



Verification Report for

Kent County Michigan
Department of Public Works
Grand Rapids, Michigan
USA

Climate Action Reserve

Landfill Gas Reporting Protocol 2.0

12 December 2009

Report Prepared for

Kent County Michigan
Department of Public Works
1500 Scribner N.W.
Grand Rapids, MI 49504
USA

Report Prepared by

NSF
789 N. Dixboro Road
Ann Arbor, MI 48105
USA

Project Verification Report

Summary

The Kent County Michigan Department of Public Works engaged NSF to verify its methane emission reductions from a landfill gas project reported to the Climate Action Reserve for the reporting periods 12 July 2008 – 31 December 2008 and 1 January 2009 – 30 March 2009. The Kent County Department of Public Works is the operator of a municipal landfill as described by NAICS code 562212.

The Kent County Department of Public Works' South Kent solid waste disposal facility is located at 300 100th St. S.W. Byron Center Kent County, MI 49315 and generated methane emission reductions during the cited time periods from the collection of landfill gas and its combustion in a flare.

1. Introduction

1.1 Objective

The objective of this verification audit was to determine, with reasonable assurance, that the Kent County, Michigan, Department of Public Works had quantified, monitored, and fairly reported to the Climate Action Reserve its landfill gas emission reductions at the South Kent Landfill.

1.2 Scope

The scope of the engagement included quantification, monitoring and reporting of greenhouse gas project emissions associated with the operation of the South Kent Landfill during two partial-year periods in 2008 and 2009. The first partial year period was 12 July – 31 December 2008. The second partial year period was 1 January – 30 March 2009.

1.3 Criteria

The Kent County Department of Public Works implemented its methane emission reduction project in accordance with the requirements of the Climate Action Reserve's Landfill Project Reporting Protocol version 2.0. NSF conducted its verification of the reported emission reductions in accordance with the following documents: Climate Action Reserve Landfill Project Verification Protocol 2.0, Climate Action Reserve Project Verification Manual (June 2009), and ISO 14064:2006 Part 3, *Greenhouse gases – Specification with guidance for the validation and verification of greenhouse gas assertions*.

1.4 Materiality

In accordance with the Climate Action Reserve Landfill Project Protocol 2.0, emission reduction reports were considered fairly stated if they varied by no more than 5% from a complete statement of the project's methane emission reductions. Thresholds of materiality defined by Climate Action Reserve Landfill Project Protocol 2.0 allowed verifiers of emission reduction reports to consider as immaterial discrepancies of 5% or less.

Project Verification Report

1.5 Level of Assurance

This engagement was performed at the reasonable level of assurance.

2. Verification Approach

2.1 Team Appointment and COI Review

This verification was performed by Janette Lutz, NSF Lead Verifier. Conflict of Interest inquiries were completed for NSF and for the verification team and a finding of low COI risk was confirmed by the Climate Action Reserve.

2.2 Document Review

The verification team conducted a document review to inform the planning process in advance of performing on-site verification activities. Documents reviewed included Kent County's project documentation submitted to the Climate Action Reserve, project reports, flow metering and data logging instrumentation documentation, calibration documentation, data logging records, monitoring plan, regulatory compliance attestations and supporting documents, and site and equipment drawings.

2.3 Planning

NSF's verification approach is risk-based. It draws upon our understanding of risks to fair statement of reported emissions and the operation of controls to reduce such risks. As a result of the document review and preliminary conversations with the Director of Engineering/Utility Services at Kent County, a verification plan and a sampling plan were developed for this engagement.

2.4 Verification Activities

As a result of its planning process, NSF conducted a site visit from 3-5 June 2009 that included a visit to the project site and to the offices of the Kent County Department of Public Works in Grand Rapids, MI. The nature of verification activities conducted included:

- Verification of the eligibility of the Kent County Department of Public Works landfill gas project to report emission reductions in accordance with the Climate Action Reserve Landfill Project Reporting Protocol 2.0;
- Verification of evidence presented by Kent County Department of Public Works to demonstrate its knowledge of and assertion of compliance with applicable air and water regulations;
- Verification of applicable methane and carbon dioxide emission sources within the project boundary and their quantification as defined by the Climate Action Reserve Landfill Project

Project Verification Report

Reporting Protocol 2.0;

- Verification of Kent County Department of Public Works' monitoring of key operational parameters of its landfill gas collection and destruction project;
- Assessment of the capability of Kent County Department of Public Works' management system and procedures to produce accurate, reliable and reproducible data and information;
- Determination of Kent County Department of Public Works' conformity in all material respects with the requirements of the Climate Action Reserve Landfill Project Reporting Protocol 2.0;
- Selecting locations and processes within the scope of Kent County Department of Public Works' landfill gas project to visit based upon an assessment of risks to fair reporting;
- Reviewing the basis for and results achieved from the calculated methane emission reductions from its landfill gas collection and destruction project;
- Visiting the selected work locations and interviewing personnel, observing operations, and reviewing relevant documents and records.

Subsequent to the site visit, the verification team performed additional work in October and November 2009 to review responses to Corrective Action Requests and to complete the final project verification documentation.

3. Verification Findings

3.1 Project Description

The South Kent Landfill is a municipal solid waste facility operated by the Kent County, Michigan, Department of Public Works. During the project periods covered by this report, landfill gas was collected and routed for combustion to a single open flare. In subsequent project periods a gas turbine electricity generator was scheduled to burn the landfill gas but these operations were not considered during this verification.

3.2 Eligibility and Title

The South Kent Landfill meets the eligibility requirements established in the Landfill Gas Reporting Protocol version 2.0. The project is located within the United States of America and meets the requirement of having a start date after 1 January 2001. The start date of the project was July 10, 2008. It was listed with the Climate Action Reserve within 12 months of becoming operational on July 10, 2008.

A review of the ownership of landfill gas emission reduction credits was conducted and determination made that the project applicant had legal right to any emission reduction credits to be issued by the Climate Action Reserve.

Project Verification Report

3.3 Additionality

Performance Standard Test. Until the development of the landfill gas project, the South Kent Landfill did not collect and destroy any landfill gas. A visit to the site with the Kent County Director of Engineering confirmed as-built drawings showing the installation of new collection and destruction equipment as of the dates specified in documents. Flow meter records confirmed the operational start date of 10 July 2008.

Regulatory Additionality. The South Kent Landfill is subject to NSPS regulation requiring the facility to conduct Non-Methane Organic Compound (NMOC) emission rate testing. The most recent Tier 2 NMOC Emission Rate Report for South Kent Landfill was 19.64 Mg/year.

The results of the regulatory review indicted the landfill is in compliance with Federal, State and Local regulations. The Michigan Department of Environmental Quality has not adopted mandatory regulatory requirements for the installation of a gas collection and conveyance system. An Attestation of Compliance was signed by the Kent County Director of Engineering Services on 1 June 2009. This attestation is on file with the Climate Action Reserve.

3.4 Project Boundaries and Emission Sources

The project includes all emission sources from the operation of the landfill gas collection system to the ultimate destruction of the landfill gas at a flare. The sources of GHG emissions reviewed in the South Kent Landfill Gas Project are as follows.

GHG sources, sinks, and reservoirs associated with the baseline scenario:

- CH₄ vented to the atmosphere.
- CO₂ from the oxidation of CH₄ by soil bacteria. As the landfill is not covered with a synthetic liner, the CCAR Landfill Project v.2 Reporting Protocol assumption that 10 percent of the methane produced would be naturally oxidized by soil bacteria has been applied.

The GHG sources, sinks, and reservoirs associated with the project:

- CO₂ from the combustion of CH₄ in the flare.
- CO₂ from the combustion of fossil fuels used during operation and maintenance activities for the project activity.
- CO₂ resulting from the consumption of imported electricity.
- The gases reviewed include CO₂ and CH₄. All gases have been converted to CO₂ equivalents.

3.5 Performance Against Project Protocol/Methodology

The South Kent Landfill Gas Project was implemented in conformity with the Climate Action Reserve Landfill Project Reporting Protocol version 2.0. The protocol required the development

Project Verification Report

and implementation of project monitoring and quarterly inspection and calibration of landfill gas flow metering devices.

Monitoring Plan and Missing Data calculation procedures were reviewed for consistency with the Landfill Project Reporting Protocol v. 2.0 requirements as part of this verification. During a review of monitoring data, the verification team learned that the independent laboratory that had verified the performance of the landfill gas flow meter had on two occasions used an incorrect variable (inside pipe diameter) in its calibration formula. This error resulted in an understatement of the actual flow of landfill gas to the combustion device. As a result of this error, the project developer requested that the Climate Action Reserve grant a variance from its “failed calibration test” requirements. See section 3.9 of this report for more details. Apart from this significant issue, there were no instances found of material missing data.

The project utilized a Yokogawa data recorder to collect flow and methane content data continuously and aggregated in 15-minute increments. A risk-based sample set of approximately 40% was selected and reviewed in order to identify material misstatements due to transcription mistakes, mathematical errors or malfunction of instruments. No material discrepancies were found, in addition to the issue described above; however, it was found that a discount factor of 5% was not applied to the methane content during a small number of periods of missing data, as stated in the project’s data management procedures. This was corrected by applying the discount factor to the affected data set.

The South Kent Landfill does not incorporate a synthetic liner in its cover system; therefore a 10% methane soil oxidation factor was applied to the baseline scenario.

A discount factor of 5% was applied to data corrected by 9.91% in the case of the South Kent Landfill to two quarters of flow measurement data to account for flow reading errors introduced by the project’s independent calibration laboratory. This discount factor was approved by the Climate Action Reserve in the approval of the variance request submitted by the project developer (see section 3.9) below. The verification team confirmed the corrections specified in the approved variance were applied as stated in the corrected emissions reports.

3.6 Project Management System

The verification team reviewed elements of the South Kent Landfill Project management system during its on-site visit conducted 3-5 June 2009. In particular, it reviewed for adequacy the following elements:

- Definition and maintenance of an appropriate control environment by Kent County Department of Public Works management and personnel;
- Training and competence of landfill project managers and operating personnel;
- Identification and management of legal requirements related to landfill operations;
- Identification and maintenance of records required by the landfill project;
- Landfill site and gas collection and combustion equipment specifications;
- Quantification methods and calculations of project emissions;
- Checking and corrective action mechanisms.

Project Verification Report

3.7 Calculation of GHG Emission Reductions

The South Kent County Landfill project emission reductions were calculated per the formula defined in the Climate Action Reserve Landfill Gas Reporting Protocol version 2.0. The basic formula was

Landfill gas destroyed

- the portion of methane oxidized in the baseline scenario,
 - carbon dioxide emissions from fossil fuel consumption
 - methane emissions from incomplete destruction of natural gas, if applicable,
 - indirect carbon dioxide emissions from the use of electricity from the grid,
 - the effective radius of influence adjustment, if applicable,
 - the discount factor to account for uncertainties associated with the project monitoring equipment
- = Project Emission Reductions.

In the case of the South Kent Landfill, the verification team verified the correct calculation of project emissions based upon evidence of fossil fuel consumption (primarily propane as supplemental fuel for the flare), indirect CO₂ emissions from the use of electricity in the grid, and the application of a discount factor taken in conjunction with flow measurement irregularities (see section 3.9 below).

3.8 Corrective Action Requests/Recommendations

The verification team raised three Corrective Action Requests (CARs) during the planning and verification stages of this engagement. All three CARs were closed by Kent County personnel to the satisfaction of the verification team. In addition, the verification team made three recommendations to Kent County related to strengthening its Project management.

3.9 Approved Variances or Deviations

Kent County applied to the Climate Action Reserve for a variance to the Landfill Reporting Protocol requirement to apply the US EPA Acid Rain Program data substitution methods in cases where monitoring equipment “failed” quarterly calibration tests. Kent County asserted that this discount factor should not apply in the case where the use of an incorrect pipe schedule by an independent laboratory conducting quarterly calibration had resulted in the understatement of landfill gas flow. After the error was discovered, it was possible to recalculate the actual flow measurements using corrected inputs to the flow calculation equation. The Climate Action Reserve issued a variance approval on 25 September 2009 which permitted the affected data to be scaled upwards by a factor of 109.91%. This additional 9.91% represented the most conservative error recorded during the two calibration events of 7/10/08 and 12/23/08. The Climate Action Reserve required Kent County to compensate for this deviation from the Protocol requirements by applying a 5% discount to all flow measurements from the affected periods after the data substitution had taken place.

Project Verification Report

4. Verification Results

4.1 Verification Team Recommendation

Based on the verification activities described above, the verification team has concluded that the project has achieved the following emission reductions:

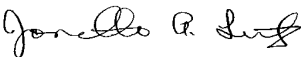
Reductions/Removals from 2008-07-12 through 2008-12-31		Metric tons CO ₂ -e
Landfill gas destroyed		39,887
- Project emissions		69
- Project adjustments (explain)		0
= Net project emission reductions/removals		39,819

Reductions/Removals from 2009-01-01 through 2009-03-30		Metric tons CO ₂ -e
Landfill gas destroyed		23,990
- Project emissions		36
- Project adjustments (explain)		0
= Net project emission reductions/removals		23,954

4.2 Verification Audit Summary

Project Developer	Kent County Michigan Department of Public Works 1500 Scribner N.W. Grand Rapids, MI 49504
Project Location	South Kent Landfill 300 100 th St. S.W. Byron Center Kent County, MI 49315
Project Type	Landfill gas collection and destruction
Project Period	12 July 2008 – 31 December 2008 1 January 2009 – 30 March 2009
Protocol/Methodology	Climate Action Reserve Landfill Project Reporting Protocol, version 2.0
Emissions/Removals Verified	Vintage 2008: 39,819 metric tons

Project Verification Report

	Vintage 2009: 23,954 metric tons
Verification Conclusion	Based upon the verification activities described above, NSF has concluded that Kent County Department of Public Works' reported 2008 vintage and 2009 vintage methane emission reductions of 39,819 metric tons and 23,954 metric tons, respectively, reported to the Climate Action Reserve for the periods ending 31 December 2008 and 31 March 2009 are, in all material respects, fairly stated.
Lead Verifier	 Janette A. Lutz, 16 December 2009
Internal Reviewer	 John C. Shideler, 16 December 2009
<i>This verification statement is valid when signed and dated by an NSF internal reviewer.</i>	