

**State of Maine
Regional Greenhouse Gas Initiative
CO₂ Budget Trading Program**



Offset Project Monitoring and Verification Report

Landfill Methane Capture and Destruction

Version 1.0

Issued by **Bureau of Air Quality**

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1. Overview

To demonstrate the achievement of CO₂-equivalent emissions reductions from a landfill methane capture and destruction offset project that has received a consistency determination from the Maine Department of Environmental Protection (Department), a Project Sponsor must submit to the Department in accordance with these instructions a fully completed *Offset Project Monitoring and Verification Report – Landfill Methane Capture and Destruction Version 1.0* (“M&V Report”), consisting of the coversheet and all forms and related attachments. Following these instructions will ensure that the *M&V Report* contains all necessary information and is submitted properly.

The Project Sponsor should review Maine's *CO₂ Budget Trading Program* regulations, 06-096 CMR Chapter 156, addressing offset projects and the award of CO₂ offset allowances. All offset project submittal materials and documents are available at www.maine.gov/dep/air/greenhouse/rggi.

2. Submission Instructions

Submit one (1) complete paper hardcopy of the *M&V Report* to the Department at the location specified below. Also submit the *M&V Report* forms and any attachments electronically to the CO₂ Allowance Tracking System (COATS) at www.rggi-coats.org. Submit hardcopies of forms requiring signatures as originally-signed copies and scan such signed forms for electronic submission. Facsimiles of the *M&V Report* are not acceptable under any circumstances.

Department of Environmental Protection
17 State House Station
25 Tyson Drive
Augusta, ME 04333-0017

The *M&V Report* includes three parts, as described below. Each part comprises specified forms and required documentation. The *M&V Report* has been created as a Microsoft Word document with editable fields. Enter information directly in the fields provided or submit information or documentation as an attachment, as instructed. Include headers on all attachments indicating the form to which each is attached, the offset project name, and offset project ID code.

The Project Sponsor should save an electronic copy for his or her file to serve as a reference for any necessary remediation.

3. M&V Report Forms

The *M&V Report* consists of eight (8) forms divided into three parts, as follows:

Part 1. General Information Forms

- Form 1.1 – Coversheet
- Form 1.2 – General Information
- Form 1.3 – Attestations
- Form 1.4 – Project Sponsor Statement
- Form 1.5 – Disclosure of Greenhouse Gas Emissions Data Reporting

Part 2. Category-Specific Information and Documentation Forms

- Form 2.1 – Demonstration of Conformance with M&V Plan
- Form 2.2 – Determination of Emissions Reduction

Part 3. Independent Verification Form

- Form 3.1 – Independent Verifier Certification Statement and Report

The following instructions address each of the forms in numerical order. Note that the forms themselves include many embedded instructions.

Part 1. General Information Forms

The five (5) forms in Part 1 of the *M&V Report* address general requirements and documentation applicable to landfill methane capture and destruction offset projects. Instructions for the Part 1 forms are provided below.

Form 1.1 Coversheet

Enter the required information in the editable text fields in the form. Check the boxes to indicate that all forms are being submitted. For information about entering the Project Sponsor, offset project name and project ID code, and RGGI COATS account name and number, see instructions below for Form 1.2, General Information.

Submission of all forms, including the Coversheet, is required. If a form is not submitted, the *Consistency Application* will not be considered complete for commencement of review by the Department.

Form 1.2 General Information

Enter the requested information in the editable text fields in the form. If a text field is not applicable or is unanswerable, enter “NA.” Note the following:

Offset Project ID Code: Enter the offset project ID code. The offset project ID code is the alphanumeric code generated when the Project Sponsor creates a record of the offset project in the RGGI CO₂ Allowance Tracking System (RGGI COATS). See the RGGI COATS User’s Guide for more information about creating an offset project record in RGGI COATS, available at www.rggi-coats.org.

Project Information: Enter project information. The name of the offset project should be the same name entered by the Project Sponsor when creating a project record in RGGI COATS. The project location entered should be the primary location of the project if the project consists of actions at multiple locations. The summary narrative of the project should indicate all locations where project actions occur or will occur.

Project Sponsor: Identify the Project Sponsor and provide his or her contact information. The Project Sponsor is the natural person who is the Authorized Account Representative for the RGGI COATS general account identified in the *Consistency Application*.

Project Sponsor Organization: Provide the full legal name of the organization the Project Sponsor represents, including any alternative names under which the organization also may be doing business (e.g., John Doe Enterprises, Inc., d/b/a JDE). If the Project Sponsor is representing himself or herself as an individual, enter “NA”.

RGGI COATS General Account Name and Number: Enter the RGGI COATS general account name and number. The RGGI COATS general account identified in the *Consistency Application* is the RGGI COATS account into which any awarded CO₂ offset allowances related to the offset project will be transferred.

Form 1.3 Attestations

Sign and date the form. Submit the originally signed form as part of the paper hardcopy *M&V Report*. Scan the signed and dated form for submission as part of the electronic version of the *M&V Report*.

Form 1.4 Project Sponsor Statement

Sign and date the form. Submit the originally signed form as part of the paper hardcopy *M&V Report*. Scan the signed and dated form for submission as part of the electronic version of the *M&V Report*.

Form 1.5 Disclosure of Greenhouse Gas Emissions Data Reporting

Check the appropriate box in the form to indicate whether greenhouse gas emissions data related to the offset project have been or will be reported to any voluntary or mandatory programs other than the CO₂ Budget Trading Program. For each program for which data have been or will be reported, provide the program name, the program type (voluntary or mandatory), program contact information (website or street address), the categories of data reported, the frequency of reporting, when the reporting began or will begin, and reporting status (prior, current, future). The Project Sponsor must disclose future reporting related to current commitments made to voluntary programs as well as future reporting mandated by current statutes, regulations, or judicial or administrative orders.

Offset Project Name

Offset Project ID Code

Form 1.1 – Coversheet

Project Sponsor (RGGI COATS Authorized Account Representative)

Project Sponsor Organization

Reporting Period

RGGI COATS General Account Name

RGGI COATS General Account Number

Check the boxes below to indicate submission of the following required forms:

- Form 1.2 – General Information
- Form 1.3 – Attestations
- Form 1.4 – Project Sponsor Statement
- Form 1.5 – Disclosure of Greenhouse Gas Emissions Data Reporting
- Form 2.1 – Demonstration of Conformance with M&V Plan
- Form 2.2 – Determination of Emissions Reduction
- Form 3.1 – Independent Verifier Certification Statement and Report

Offset Project Name Offset Project ID Code

Form 1.2 – General Information

Project Sponsor (RGGI COATS Authorized Account Representative)

Telephone Number **Fax Number** **Email Address**
Street Address
City **State/Province** **Postal Code** **Country**

RGGI COATS General Account Name

RGGI COATS General Account Number

Name of Offset Project **Project Commencement Date**

Summary Description of Offset Project

Project City **Project County** **Project State**

Project Sponsor Organization

Primary Street Address

City **State/Province** **Postal Code** **Country**

Brief Description of Project Sponsor Organization

Telephone Number **Website URL**

Independent Verifier (Company/Organization) **States Where Verifier Accredited**

Primary Street Address **Website URL**

City **State/Province** **Postal Code** **Country**

Point of Contact for Project

Contact Telephone Number **Contact Fax Number** **Contact Email Address**

Contact Street Address

City **State/Province** **Postal Code** **Country**

Offset Project Name

Offset Project ID Code

Form 1.3 – Attestations

The undersigned Project Sponsor certifies the truth of the following statements:

1. All offset projects for which the Project Sponsor or project sponsor organization has received CO₂ offset allowances, under the Project Sponsor's or project sponsor organization's ownership or control (or under the ownership or control of any entity which controls, is controlled by, or has common control with the Project Sponsor or project sponsor organization) are in compliance with all applicable requirements of the CO₂ Budget Trading Program in all participating states.
2. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this *M&V Report* and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Project Sponsor signature

date

printed name

title

organization

notary

Offset Project Name

Offset Project ID Code

Form 1.4 – Project Sponsor Statement

The undersigned Project Sponsor hereby confirms and attests that the offset project upon which this Monitoring and Verification Report is based is in full compliance with all of the requirements of Maine’s CO₂ Budget Trading Program. The Project Sponsor holds the legal rights to the offset project, or has been granted the right to act on behalf of a party that holds the legal rights to the offset project. The Project Sponsor understands that eligibility for the award of CO₂ offset allowances is contingent on meeting the requirements of Maine’s CO₂ Budget Trading Program. The Project Sponsor authorizes the Department or its agent to audit this offset project for purposes of verifying that the offset project, including the Monitoring and Verification Plan, has been implemented as described in the *Consistency Application* that was the subject of a consistency determination by the Department. The Project Sponsor understands that this right to audit shall include the right to enter the physical location of the offset project and to make available to the Department or its agent any and all documentation relating to the offset project at the Department’s request. The Project Sponsor submits to the legal jurisdiction of the State of Maine.

Project Sponsor signature

date

printed name

title

organization

notary

Offset Project Name

Offset Project ID Code

Form 1.5 – Disclosure of Greenhouse Gas Emissions Data Reporting

Check the box below that applies:

- No greenhouse gas emissions data related to the offset project referenced in this *M&V Report* have been or will be reported to a voluntary or mandatory program other than the CO₂ Budget Trading Program.
- Greenhouse gas emissions data related to the offset project referenced in this *M&V Report* have been or will be reported to a voluntary or mandatory program other than the CO₂ Budget Trading Program. Information for all such programs to which greenhouse gas emissions data have been or will be reported is provided below.

Name of Program to which GHG Emissions Data Reported

Check all that apply:

- Reporting is currently ongoing
- Reporting was conducted in the past
- Reporting will be conducted in the future
- Reporting is mandatory
- Reporting is voluntary

Enter Frequency of Reporting

Enter Reporting Start Date

Program Contact Information – Address

Program Website

Categories of Emissions Data Reported

Name of Program to which GHG Emissions Data Reported

Check all that apply:

- Reporting is currently ongoing
- Reporting was conducted in the past
- Reporting will be conducted in the future
- Reporting is mandatory
- Reporting is voluntary

Enter Frequency of Reporting

Enter Reporting Start Date

Program Contact Information – Address

Program Website

Categories of Emissions Data Reported

Add extra pages as needed.

Part 2. Category-Specific Information and Documentation Forms

The two (2) forms in Part 2 of the *M&V Report* address documentation of conformance with the Monitoring and Verification Plan (M&V Plan) and determination of CO₂-equivalent emissions reductions. Instructions for the Part 2 forms are provided below.

Form 2.1 Demonstration of Conformance with M&V Plan

Provide documentation that procedures and protocols specified in the M&V Plan were performed and records specified in the M&V Plan were generated and retained. Check the boxes in the tables in Form 2.1 to indicate that the referenced documentation is provided as an attachment to Form 2.1. All attached documentation must include a header that indicates it is an attachment to Form 2.1, identifies the number of the appropriate table and the reference number in the left-hand column of the table, and includes the offset project name and offset project ID code.

Form 2.2 Determination of Emissions Reduction

Enter the calculated values for the following in the editable text fields:

1. CO₂-equivalent emissions reductions (short tons)
2. Volume of methane collected (standard cubic feet)
3. Mass of methane per standard cubic foot (pounds)

Attach a spreadsheet documenting the data sources and calculations for the values, in accordance with the following:

1. Calculate CO₂-equivalent emissions reductions that occurred during the reporting period, in accordance with the following equation:

$$\text{Emissions (tons CO}_2\text{e)} = (V \times M \times (1-\text{OX}) \times \text{GWP})/2000$$

where:

- V = Volume of methane recovered in standard cubic feet
- M = Mass of methane per standard cubic foot (lbs/scf)
- OX = Oxidation factor (0.10)
- GWP = CO₂e global warming potential of methane (23)

2. Calculate the volume of methane recovered during the reporting period as follows:
 - Obtain daily methane recovery volume as measured in standard cubic feet of methane per day from the continuous monitoring system.
 - Sum the daily methane recovery volume for each month during the reporting period.
 - Adjust monthly methane recovery volume to account for recovered methane vented directly to the atmosphere rather than combusted and destroyed by the combustion device, during periods when the combustion device was inoperable.

- Total the adjusted monthly volume of methane recovered during each month to obtain the total amount of annual methane recovered (in standard cubic feet of methane per year) from the landfill.
3. Determine the value for mass of methane per standard cubic foot (lbs/scf) as follows:
- Use the default value of 0.04246 lbs/scf at 1 atmosphere and 20°C or justify and document the use of any alternate value.

Offset Project Name

Offset Project ID Code

Form 2.1 – Demonstration of Conformance with M&V Plan

Using the checklist provided in the right hand column of the tables below, attach documentation that demonstrates that the required elements of the submitted M&V Plan described in the left hand column of the tables were performed. Indicate that the required documentation is provided as an attachment to Form 2.1 by checking the appropriate boxes. Each attachment must include a header that indicates it is an attachment to Form 2.1, identifies the number of the appropriate table and the reference number in the left-hand column of the table, and includes the offset project name and offset project ID code.

Table 1. Quality Assurance/Quality Control (QA/QC) Program for Measuring Equipment

Procedures and Documentation Required by the M&V Plan	Documentation Provided (check the boxes to indicate attachment of required documentation)
Quality Assurance/Quality Control (QA/QC) Program for Measuring Equipment	
1. Procedures for recording names and contact information for: personnel responsible for recording measurements and data entry, QA/QC managers, and third party analytical laboratory	<input type="checkbox"/> Copy of the organizational structure of the landfill gas measurement and monitoring team, including names and contact information; contact information for third-party laboratory
2. Procedures for designated personnel to keep landfill gas sales records (in MMBtu or standard cubic feet), electricity sales records, records of measured heat rate of combustion device if applicable, and records of newly installed equipment and retired equipment	<input type="checkbox"/> List of specific procedures performed by designated personnel <input type="checkbox"/> Sales receipts showing amount of landfill gas (in MMBtu or standard cubic feet) or electricity (in kWh) sold <input type="checkbox"/> Copies of records of measured heat rate of combustion and equipment installation/retirement
3. Procedures for annual comparison of collected methane as measured by monitoring equipment with calculated methane used to generate electricity or calculated methane in landfill gas sold, noting any discrepancies	<input type="checkbox"/> Copy of annual comparison calculation, including data sources and assumptions
4. Calculation procedures for standardizing landfill gas flow that correct for documented site-specific temperature and pressure measurements (only necessary if landfill gas flow meter does not automatically adjust landfill gas measurement to standard units)	<input type="checkbox"/> Records of daily standardization calculations of landfill gas flow (to standard cubic feet) using daily site-specific measurements of temperature and pressure
5. Description of the contents of an annual quality control report describing the procedures taken to QA/QC landfill gas collection and monitoring equipment	<input type="checkbox"/> Annual quality control report that describes landfill gas collection system, updates or equipment changes, procedures taken to QA/QC landfill gas collection and monitoring equipment, findings of quarterly reviews, issues encountered, and remedial actions taken

Offset Project Name

Offset Project ID Code

Table 2. Maintenance, Operation, and Calibration of Measuring and Monitoring Equipment

Procedures and Documentation Required by the M&V Plan	Documentation Provided (check the boxes to indicate attachment of required documentation)
Maintenance, Operation, and Calibration of Measuring and Monitoring Equipment	
1. Landfill gas flow rate performance tests will be conducted at least monthly to ensure flow readings are being recorded at least every 15 minutes	<input type="checkbox"/> Copy of monthly performance tests <input type="checkbox"/> Copy of data for one sample day per month of flow meter readings recorded in intervals of at least 15 minutes
2. Monthly performance tests will be conducted to show that the accuracy of flow meter readings is within +/- 5 percent of manufacturer specifications	<input type="checkbox"/> Copy of monthly performance tests <input type="checkbox"/> List of specific procedures followed and equipment used to verify flow meter accuracy
3. Monthly performance tests will be conducted of methane concentration instrument showing that manufacturer specifications are met for precision and accuracy	<input type="checkbox"/> Copy of monthly performance tests <input type="checkbox"/> List of specific procedures followed and equipment used to verify methane concentration instrument accuracy and precision
4. Maintenance schedules for landfill gas flow meter and methane concentration instrument are performed in accordance with manufacturer recommendations and specifications	<input type="checkbox"/> Copies of maintenance schedules <input type="checkbox"/> Copy of manufacturer recommended maintenance schedule for landfill gas flow meter and methane concentration instrument (permanent and portable equipment)
5. Collected landfill gas flow rates and methane concentration recorded at least daily	<input type="checkbox"/> Copies of at least daily measured landfill gas flow rates and methane concentration
6. Records kept on a monthly basis of the number of hours that the landfill gas collection system was not in operation	<input type="checkbox"/> Records of monthly landfill gas collection system operation status (in hours per month)
7. Records kept on a monthly basis of the number of hours that the combustion device (e.g., flare, boiler, electricity generation unit) was not in operation	<input type="checkbox"/> Records of monthly combustion device operation status (in hours per month)
8. Records kept on a monthly basis of calculation of landfill gas flow rate standardization (in standard cubic feet per day) to correct for site-specific pressure and temperature measurements (only required if landfill gas flow meter does not automatically adjust landfill gas flow to standard units)	<input type="checkbox"/> Records of daily landfill gas flow rate calculation into standard cubic feet including site-specific pressure and temperature measurements

Offset Project Name

Offset Project ID Code

Table 2. Maintenance, Operation, and Calibration of Measuring and Monitoring Equipment (continued)

Procedures and Documentation Required by the M&V Plan	Documentation Provided (check the boxes to indicate attachment of required documentation)
9. Records kept on an annual basis of measured heat rate of combustion (in Btu/kWh) in accordance with manufacturer specifications for landfill gas, if applicable to the offset project (required for offset projects with an electric generation component)	<input type="checkbox"/> List of manufacturer specifications for combustion device heat rate (in Btu/kWh) <input type="checkbox"/> Copies of annual records from source tests showing the measured heat rate of combustion device
10. Records kept on a monthly basis on the amount of landfill gas combusted (in standard cubic feet) in the combustion device	<input type="checkbox"/> Copies of records of the monthly amount of landfill gas combusted (in standard cubic feet) in the combustion device
11. Records kept of calibration procedures for landfill gas flow monitoring equipment as specified by the manufacturer	<input type="checkbox"/> List of calibration activities and receipt of services rendered if performed by outside contractor <input type="checkbox"/> List of manufacturer specifications for landfill gas flow meter calibration
12. Records kept of calibration procedures for both portable and permanent methane concentration measurement equipment as specified by the manufacturer	<input type="checkbox"/> List of calibration activities and receipt of services rendered if performed by outside contractor <input type="checkbox"/> Calibration data from field measurements for methane concentration instrument <input type="checkbox"/> List of manufacturer recommendations for landfill gas concentration measurement equipment
13. Records kept of calibration schedules for landfill gas flow meter and methane concentration instrument (for both permanent and portable equipment) in accordance with manufacturer recommendations and specifications	<input type="checkbox"/> Copies of calibration schedule performed for landfill gas flow meter and methane concentration instrument (for both permanent and portable equipment)

Offset Project Name

Offset Project ID Code

Table 3. Records Retention

Procedures and Documentation Required by the M&V Plan	Documentation Provided (check the boxes to indicate attachment of required documentation)
Records Retention	
<p>1. Document recordkeeping protocol that will be used to maintain record keeping throughout the duration of the offset project, including maintenance of an electronic index of all material to be collected, and storage procedures for such material</p>	<p><input type="checkbox"/> Index of all project documentation materials collected during the reporting period</p>

Table 4. Independent Verification of Landfill Gas Methane Composition

Procedures and Documentation Required by the M&V Plan	Documentation Provided (check the boxes to indicate attachment of required documentation)
Independent Verification of Landfill Gas Methane Composition	
<p>1. Document process used to perform annual third-party laboratory analysis of sampled landfill gas using U.S. EPA-approved laboratory testing methods</p>	<p><input type="checkbox"/> List of EPA-approved test procedure followed</p> <p><input type="checkbox"/> Copy of third-party analysis report of sampled landfill gas and date of analysis</p>
<p>2. Document protocol used to ensure landfill gas samples taken at the same location as the landfill gas flow meter</p>	<p><input type="checkbox"/> Signed documentation by sampling technician that methane concentration measurements were taken at location of landfill gas flow meter</p>

Offset Project Name

Offset Project ID Code

Form 2.2 – Determination of Emissions Reduction

Provide documentation of CO₂-equivalent emissions reductions during the reporting period. Attach a spreadsheet documenting the calculations and data sources used to determine CO₂-equivalent emissions reductions, volume of methane collected, and mass of methane per standard cubic foot. The attachment must include a header that indicates it is an attached to Form 2.2 and includes the offset project name and offset project ID code

Enter calculated values:

Emissions reductions (tons CO₂e)
Volume of methane collected (scf)
Mass of methane (lbs/scf)

Part 3. Independent Verification Form

The form in Part 3 of the *M&V Report* addresses requirements and documentation related to the independent verifier certification statement and report. Instructions for the form in Part 3 are provided below.

Form 3.1 Independent Verifier Certification Statement and Report

An accredited independent verifier must sign and date the form. Submit the originally signed form as part of the paper hardcopy of the *M&V Report*. Scan the signed and dated form for submission as part of the electronic version of the *M&V Report*.

Provide the independent verifier report as an attachment to Form 3.1. The verifier report must include a header that indicates it is an attachment to Form 3.1 and includes the offset project name and offset project ID code.

The verifier report must document the following:

1. The verifier has reviewed the entire *M&V Report* and evaluated the contents of the report in relation to the applicable requirements of Maine's CO₂ Budget Trading Program.
2. The verifier has evaluated the adequacy and validity of information supplied by the Project Sponsor to determine CO₂-equivalent emissions reductions in accordance with the applicable requirements of Maine's CO₂ Budget Trading Program, and the documentation required in the *M&V Report*.
3. The verifier has evaluated the adequacy and consistency of methods used by the Project Sponsor to quantify, monitor, and verify CO₂-equivalent emissions reductions in accordance with the applicable requirements of Maine's CO₂ Budget Trading Program and the Monitoring and Verification Plan submitted as part of the *Consistency Application*.

The verifier report must include the following contents, in the order listed below:

- Cover page with report title and date
- Table of contents
- List of acronyms and abbreviations
- Executive summary
- Description of objective of report
- Identification of the client, including name, address, and other contact information
- Identification of the offset project
- Description of evaluation criteria (applicable regulatory provisions and documentation requirements specified in the *M&V Report*)
- Description of the review and evaluation process, including any site visits and interviews
- Identification of individuals performing the verification work, including the verification team leader and key personnel, and contact information for the team leader

- Description of the materials provided to the verifier by the Project Sponsor
- Evaluation conclusions and findings, including level of assurance provided

Offset Project Name

Offset Project ID Code

Form 3.1 – Independent Verifier Certification Statement and Report

An accredited independent verifier must sign and date the form. Attach the accredited verifier report. The attached verifier report must include a header that indicates it is an attachment to Form 3.1 and includes the offset project name and offset project ID code.

Name of Accredited Independent Verifier

I certify that the accredited independent verifier identified above reviewed this *M&V Report*, including all forms and attachments, in its entirety, including a review of the following:

1. The verifier has reviewed the entire *M&V Report* and evaluated the contents of the report in relation to the applicable requirements of Maine’s CO₂ Budget Trading Program and the required information that must be provided in the *M&V Report*.
2. The verifier has evaluated the adequacy and validity of information supplied by the Project Sponsor to determine CO₂-equivalent emissions reductions in accordance with Maine’s CO₂ Budget Trading Program, and the required documentation that must be provided in the *M&V Report*.
3. The verifier has evaluated the adequacy and consistency of methods used by the Project Sponsor to quantify, monitor, and verify CO₂-equivalent emissions reductions in accordance with the requirements of Maine’s CO₂ Budget Trading Program and the Monitoring and Verification Plan submitted as part of the *Consistency Application*.

A verification report is attached that documents the verifier’s review of the items listed above and includes evaluation conclusions and findings.

Verifier Representative signature

date

printed name

title

notary