



CLIMATE
ACTION
RESERVE

Landfill Project Verification Protocol

Capturing and Combusting Methane
from Landfills

Version 1.0

November 2007

Climate Action Reserve

Landfill Project Verification Protocol

Capturing and combusting methane from landfills

TABLE OF CONTENTS

I. Introduction	1
II. Standard of Verification	1
III. Core Verification Activities – Landfill Operations	2
Step 1: Identifying Emission Sources.....	3
Step 2: Reviewing GHG Management Systems and Estimation Methodologies	4
Step 3: Verifying Emission Estimates	6
Completing the Verification Process	6
IV. Project Monitoring Parameters.....	7

i. Terminology Update

The Climate Action Reserve (Reserve) is in the process of updating the terminology used in our protocols to be in agreement with generally accepted national and international terminology. To date, Reserve protocols have used the term “certification” to represent the activity of verifying that GHG emissions data submitted to the Reserve has been collected and quantified in accordance with the guidelines put forth in Reserve protocols. Also, the “certification” activities are performed by a Reserve approved “certifier”. Starting with this protocol, the Reserve will begin to shift the terminology from “certification” and “certifier” to the more widely accepted “verification” and “verifier”.

I. Introduction

The Climate Action Reserve's (Reserve) Landfill Project Verification Protocol provides guidance to California Air Resources Board (CARB) and Reserve-approved verifiers for verifying greenhouse gas (GHG) emissions reductions associated with installing a landfill gas control system, in accordance with the Reserve's Landfill Project Reporting Protocol. Project verification occurs on an annual basis. This verification protocol supplements the California Climate Action Registry's (California Registry) General Verification Protocol (GVP). It describes the core verification activities in the context of a Landfill operation and provides information on project monitoring parameters.

The purpose of verification is to provide an independent review of data and information used to produce a GHG project report. It aims to ensure that a participant's reported emissions reductions are: real, permanent, surplus, and verifiable. The intended audience of the project verification protocol is approved verifier. However, Landfill emission reduction project developers will also find it useful to review this document to develop a better understanding of the verification activities associated with reporting GHG reductions to the Reserve.

Landfill sector verifiers must read and be familiar with the following reporting tools:

- California Registry General Reporting Protocol
- California Registry General Verification Protocol
- Reserve Landfill Project Reporting Protocol
- Reserve Landfill Project Verification Protocol

The California Registry's General Verification Protocol and the Reserve's industry-specific verification protocols are designed to be compatible with each other and are available online at www.climateregistry.org.

Only CARB- and Reserve-approved landfill sector verifiers are eligible to verify landfill project reports. Approved verifiers under the California Registry's GVP are not automatically permitted to verify the project reports. To become an approved landfill sector verifier, a general verifier must successfully complete a landfill sector-specific application process. Information on the application process can be found at www.climateregistry.org/verifiers.

II. Standard of Verification

The Reserve's standard of verification for landfill GHG projects is the Landfill Project Reporting Protocol. To verify a Landfill project developer's project report, verifiers apply the verification guidance in the GVP and this document to the standards described in the project reporting protocol. It provides eligibility rules, methods to calculate reductions, performance-monitoring instructions, and procedures for reporting project information to the Reserve. The Landfill Project Reporting Protocol:

- defines the GHG reduction project,
- defines project eligibility rules,
- delineates the project boundary,
- provides GHG reductions calculation methods,
- identifies procedures for project monitoring, and

- describes project reporting parameters.

Specifically, this verification protocol supports the verification of GHG reduction projects associated with the installation of a landfill gas control system that captures and combusts methane gas from landfill operations and that commences operation on or after January 1, 2001. The landfill gas control system destroys methane associated with the biodegradation of landfill waste that would have otherwise been emitted to the atmosphere. Captured landfill gas could be combusted on-site, or transported for off-site use (e.g., through gas distribution or transmission pipeline), or used to power vehicles. Regardless of how project developers take advantage of the captured landfill gas, the ultimate fate of the methane must be combustion.

Project verification occurs annually. GHG reductions associated with the landfill gas control system are accounted for on an ex-post basis, and project developers annually report reductions that occurred the preceding year. In keeping with the reporting rules of the General Reporting Protocol, the reporting deadline for project developers is August 31 the year following the reduction year, and the verification deadline is December 31.¹

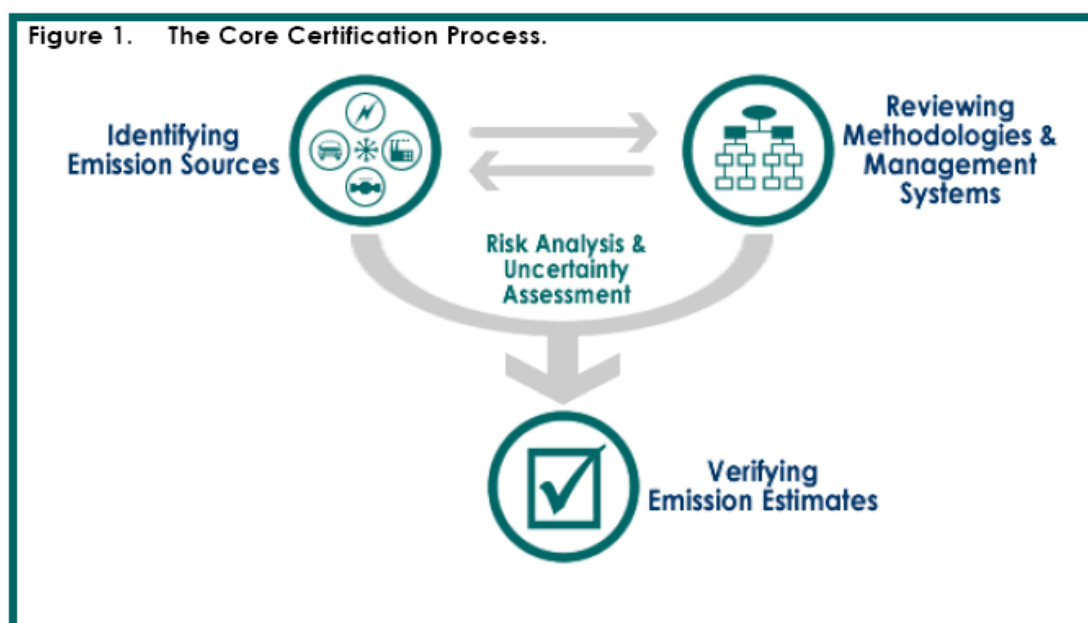
Table 1 in the Landfill Project Reporting Protocol delineates which emission sources should be reported within the project boundary.

III. Core Verification Activities – Landfill Operations

Although the Reserve’s Landfill Project Reporting Protocol provides explicit guidance to determine the GHG impact associated with installing a landfill gas control system, the focus of this verification protocol is on the process to undertake a review and verify a Landfill project developer’s GHG reduction report.

The Reserve’s core verification activities are a risk assessment and data sampling effort developed to ensure that the risk of a reporting error is assessed and addressed through appropriate sampling and review. An illustration of the core verification process is provided in Figure 1, and a description of the three-step procedure is provided below, which is adapted from the California Registry’s GVP.

¹ General Reporting Protocol, IV.14.7. <http://www.climateregistry.org/PROTOCOLS/GRCP/>



The GHG reduction project's impacts are determined within a project boundary. The project reporting protocol delineates the GHG sources and gasses assessed by project developers to determine the net change in emissions associated with installing a landfill gas collection and combustion system. The boundary captures sources from landfill gas collection to combustion.

Within the defined project boundary, project developers at landfill operations quantify the impact on methane, and carbon dioxide, by assessing project emission reductions. Therefore, a landfill project developer's project report will consist of two main parts:

1. A baseline emissions determination
2. A project emissions reduction assessment

The verification process includes the identification of the emissions sources, data management systems review, and verification of emission reduction estimates to verify the project's GHG impacts.

Reserve verifiers apply verification procedures consistently for all project developers. However, based on the size and complexity of a landfill project, verification activities may vary.

Step 1: Identifying Emission Sources

Verifiers review the project developer's emissions and emissions reductions source categories (various components of the landfill gas collection and combustion system including fossil fuel consumption, indirect CO₂ emissions and methane destruction) for both the baseline scenario and after project implementation. Verifiers then determine the GHG emissions and emissions reductions that result from the identified sources and estimate their magnitude. Finally, verifiers rank, by the total annual emissions and emissions reductions, the remaining reported emissions and emissions reductions by CO₂e to assess the environmental risk associated with the emissions.

Project verifiers review the GHG emissions reduction report and document whether the report reflects the characterization and scope of the operation. The “Pre-registration forms” from Section VII in the project reporting protocol should help this assessment. Questions to answer are:

1. Does the project meet the definition of the project as provided in the project reporting protocol?
2. Does the project satisfy the eligibility criteria?
3. Did the project developer sufficiently review compliance with local, state and federal regulations or permitting requirements (as well as local agency ordinances/rulings) and supply an attestation to their compliance status?
4. Does the report correctly depict the landfill system under the baseline scenario and project case?
5. Does the project report include all necessary direct and indirect methane and carbon dioxide sources within the project boundary – for the baseline case and post project implementation?²

Step 2: Reviewing GHG Management Systems and Estimation Methodologies

After confirming the scope and comprehensiveness of the project developer’s emission sources, verifiers review the methodologies and management systems that the landfill project developer used to calculate project emission reductions. The objective is to assess the appropriateness of the data management systems that provide emissions information to the Reserve.

This is principally a risk assessment exercise, in which the verifier weighs the relative complexity of the scope of the project, the methodologies and management systems used to prepare the GHG project report, and the risk of calculation error as a result of reporting uncertainty or misstatement. A verifier’s review of a project developer’s GHG data collection and organization system should consider the following questions:

1. Are GHG sources within the project boundary correctly organized by source category?
2. Are the GHG sources differentiated by gas?
3. Are the landfill parameters accurate?
4. Are there federal, state or local regulations, ordinances or permitting requirements pertaining to air quality, water quality, explosive gas, or local nuisance that may affect landfill operations?
5. Does the landfill pass the regulatory additionality test?
6. Did the project developer provide source testing data for any of the combustion devices, or did the developer use the default destruction efficiencies provided in the Landfill Project Reporting Protocol. If qualifying source test data is available, the project developer must use the source test data in place of the default destruction efficiencies.
7. Did the project developer correctly monitor, quantify and aggregate the amount of uncontrolled methane collected from the landfill and combusted by the project landfill gas control system?

² Table 1 in the Landfill Project Reporting Protocol delineates which emission sources should be reported within the project boundary.

8. Did the project developer correctly monitor, quantify and aggregate the amount of uncontrolled methane collected from the land fill, upgraded, and injected into a natural gas pipeline or used in CNG/LNG vehicles?
9. Did the project developer correctly monitor, quantify and aggregate direct and indirect CO₂ emissions from the project?
10. Did the project developer correctly monitor, quantify and aggregate methane emissions reductions from the project?
11. Did the project developer correctly monitor, quantify and aggregate CO₂ emissions and methane emission reductions?
12. Did the project developer apply the correct carbon dioxide emission factors?
13. Did the project developer apply the correct methane destruction efficiencies?
14. For other calculation variables, did the project developer use correct data inputs?
15. Did the project developer correctly monitor, quantify and aggregate fossil fuel use?
16. Is the landfill gas control system operated in a manner consistent with the design specifications?
17. Is the landfill gas control system monitored in a manner consistent with the Landfill Project Reporting Protocol?
18. Are the landfill gas combustion devices operated and maintained in a manner consistent with manufacturer specifications?
19. Is an individual responsible for managing and reporting GHG emissions? Is this individual qualified to perform this function?
20. Is appropriate training provided to personnel assigned to GHG emissions reporting duties?
21. If the project developer relies on external staff to perform required activities, are the contractors qualified to undertake such work? Is there internal oversight to assure quality of the contractor's work?
22. Are appropriate documents created to support and/or substantiate activities related to GHG emissions reporting activities, and is such documentation retained appropriately? For example, is such documentation maintained through reporting plans or procedures, fuel purchase records, etc.?
23. For direct use agreements, between the project developer and the end user of the landfill gas (i.e. an industrial client purchasing the landfill gas from the project developer), is a legally binding mechanism built into the agreement language to assure that the GHG offset credits will not be double counted?
24. Are the mechanisms used to measure and review the effectiveness of GHG emissions reporting programs appropriate for this purpose? For example, are policies, procedures, and practices evaluated and updated at appropriate intervals?

Once the verifier has assessed the overall risk of misstatement associated with the GHG management systems, those risks should be assessed in conjunction with the project characterization and emissions source assessment in Step 1 (Identifying Emission Sources).

Verifiers then identify the areas with the greatest potential for material misstatements (either based on volume of emissions, lack of management systems, or both) to determine the best risk-based strategy to identify a representative sample of emissions to recalculate in Step 3 below.

Step 3: Verifying Emission Estimates

The final step in completing the core verification activities is to verify the emission estimates. To do so, verifiers re-calculate a subset of the landfill projects's emission reductions from the post-project implementation and compare the sub-sample re-calculated results with the project developer's calculated results from the same sources to determine if the GHG project emissions inventory is free of material misstatements. It is possible that during the verification process differences will arise between the emissions estimated by the project developer and those estimated by the verifier. Differences of this nature may be classified as either material (significant) or immaterial (insignificant). A discrepancy is considered to be material if the overall reported emissions differ from the overall emissions estimated by the verifier by 5% or more. A difference is immaterial if this difference is less than 5%.

Similar to Step 2, this procedure is a risk assessment exercise. The verifier weighs the relative complexity of the scope and diversity of the landfill project GHG emissions and emissions reductions, the appropriateness of the calculation methodologies, the strength of the GHG management systems and the risk of a calculation or reporting error to determine the best risk-based strategy for selecting a representative sample to re-calculate. Verifiers must compare estimated GHG emissions in the baseline scenario and post-project implementation to those of the project developer to determine if any material misstatements exist.

Verifiers should concentrate their activities in the areas that have the greatest impact to the net change in emissions due to installing a landfill gas control system. The verification of emissions estimates should document the answers to the following questions:

1. Have you documented your process for determining the appropriate sampling plan?
2. Have you performed data triangulations where reasonable?
3. Are the current year's baseline and post-project implementation reported emissions significantly different from the prior year's emission levels? If so, do you understand the reasons for the changes, and to the best of your knowledge, do they explain the differences in emissions?
4. Are any discrepancies between your emissions estimates and the project developer's material?

Completing the Verification Process

The California Registry's GVP provides general instructions for verifiers to finalize the verification process. It describes completing a Verification Report, preparing a Verification Opinion, conducting an Exit Meeting with the project developer, and notifying the California Registry of the project developer's verification status. Furthermore, verifiers should refer to the GVP for information on the Verification Activities Log. Verifiers are responsible for applying the guidance in a manner that meets the goals of project verification.

IV. Project Monitoring Parameters

To confirm that a project developer's GHG emissions have been reported accurately, verifiers should review appropriate data sources. Verifiers should validate the activity data for the calculation inputs to substantiate the baseline and post-project implementation determinations. Prior to the first meeting verifiers should identify key documents and project developers should provide them to the verifier in a timely manner for review. This will help to expedite the verification process.

Please reference the Landfill Project Reporting Protocol for project monitoring parameters to be reviewed by verifiers.