Head and Associates, Inc.
Unit Type:	General Stationary Fuel Combustion

Fuel Input Data

[Fuel] = Mass or volume of fuel combusted per year, from company records as defined in §98.6 (express mass in short tons for solid fuel, volume in standard cubic feet for gaseous fuel, and volume in gallons for liquid fuel)	3,512.
[HHV] = Default High heat value of the fuel, from Table C-1 (mmBtu/mass or mmBtu/volume)	0.091

Constants

[1 x 10 ⁻³] = Conversion Factor from kg to metric tons (constant)	0.001
---	-------

Annual CO₂ Mass Emissions For the Specific Fuel Type (metric tons) from Equation C-1

[EF] = Fuel-Specific Default CO ₂ Emission Factor, from Table C-1 (kg CO ₂ /mmBtu)	62.87
[CO ₂] = Annual CO ₂ emissions from combustion of the specified fuel (metric tons)	20.0927490

 Enter this value in e-GGRT

Subpart C - General Stationary Fuel Combustion - Tier 1 Calculation Methodology Using Equations C-1 and C-8

OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES

Version e-GGRT RY2013.R.01
 Today's date 3/27/2019

Annual CH₄ Mass Emissions For the Specific Fuel Type (metric tons) from Equation C-8

[EF] = Fuel-Specific Default Emission Factor for CH ₄ , from Table C-2 (kg CH ₄ /mmBtu)	0.003
[CH ₄] = Annual CH ₄ emissions from combustion of the specified fuel (metric tons)	0.0009588

Note: If you are reporting CH₄ emissions from a pulp mill lime kiln located at a kraft or soda facility under subpart AA, you are required to use the emission factors in Table AA-2 per 98.273(c)(2).

Enter this value in e-GGRT

Annual N₂O Mass Emissions For the Specific Fuel Type (metric tons) from Equation C-8

[EF] = Fuel-Specific Default Emission Factor for N ₂ O, from Table C-2 (kg N ₂ O/mmBtu)	0.0006
[N ₂ O] = Annual N ₂ O emissions from combustion of the specified fuel (metric tons)	0.0001918

Note: If you are reporting N₂O emissions from a pulp mill lime kiln located at a kraft or soda facility under subpart AA, you are required to use the emission factors in Table AA-2 per 98.273(c)(2).

Enter this value in e-GGRT

INFORMATION ONLY: Annual CH₄ Mass Emissions For the Specific Fuel Type Converted to Carbon Dioxide Equivalent (metric tons CO₂e)

[GWP _{CH4}] = Global Warming Potential for CH ₄	25
[CH ₄] = Annual CH ₄ emissions from combustion of the specified fuel (metric tons CO ₂ e)	0.0239694

Note: 25 is the GWP effective 1/1/14. The new GWP will affect reports for the 2013 reporting year (submitted to EPA by March 2014) with the exception of reporters who are newly required to report to the GHGRP due to changes to the GWP. Prior to this date, the GWP to use is 21.

INFORMATION ONLY: Annual N₂O Mass Emissions For the Specific Fuel Type Converted to Carbon Dioxide Equivalent (metric tons CO₂e)

[GWP _{N2o}] = Global Warming Potential for N ₂ O	298
[N ₂ O] = Annual N ₂ O emissions from combustion of the specified fuel (metric tons CO ₂ e)	0.05714305

Note: 298 is the GWP effective 1/1/14. The new GWP will affect reports for the 2013 reporting year (submitted to EPA by March 2014) with the exception of reporters who are newly required to report to the GHGRP due to changes to the GWP. Prior to this date, the GWP to use is 310.

USEPA SUBPART HH

EQUATION HH-4

CALCULATION SPREADSHEETS

Subpart HH - Municipal Solid Waste Landfills - Calculating Methane Recovery Using Equation HH-4

OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES

Version e-GGRT RY2013.R.01
Today's date 3/26/2019

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Equation HH-4:

$$R = \sum_{n=1}^n (V)_n \times (K_{MC})_n \times \frac{(CH_4)_n}{100\%} \times 0.0423 \times \frac{520^\circ R}{(T)_n} \times \frac{(P)_n}{1 \text{ atm}} \times \frac{0.454}{1,000}$$

Facility Name:	Lebanon Regional Solid Waste Facility
Reporter Name:	City of Lebanon, New Hampshire
Unit Name/ID:	Municipal Solid Waste Landfill
Reporting Period:	January through December 2018
Comments:	Prepared by Sanborn Head and Associates, Inc.
Unit Type:	Municipal Solid Waste Landfill

Input Data	
Basis for (V) _n (dry basis or wet basis)	Wet basis
Basis for (CH ₄) _n (dry basis or wet basis)	Wet basis
[n] = Total number of measurement periods in a year. For daily sampling, use daily averaging periods for a continuous monitoring system and n = 365 (or n = 366 for leap years). For monthly sampling, use n = 12 as provided in section 98.343(b)(2).	12

[n] = Index for Measurement Period	[(V) _n] = Cumulative volumetric flow for the measurement period in actual cubic feet (act). Note: If the flow rate meter automatically corrects for temperature and pressure, replace "520°R/(T) _n × (P) _n /1 atm" with "1" (i.e., enter 520 for [(T) _n] and 1 for [(P) _n].	[(CH ₄) _n] = Average CH ₄ concentration of landfill gas for the measurement period (volume %)	[(T) _n] = Average temperature at which flow is measured for the measurement period (°R) Note: If the flow rate meter automatically corrects for temperature and pressure, replace "520°R/(T) _n × (P) _n /1 atm" with "1" (i.e., enter 520 for [(T) _n] and 1 for [(P) _n].	[(P) _n] = Average pressure at which flow is measured for the measurement period (atm) Note: If the flow rate meter automatically corrects for temperature and pressure, replace "520°R/(T) _n × (P) _n /1 atm" with "1" (i.e., enter 520 for [(T) _n] and 1 for [(P) _n].	[(H ₂ O) _n] = Average moisture content of the landfill gas during the measurement period, volumetric basis (cubic feet water per cubic feet landfill gas). Note: Values are only needed if the bases for determining (V) _n and (CH ₄) _n are different (i.e., one is wet and the other is dry).	[(K _{MC}) _n] = Moisture correction term for the measurement period, volumetric basis, as follows: • (K _{MC}) _n = 1 when (V) _n and (CH ₄) _n are both measured on a dry basis or if both are measured on a wet basis; • (K _{MC}) _n = 1/(1-(H ₂ O) _n) when (V) _n is measured on a wet basis and (CH ₄) _n is measured on a dry basis; • (K _{MC}) _n = 1/(1-(H ₂ O) _n) when (V) _n is measured on a dry basis and (CH ₄) _n is measured on a wet basis.	[R] = Equation value R for period n
1	13,312,974.	46.10%	520.	1.		1.00	117.862
2	11,353,743.	41.30%	520.	1.		1.00	90.050
3	15,074,770.	46.30%	520.	1.		1.00	134.038
4	14,562,408.	42.80%	520.	1.		1.00	119.694
5	16,198,088.	41.05%	520.	1.		1.00	127.895
6	15,462,052.	41.30%	520.	1.		1.00	122.835
7	14,083,415.	57.00%	520.	1.		1.00	154.163
8	21,587,281.	36.30%	520.	1.		1.00	150.488
9	14,249,369.	38.60%	520.	1.		1.00	105.628
10	11,299,397.	45.40%	520.	1.		1.00	98.516
11	13,387,580.	46.10%	520.	1.		1.00	118.522
12	14,786,440.	46.80%	520.	1.		1.00	132.894
13						1.00	0.000
14						1.00	0.000
15						1.00	0.000
16						1.00	0.000
17						1.00	0.000
18						1.00	0.000
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47						1.00	0.000
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53						1.00	0.000

Subpart HH - Municipal Solid Waste Landfills - Calculating Methane Recovery Using Equation HH-4

OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES

Version e-GGRT RY2013.R.01

Today's date 3/26/2019

54						1.00	0.000
55						1.00	0.000
56						1.00	0.000
57						1.00	0.000
58						1.00	0.000
59						1.00	0.000
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63						1.00	0.000
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77						1.00	0.000
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103						1.00	0.000
104						1.00	0.000
105						1.00	0.000
106						1.00	0.000
107						1.00	0.000
108						1.00	0.000
109						1.00	0.000
110						1.00	0.000
111						1.00	0.000
112						1.00	0.000
113						1.00	0.000
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116						1.00	0.000
117						1.00	0.000
118						1.00	0.000
119						1.00	0.000
120						1.00	0.000
121						1.00	0.000
122						1.00	0.000
123						1.00	0.000
124						1.00	0.000
125						1.00	0.000
126						1.00	0.000
127						1.00	0.000
128						1.00	0.000
129						1.00	0.000
130						1.00	0.000
131						1.00	0.000
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136						1.00	0.000
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140						1.00	0.000
141						1.00	0.000
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145						1.00	0.000
146						1.00	0.000
147						1.00	0.000
148						1.00	0.000

Subpart HH - Municipal Solid Waste Landfills - Calculating Methane Recovery Using Equation HH-4

OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES

Version e-GGRT RY2013.R.01

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149						1.00	0.000
150						1.00	0.000
151						1.00	0.000
152						1.00	0.000
153						1.00	0.000
154						1.00	0.000
155						1.00	0.000
156						1.00	0.000
157						1.00	0.000
158						1.00	0.000
159						1.00	0.000
160						1.00	0.000
161						1.00	0.000
162						1.00	0.000
163						1.00	0.000
164						1.00	0.000
165						1.00	0.000
166						1.00	0.000
167						1.00	0.000
168						1.00	0.000
169						1.00	0.000
170						1.00	0.000
171						1.00	0.000
172						1.00	0.000
173						1.00	0.000
174						1.00	0.000
175						1.00	0.000
176						1.00	0.000
177						1.00	0.000
178						1.00	0.000
179						1.00	0.000
180						1.00	0.000
181						1.00	0.000
182						1.00	0.000
183						1.00	0.000
184						1.00	0.000
185						1.00	0.000
186						1.00	0.000
187						1.00	0.000
188						1.00	0.000
189						1.00	0.000
190						1.00	0.000
191						1.00	0.000
192						1.00	0.000
193						1.00	0.000
194						1.00	0.000
195						1.00	0.000
196						1.00	0.000
197						1.00	0.000
198						1.00	0.000
199						1.00	0.000
200						1.00	0.000
201						1.00	0.000
202						1.00	0.000
203						1.00	0.000
204						1.00	0.000
205						1.00	0.000
206						1.00	0.000
207						1.00	0.000
208						1.00	0.000
209						1.00	0.000
210						1.00	0.000
211						1.00	0.000
212						1.00	0.000
213						1.00	0.000
214						1.00	0.000
215						1.00	0.000
216						1.00	0.000
217						1.00	0.000
218						1.00	0.000
219						1.00	0.000
220						1.00	0.000
221						1.00	0.000
222						1.00	0.000
223						1.00	0.000
224						1.00	0.000
225						1.00	0.000
226						1.00	0.000
227						1.00	0.000
228						1.00	0.000
229						1.00	0.000
230						1.00	0.000
231						1.00	0.000
232						1.00	0.000
233						1.00	0.000
234						1.00	0.000
235						1.00	0.000
236						1.00	0.000
237						1.00	0.000
238						1.00	0.000
239						1.00	0.000
240						1.00	0.000
241						1.00	0.000
242						1.00	0.000
243						1.00	0.000

Subpart HH - Municipal Solid Waste Landfills - Calculating Methane Recovery Using Equation HH-4

OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES

Version e-GGRT RY2013.R.01

Today's date 3/26/2019

244						1.00	0.000
245						1.00	0.000
246						1.00	0.000
247						1.00	0.000
248						1.00	0.000
249						1.00	0.000
250						1.00	0.000
251						1.00	0.000
252						1.00	0.000
253						1.00	0.000
254						1.00	0.000
255						1.00	0.000
256						1.00	0.000
257						1.00	0.000
258						1.00	0.000
259						1.00	0.000
260						1.00	0.000
261						1.00	0.000
262						1.00	0.000
263						1.00	0.000
264						1.00	0.000
265						1.00	0.000
266						1.00	0.000
267						1.00	0.000
268						1.00	0.000
269						1.00	0.000
270						1.00	0.000
271						1.00	0.000
272						1.00	0.000
273						1.00	0.000
274						1.00	0.000
275						1.00	0.000
276						1.00	0.000
277						1.00	0.000
278						1.00	0.000
279						1.00	0.000
280						1.00	0.000
281						1.00	0.000
282						1.00	0.000
283						1.00	0.000
284						1.00	0.000
285						1.00	0.000
286						1.00	0.000
287						1.00	0.000
288						1.00	0.000
289						1.00	0.000
290						1.00	0.000
291						1.00	0.000
292						1.00	0.000
293						1.00	0.000
294						1.00	0.000
295						1.00	0.000
296						1.00	0.000
297						1.00	0.000
298						1.00	0.000
299						1.00	0.000
300						1.00	0.000
301						1.00	0.000
302						1.00	0.000
303						1.00	0.000
304						1.00	0.000
305						1.00	0.000
306						1.00	0.000
307						1.00	0.000
308						1.00	0.000
309						1.00	0.000
310						1.00	0.000
311						1.00	0.000
312						1.00	0.000
313						1.00	0.000
314						1.00	0.000
315						1.00	0.000
316						1.00	0.000
317						1.00	0.000
318						1.00	0.000
319						1.00	0.000
320						1.00	0.000
321						1.00	0.000
322						1.00	0.000
323						1.00	0.000
324						1.00	0.000
325						1.00	0.000
326						1.00	0.000
327						1.00	0.000
328						1.00	0.000
329						1.00	0.000
330						1.00	0.000
331						1.00	0.000
332						1.00	0.000
333						1.00	0.000
334						1.00	0.000
335						1.00	0.000
336						1.00	0.000
337						1.00	0.000
338						1.00	0.000

Subpart HH - Municipal Solid Waste Landfills - Calculating Methane Recovery Using Equation HH-4

OPTIONAL SPREADSHEET FOR FACILITY RECORDKEEPING PURPOSES

Version e-GGRT RY2013.R.01

Today's date 3/26/2019

339						1.00	0.000
340						1.00	0.000
341						1.00	0.000
342						1.00	0.000
343						1.00	0.000
344						1.00	0.000
345						1.00	0.000
346						1.00	0.000
347						1.00	0.000
348						1.00	0.000
349						1.00	0.000
350						1.00	0.000
351						1.00	0.000
352						1.00	0.000
353						1.00	0.000
354						1.00	0.000
355						1.00	0.000
356						1.00	0.000
357						1.00	0.000
358						1.00	0.000
359						1.00	0.000
360						1.00	0.000
361						1.00	0.000
362						1.00	0.000
363						1.00	0.000
364						1.00	0.000
365						1.00	0.000
366						1.00	0.000

[100%] = Constant	100%
[0.0423] = Density of CH ₄ lb/cf at 520°R or 60° Fahrenheit and 1 atm	0.0423
[520°R] = Constant	520
[1 atm] = Constant	1
[0.454/1000] = Conversion factor (metric ton/lb)	0.000454

[R] = Annual quantity of recovered CH ₄ (metric tons CH ₄).	1,472.1841612
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Use this value in Equation HH-6, HH-7, HH-8