Greenhouse Gas Reporting Program

40 CFR part 98

Subpart HH- Municipal Solid Waste Landfills

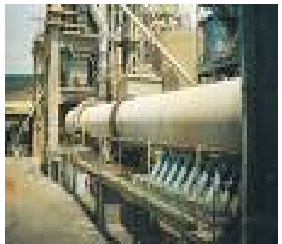
Disclaimer

This training is provided solely for informational purposes. It does not provide legal advice, have legally binding effect, or expressly or implicitly create, expand, or limit any legal rights, obligations, responsibilities, expectations, or benefits in regard to any person.

Introduction to the Rule

Overview: U.S. EPA GHG Reporting Program (GHGRP)

- The GHGRP was created by an EPA regulation issued in 2009. The goal of the program is to collect accurate and timely data on GHG emissions to inform future climate policy decisions.
- Annual monitoring requirements for applicable MSW landfills began in 2010 with first reports due by 9/30/2011.
- **Over 8,000 facilities** across all sectors are reporting, accounting for 85-90% of U.S. GHG emissions.
  - 1,217 MSW landfills submitted 2012 reports
- Monitoring and reporting only, no control or use requirements.



What GHGs are monitored and reported?

- CO_2
- CH_4 (methane)
- N_2O (nitrous oxide)
- Fluorinated GHGs
  - HFCs (hydrofluorocarbons)
  - PFCs (perfluorocarbons)
  - NF_3 (nitrogen trifluoride)
  - SF_6 (sulfur hexafluoride)
  - Other fluorinated gases (except CFC and HCFC and gases <1 mm Hg @25°C)

What is CO_2e?

- The applicability threshold for MSW landfills* is in units of carbon dioxide equivalent (CO_2e)
- GHGs have varying heat-trapping ability and atmospheric lifetimes.
- Global warming potential (GWP) is a metric used to compare emissions among GHGs.
- The GWP of CO_2 is 1.0, and the GWP of other GHGs are expressed relative to CO_2
  - For example, CH_4 has a GWP of 25. Each metric ton of CH_4 emissions would have 25 times as much impact on global warming (over a 100-year time horizon) as a metric ton of CO_2 emissions.
- Mass emissions x GWP = CO_2e (metric tons).

*we will go over the threshold later in this webinar

Current Version of 40 CFR 98

Available in the electronic Code of Federal Regulations (eCFR) at:

http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=6c812965b3fe4dfd2d7ef9e8cd1d4c2f&tpl=/ecfrbrowse/Title40/40cfr98_main_02.tpl

The MSW Landfill Subpart is located at 40 CFR 98.340 – 98.348 (subpart HH)

This version of the regulation will contain all published rule updates, including recent amendments which updated the GWP for methane from 21 to 25.
http://www.gpo.gov/fdsys/pkg/FR-2013-11-29/pdf/2013-27996.pdf

Subpart HH: Applicability

Which landfills must report?

- Municipal solid waste landfills
  - Definition in 40 CFR 98.6
  - Excludes RCRA Subtitle C and TSCA hazardous waste landfills, C&D waste landfills, and industrial waste landfills
  - Industrial landfills must report to the GHGRP but under a different subpart (subpart TT), with different methods and requirements
- Accepted waste since January 1, 1980
  - Covers both open and closed MSW landfills
- Methane generation ≥ 25,000 metric tons CO_2e/yr
  - Applicability based on generation, not actual emissions

Important Definitions

A facility is defined as…

- Physical property, plant, building, structure, source, or stationary equipment;
- on contiguous or adjacent properties;
- in actual physical contact or separated solely by public roadway or other public right of way; and
- under common ownership or common control.

An MSW landfill is defined as…

- An entire disposal facility in a contiguous geographical space where household waste is placed in or on land;
- May also receive other types of RCRA Subtitle D wastes;
- Portions may separated by access roads, public roadways, or public right-of-ways;
- May be publicly or privately owned.

How do I determine applicability?

- Applicability is based on equations in the rule
- EPA online applicability tool may be used for screening purposes

  <http://www.epa.gov/ghgreporting/help/tool/index.html >
  - Includes a simplified calculator for screening purposes.
- If methane generation is close to 25,000 metric tons CO_2e for 2013, perform more detailed calculations
  - Use equations in the rule
  - Use available data as input to the equations to estimate 2013 generation

How do I calculate generation if I don't have a gas collection system?

Landfills without GCS use Eq. HH-5:

Methane generation (and methane emissions) = **G_{CH4} (modeled methane generation from Eq. HH-1)** x **(1 – OX) Where OX = soil oxidation factor**

Eq. HH-1. First order decay model

$$G_{CH4} = \left[\sum_{x=S}^{T-1} \left\{ W_x \times MCF \times DOC \times DOC_F \times F \times \frac{16}{12} \left(e^{-k(T-x-1)} - e^{-k(T-x)} \right) \right\} \right]$$

If waste composition is known, calculate using material-specific DOC and k. Otherwise, use bulk waste or modified bulk waste factors in rule Table HH-1.

Data Needed for Eq. HH-1 (modeled methane generation)

Must determine or measure	In units of	Using the following methods
S = Start year of calculation (year LF opened or 1960)	NA	Available records
MCF=Methane correction factor	Fraction	Use the default value of 1, unless there is active aeration of waste within the landfill during the reporting year, in which case use an alternative value between 0.5 and 1
DOC= Degradable organic carbon	Fraction Metric tons C/metric ton waste	Use bulk waste, modified bulk MSW, or material-specific default values from Table HH-1
DOC_F=Fraction of DOC dissimilated	Fraction	Use default value of 0.5
F=Fraction by volume of CH4 in landfill gas	Fraction	From measurement data on a dry basis, if available, or use default value of 0.5
k=Rate constant	Yr^{-1}	Use bulk waste, modified bulk MSW, or material-specific default values from Table HH-1. If using bulk waste k-values, select most applicable value for the majority of the past 10 years based on amount of precipitation plus recirculated leachate.

Data Needed for Eq. HH-1 (modeled methane generation) (continued)

Must determine or measure	In units of	Using the following methods
W_x = quantity of waste disposed in year X (for each year since start year of calc)	Metric tons, as received (wet waste)	For reporting year and all future years determine Wx using one of the following*: 1) Landfills with scales in place - Use scales to weigh loads both before and after off-loading OR - Use scales to weigh loads before off-loading and tare vehicle/container weights after off-loading 2) Landfills without scales - Use working capacity for each vehicle/container, e.g. determine volumetric capacity of each container, use average density of waste as received, & record number of loads by type of vehicle/ container
		For years prior to 2010, determine Wx using one of the methods above or through tipping fee receipts or other company records. For prior years for which quantities are not available, estimate Wx using one of 3 methods: 1) Assume all prior years are the same as the first year for which waste data are available 2) Eq. HH-2: calculate for each year based on population served and per capita waste disposal rate specified in Table HH-2 3) Eq. HH-3: use a constant annual average calculated from landfill capacity and number of years waste was received

* For loads other than cars, light-duty trucks, and loads that cannot be measured with scales due to physical or operational limitations.

How do I calculate generation if I have a gas collection system?

- Use 2 methods. If ***either*** result exceeds threshold, the landfill must report
  - Method 1. Same as for LFs without gas collection
  - Method 2. Combination of Eq. HH-4 (calculates methane recovery from measured GCS flow and CH4 concentration) AND Eq. HH-7 (calculates generation using methane recovery from HH-4 and assumed gas collection efficiency, and adjusts for soil oxidation)

Measuring CH4 Recovered: Overview

- CH_4 recovered must be determined if landfill has gas collection
  - Continuously monitor gas flow
  - Monitor CH_4 concentration continuously OR measure monthly (allows use of handheld meters)
  - Adjust measurements for temperature, pressure, and moisture
  - See 98.343(b) & Eq. HH-4 for details
- Measure in Gas Collection System (GCS) header prior to destruction device or treatment equipment
  - Knockout pots, compressors, blowers, etc. are not treatment
- Measure CH_4 concentration near the flow monitor or at a location representative of flow monitor location

Determining Collection Efficiency

- Collection efficiency must be determined for the second generation calculation method (collection efficiency is applied to CH_4 recovered to account for uncollected gas)

- Select collection efficiency (CE) from Table HH-3 based on landfill cover type and presence of active collection system
  - If areas within the landfill differ in terms of cover type or presence of collection system, determine CE for each area and determine overall weighted CE for landfill per equation in Table HH-3

- If area by cover type is not available, use CE = 0.75

Determining Soil Oxidation

- Methane generation must be adjusted for soil oxidation for both methane generation calculation methods
  - Prior to the 2013 RY a default value of 10% must be used
  - Starting in 2013 RY you may use 0%, 10%, 25%, or 35% depending upon the conditions at your landfill
    - Depth of soil cover over majority of the landfill cover
    - Methane flux in grams per square meter per day ($g/m^2/d$)
      - the mass flow rate of methane per unit area at the bottom of the surface soil prior to any oxidation. Detailed equations provided in the rule.

Table HH–4 Methane Oxidation Fraction

:

Under these conditions:	Use this landfill methane oxidation fraction:
I. For all reporting years prior to the 2013 reporting year	
C1: For all landfills regardless of cover type or methane flux	0.10
II. For the 2013 reporting year and all subsequent years	
C2: For landfills that have a geomembrane (synthetic) cover with less than 12 inches of cover soil for the majority of the landfill area containing waste	0.0
C3: For landfills that do not meet the conditions in C2 above, and for which you elect not to determine methane flux	0.10
C4: For landfills that do not meet the conditions in C2 above and that do not have a soil cover of at least 24 inches for a majority of the landfill area containing waste	0.10
C5: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is less than 10 $g/m^2/d$	0.35
C6: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is 10 to 70 $g/m^2/d$	0.25
C7: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is greater than 70 $g/m^2/d$	0.10

If there is gas collection…

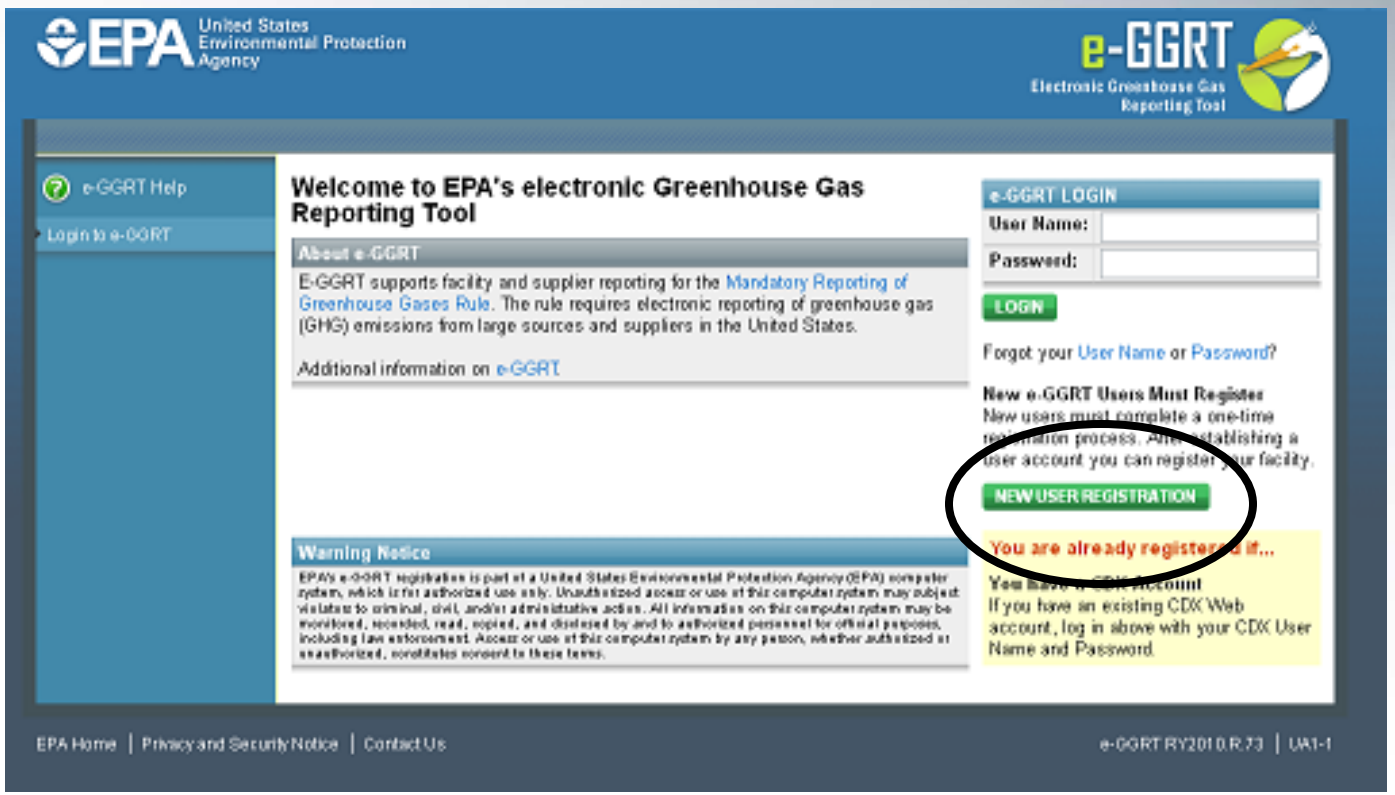
- If the landfill has gas collection and ***either*** the result of Equation HH-5 or HH-7 meets the 25,000 metric ton CO2e threshold then you must report to the GHGRP.

Recent Amendment to the Rule

- GWP for CH_4 increased from 21 to 25
- EPA is providing a specific exclusion for certain small, older, closed MSW landfills. Reporting is not required if:
  - Landfill did not receive waste after January 1, 2013
  - Methane generation was less than 1,190 metric tons CH_4 in 2013
  - Landfill was not required to report to the GHGRP in reporting years prior to 2013
- http://www.gpo.gov/fdsys/pkg/FR-2013-11-29/pdf/2013-27996.pdf

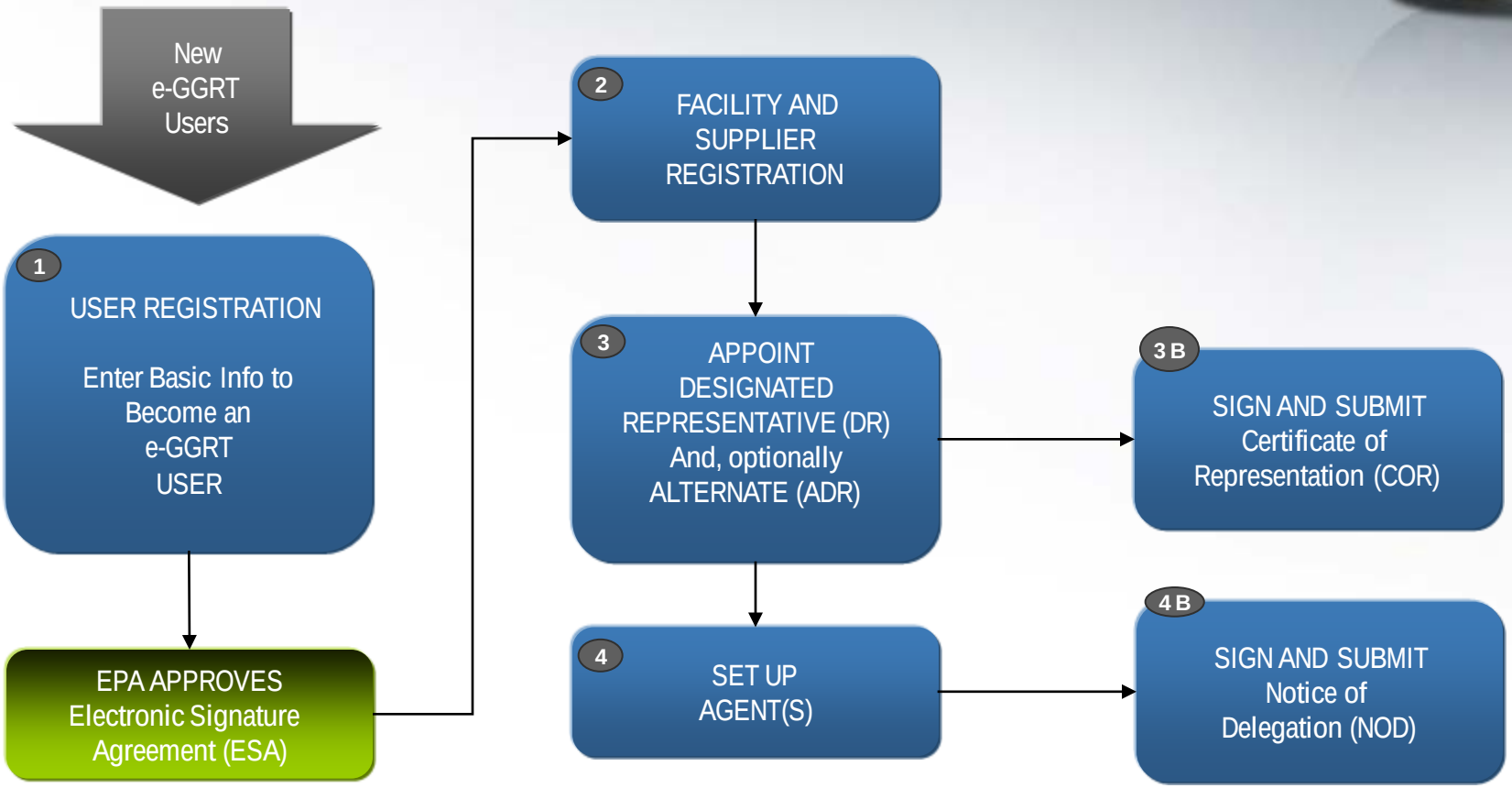
Registering and Reporting

Electronic Reporting System

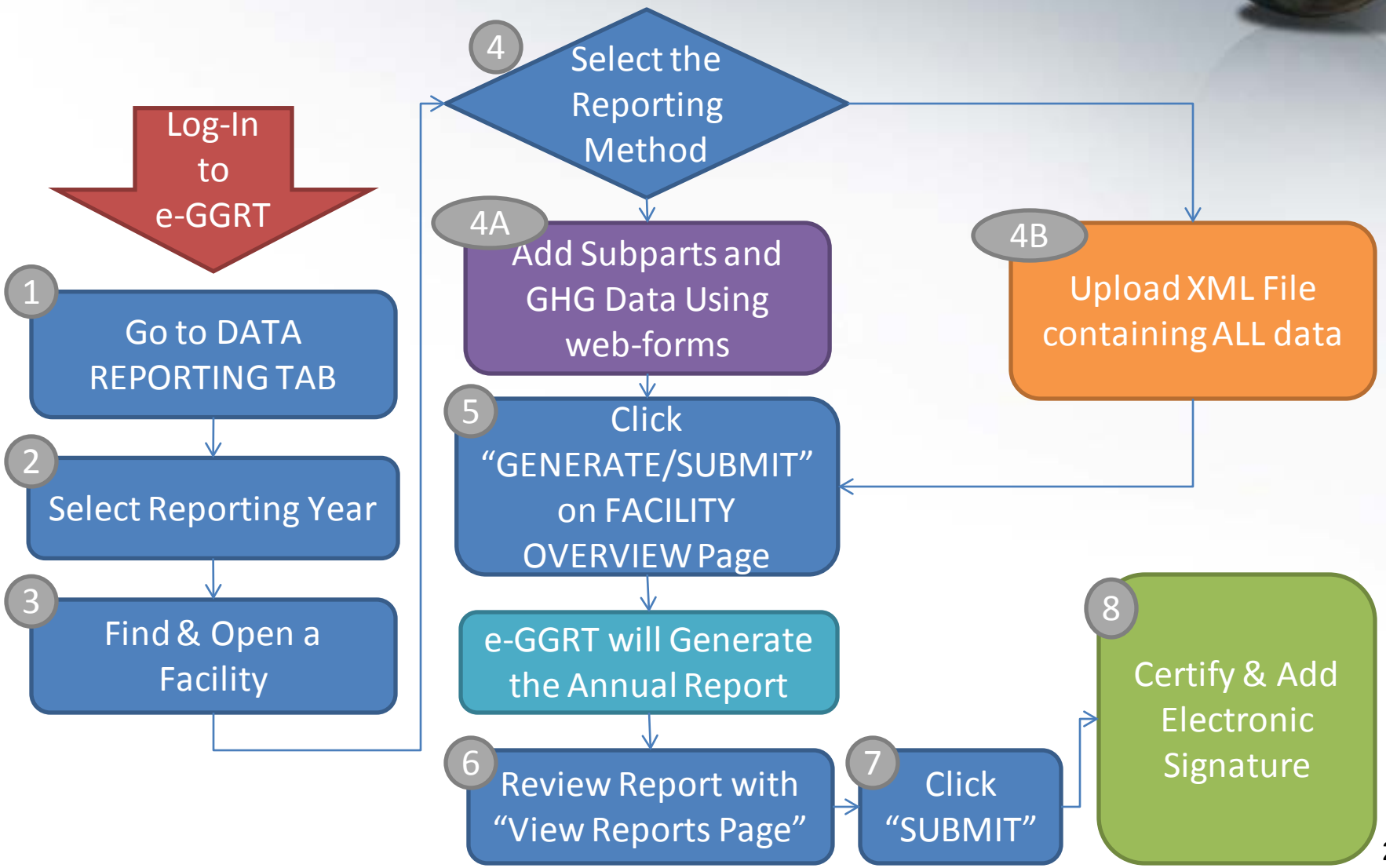


All registration and reporting is done electronically on EPA's Greenhouse Gas Reporting Tool (e-GGRT).
https://ghgreporting.epa.gov/

E-GGRT Registration: The Basic Process



Submitting Annual Reports



MSW Landfills Reporting

- Report 3 key items:
  - CH_4 generation and emissions from the landfill (HH)
  - CH_4 destruction from collection and combustion (HH)
  - CH_4, CO_2 and N_2O from combustion devices (reported under subpart C)
- What do I report for landfill flares?
  - Subpart HH calculations and reporting includes CH_4 destruction in flares and CH_4 emitted from flares
  - CO_2 and N_2O from flares is not reported under HH or C

How will emissions be verified?

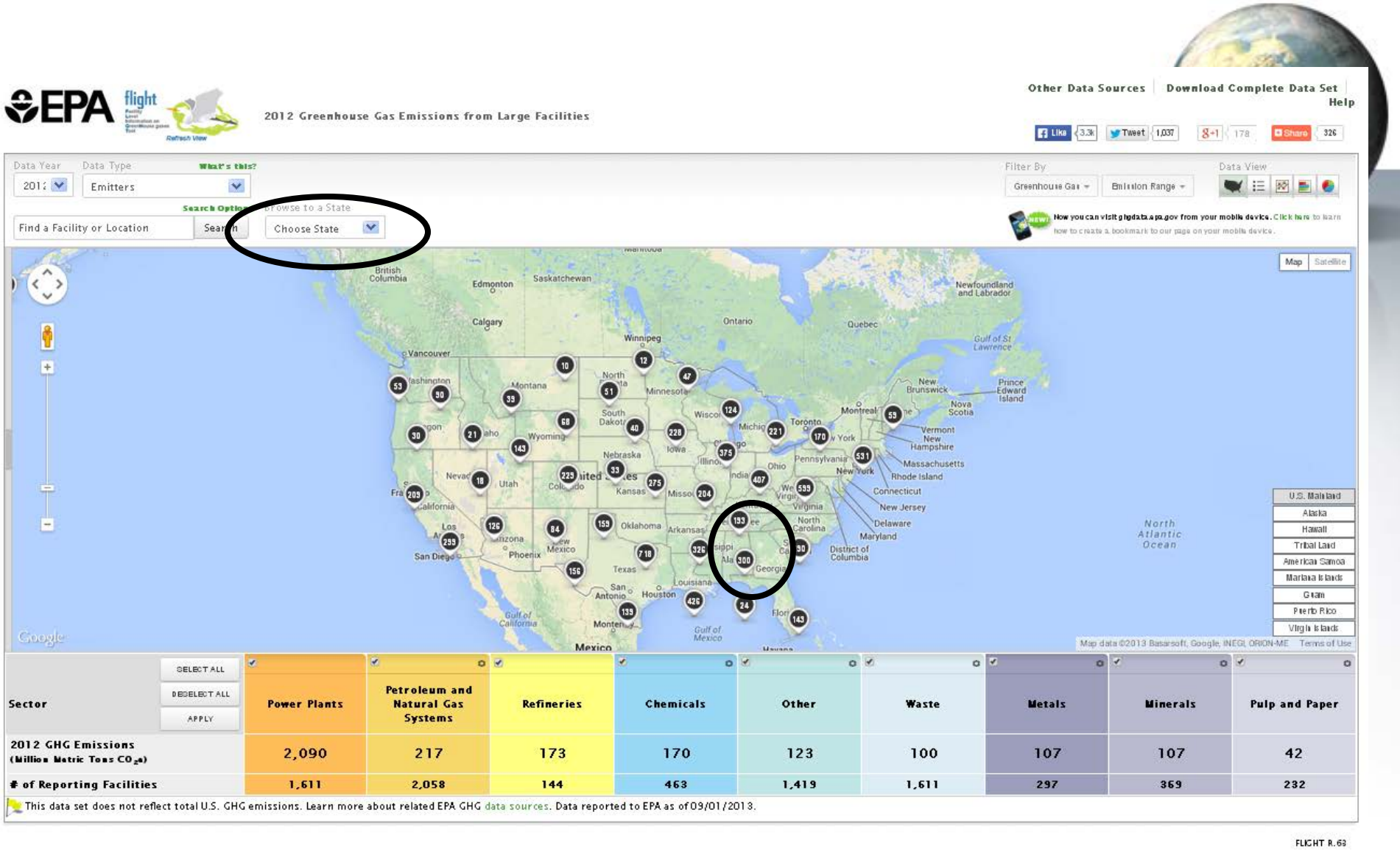
- Self certification
  - Designated representative certifies report
  - Rule requires one designated representative (DR) and allows one alternate designated representative (ADR) for each facility and supplier
- EPA verification
  - Reports submitted through an electronic system
  - Built-in calculation and completeness checks for reporters
  - Electronic QA and consistency checks
  - EPA data and report review and follow-up with reporters

GHG Data Publication

- The data reported to the GHGRP are available on the website. (See EPA's ghgdata website at http://ghgdata.epa.gov.)

- EPA will publish only non-CBI data

- The GHGRP data publication tool
  - Displays facilities on a map
  - Creates charts, graphs, and lists
  - Enables data download
  - Leverages social media


EPA
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2012 Greenhouse Gas Emissions from Large Facilities
Other Data Sources
Download Complete Data Set
Help
Like 3.3k
Tweet 1,037
+1 178
Share 326
Data Year
2012
Data Type
Emitters
What's this?
Search Options
Find a Facility or Location
Search
Browse to a State
Choose State
Filter By
Greenhouse Gas
Emission Range
Data View
Now you can visit ghgdata.epa.gov from your mobile device. Click here to learn how to create a bookmark to our page on your mobile device.
Map
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Alaska
Hawaii
Tribal Land
American Samoa
Mariana Islands
Guam
Puerto Rico
Virgin Islands
Google
Map data ©2013 Basarsoft, Google, INEGI, ORION-ME
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SELECT ALL
DESELECT ALL
APPLY
Sector
Power Plants
Petroleum and Natural Gas Systems
Refineries
Chemicals
Other
Waste
Metals
Minerals
Pulp and Paper
2012 GHG Emissions (Million Metric Tons CO2e)
2,090
217
173
170
123
100
107
107
42
# of Reporting Facilities
1,611
2,058
144
463
1,419
1,611
297
369
232
This data set does not reflect total U.S. GHG emissions. Learn more about related EPA GHG data sources. Data reported to EPA as of 09/01/2013.

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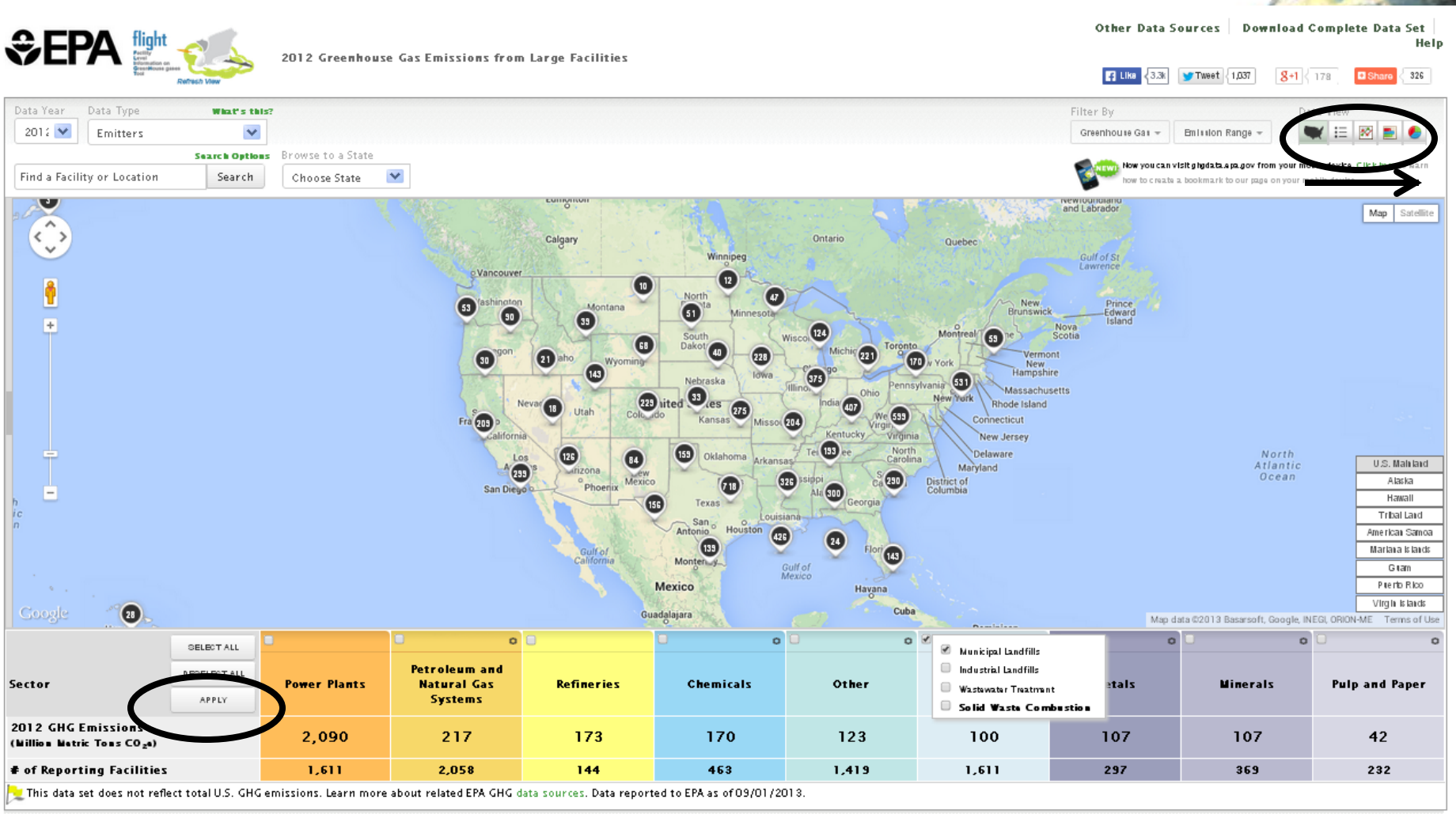
EPA
flight
2012 Greenhouse Gas Emissions from Large Facilities
Other Data Sources
Download Complete Data Set
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+1 178
Share 326
Data Year
2012
Data Type
Emitters
What's this?
Search Options
Find a Facility or Location
Search
Browse to a State
Choose State
Filter By
Greenhouse Gas
Emission Range
Map
Satellite
U.S. Mainland
Alaska
Hawaii
Tribal Land
American Samoa
Mariana Islands
Guam
Puerto Rico
Virgin Islands
Google
Map data ©2013 Basarsoft, Google, INEGI, ORION-ME
Terms of Use
SELECT ALL
DESELECT ALL
APPLY
Municipal Landfills
Industrial Landfills
Wastewater Treatment
Solid Waste Combustion
Sector
Power Plants
Petroleum and Natural Gas Systems
Refineries
Chemicals
Other
Minerals
Pulp and Paper
2012 GHG Emissions (Million Metric Tons CO2e)
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217
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EPA flight — 2012 Greenhouse Gas Emissions from Large Facilities

Other Data Sources | Download Complete Data Set | Help

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Data Year: 2012 | Data Type: Emitters | What's this?

Search Options | Find a Facility or Location | Search | Browse to a State: Choose State

Filter By: Greenhouse Gas | Emission Range | Data View

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View by: Geography | Facility | Selected Year | Changes

1217 Total Emitters Displayed

Facility Name/Location	2012 Emissions (metric tons CO_2e)
YORK COUNTY LANDFILL YORK, SC, 29745	36,339
YAKIMA COUNTY TERRACE HTS LANDFILL YAKIMA, WA, 98901	86,092
YAKIMA CNTY CHEYNE LANDFILL ZILLAH, WA, 98953	25,620
WSI Sandy Run Landfill, Inc. Hopewell, PA, 16650	63,156
Worthington Landfill WORTHINGTON, IN, 47471	66,294
Woolworth Road Landfill Natchitoches, LA, 71457	120,199
Woodville Landfill Tulare, CA, 93274	11,464

Page 1 of 13 Pages

Facility	City	State	Total Reported Emissions	Sectors
121 REGIONAL DISPOSAL FACILITY	MELISSA	TX	171,360	Waste
58TH ST LF (MAIN COUNTY LF)	MIAMI	FL	84,652	Waste
ACADIA PARISH POLICE JURY - ACADIA PARIS...	EGAN	LA	41,740	Waste
ADRIAN LANDFILL	ADRIAN	MI	15,558	Waste
ADS/MCLEAN COUNTY LANDFILL	BLOOMINGTON	IL	82,065	Waste
ADVANCED DISPOSAL CRANBERRY CREEK LAN...	WISCONSIN RAPIDS	WI	85,310	Waste
ADVANCED DISPOSAL EMERALD PARK LANDFIL...	MUSKEGO	WI	123,943	Waste
ADVANCED DISPOSAL GLACIER RIDGE LANDFIL...	HORICON	WI	28,567	Waste
ADVANCED DISPOSAL HICKORY MEADOWS LA...	HILBERT	WI	45,200	Waste
ADVANCED DISPOSAL MALLARD RIDGE LANDFI...	DELEVAN	WI	56,184	Waste
ADVANCED DISPOSAL MAPLE HILL LANDFILL, LLC	MACON	MO	18,089	Waste
ADVANCED DISPOSAL OAK RIDGE LANDFILL	BALWIN	MO	9,095	Waste
ADVANCED DISPOSAL ORCHARD HILLS LANDFI...	DAVIS JUNCTION	IL	116,316	Waste
ADVANCED DISPOSAL ROLLING HILLS LANDFILL...	BUFFALO	MN	8,702	Waste
ADVANCED DISPOSAL SEVEN MILE CREEK LAND...	EAU CLAIRE	WI	83,962	Waste
ADVANCED DISPOSAL VALLEY VIEW LANDFILL INC	DECATUR	IL	86,071	Waste
ADVANCED DISPOSAL ZION LANDFILL	ZION	IL	57,096	Waste
AKRON REGIONAL LANDFILL *	AKRON	OH	3,751	Waste

SELECT ALL | DESELECT ALL | APPLY

Sector	Power Plants	Petroleum and Natural Gas Systems	Refineries	Chemicals	Other	Waste	Metals	Minerals	Pulp and Paper
2012 GHG Emissions (Million Metric Tons CO_2e)	---	---	---	---	---	79	---	---	---
# of Reporting Facilities	---	---	---	---	---	1,217	---	---	---

This data set does not reflect total U.S. GHG emissions. Learn more about related EPA GHG data sources. Data reported to EPA as of 09/01/2013.

FLIGHT R.63

Schedule for Monitoring and Reporting

Deadline	Action
January 1, 2014	Begin collecting data using required methods in each subpart
December 31, 2014	Complete data collection for the 2014 reporting year
March 31, 2015	Submit annual report for the 2014 reporting year

- *Annual reports for the 2013 reporting year are due March 31, 2014.*
- *Reports for the 2010, 2011, and 2012 reporting years were already due. E-GGRT is still accepting reports for these years.*

When can an MSW landfill stop annual reporting?

- Notify EPA via e-GGRT by March 31 of the year after you meet one of the following conditions:
  - If annual reports demonstrate CO_2e emissions <25,000 metric tons/yr for 5 consecutive years.
  - If annual reports demonstrate CO_2e emissions <15,000 metric tons/yr for 3 consecutive years.
- You must resume reporting in future year if your emissions rise above 25,000 metric tons in a future year

For More Information

www.epa.gov/ghgreporting

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Greenhouse Gas Reporting Program

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For GHG Reporters

If you are required to report emissions under EPA's Greenhouse Gas Reporting Program, or you want to know more about the requirements, visit the Reporting Resources page.

EPA's Greenhouse Gas Reporting Program will help us better understand where greenhouse gas emissions are coming from and will improve our ability to make informed policy, business, and regulatory decisions.

What's New

- Revisions to GHGRP and Confidentiality Determinations for 33 subparts
- Proposed Subpart L amendments
- EPA releases 2012 GHGRP Data
- EPA proposes amendments to 24 subparts
- New Features in FLIGHT
- Subpart I amendments finalized

GHG Data Publication Tool

With EPA's Facility Level Information on GreenHouse gases Tool (FLIGHT), you can quickly and easily filter GHG data in a variety of ways, including by facility, industry, location, or gas. ***Click the map to launch the tool***

2012 Summary

In 2012, power plants accounted for about 40% of U.S. carbon pollution and 67% of direct emissions reported under the GHGRP. ***Learn more*** about what 2012 GHGRP data reveal about U.S. GHG emissions.

Climate Change Links

- Climate Change Home
- U.S. GHG Annual Inventory

ghgdata | For GHG Reporters | Help Center

Comprehensive greenhouse gas (GHG) data reported directly to EPA from across the country are now easily accessible to the public through EPA's GHG Reporting Program (GHGRP). The 2011 GHGRP data set includes public information from facilities in nine industry groups that directly emit large quantities of GHGs, as well as suppliers of certain fossil fuels and industrial gases.

Learn More »

Technical Assistance

- Online applicability tool: Assists potential reporters in assessing whether they are required to report
  - http://www.epa.gov/ghgreporting/help/tool/index.html
- Technical assistance materials specific to MSW landfills (e.g., Information Sheets, Monitoring Checklists, FAQs)
  - http://www.epa.gov/ghgreporting/reporters/subpart/hh.html
- Trainings and webinars
  - http://www.epa.gov/ghgreporting/reporters/training/index.html
- Information on the electronic greenhouse gas reporting tool (e-GGRT)
  - http://www.epa.gov/ghgreporting/reporters/datasystem/index.html