



Verification Report for CAR475 Gaston County Landfill Gas
Destruction Project
April 1, 2011 – March 31, 2012 Reporting Period

Prepared for:
EcoSecurities International Limited

May 15, 2012

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1.0 Introduction

Ruby Canyon Engineering (RCE) was contracted by EcoSecurities International Limited (EcoSecurities) to perform the verification of the Gaston County Landfill Gas Destruction Project (Project) for the reporting period April 1, 2011 through March 31, 2012 to the Climate Action Reserve (CAR) Landfill Project Protocol 3.0 (Protocol). The Project involves GHG emission reductions from the capture and destruction of methane from the municipal solid waste landfill located in the town of Dallas, North Carolina, at the Gaston County Landfill – Hardin Site.

1.1 Project Background & Site Description

The Gaston County Landfill is owned by Gaston County and is operated by the County Public Works department. The Landfill, which opened in 1988, covers 130.5 acres. The estimated date of landfill closure is 2029. The Gaston County Landfill has an active recycling facility at the site in addition to various administration offices.

A pre-project passive venting system of wells and cut-off trenches was installed in 1995 – 1996 to control migratory and explosive gas. This consisted of nine wells along the northeastern side of the Areas C and D, which closed in 1998. The passive system remained in operation until 2008 when the landfill gas (LFG) capture and destruction Project was designed and installed. The current Gaston County Project consists of seventy eight LFG capture wells, piping and manifolds for transporting the captured gas, a knockout pot, blowers, LFG flow meters and gas concentration analyzer, and destruction devices to combust the LFG.

The original Project destruction device was an 8-inch open candlestick flare. New destruction devices were installed to replace that flare during this reporting period with the equipment becoming operational on April 21, 2011. The Project destruction devices now include a 4-inch open candlestick flare, a 10-inch open candlestick flare, and three GE Jenbacher lean burn engines (which began producing electricity in June).

1.2 Responsible Party

EcoSecurities International Limited
40 Dawson Street
Dublin 2, Ireland

1.3 Verification Team

The RCE verification team consisted of the following individuals who were selected based upon verification experience and knowledge of the landfill methane sector.

Lead Verifier: Nina Pinette
Team Member: Zach Eyler
Senior Reviewer: Bonny Crews

1.4 Objectives

The goal of the verification activities was to ensure that the claimed GHG emission reductions were complete, consistent, accurate, transparent and permanent and that the Project was in compliance with CAR project additionality, monitoring, and reporting requirements. Furthermore, the verification

activities ensure that the data provided to RCE is well documented and free of any material errors or omissions.

1.5 Scope

The scope of the periodic verification consists of the following independent and objective activities:

- Review the Project's Monitoring Manual
- Review the reporting period's Project Monitoring Report
- Review the project data acquisition and quality control procedures
- Conduct a site visit to the Gaston County Landfill
- Review the Project's baseline emissions and check that the baseline and Project boundaries have not changed since the previous verification
- Review the Project's emission reduction calculations
- Review of the Project documents and data against the verification criteria in Table 1
- Issue requests for additional documentation, clarifications, and corrective actions as necessary
- Issue a verification report, verification statement, and list of findings to EcoSecurities and CAR

1.6 Verification Criteria

Table 1 –Verification Criteria

Standard of Verification	• Climate Action Reserve Landfill Project Protocol 3.0 • Errata and Clarifications to Landfill Project Protocol Version 3.0 (October 26, 2011) • CAR Program Manual (October 26, 2011) • CAR Verification Program Manual (December 20, 2010)
Verification Process	CAR and ISO 14064-3 Specification with guidance for the validation and verification of greenhouse gas assertions
Level of Assurance	Reasonable assurance
Materiality	A +97% accuracy level (less than 3% error) because total annual ERs are greater than 25,000 tCO ₂ e but less than or equal to 100,000 tCO ₂ e.

2.0 Verification Activities Summary

This is the verification of the fourth reporting period of the Project from April 1, 2011 through March 31, 2012. RCE previously verified the August 1, 2009 through March 31, 2010 and April 1, 2010 through March 31, 2011 reporting periods. The verification process began with EcoSecurities selecting RCE as the verification body.

Prior to starting the verification, RCE developed a verification plan to be followed throughout the verification. The verification plan consisted of the following activities:

- RCE completed the Project NOVA/COI form to identify any potential conflicts of interest with the Project or Project developer. The NOVA/COI form was submitted to the Reserve's website, and the COI assessment revealed no conflicts of interest and was approved by CAR on February 1, 2012.
- RCE held a verification kickoff meeting with EcoSecurities on February 21, 2012. During the kickoff meeting RCE reviewed the verification objectives, verification process and the verification schedule.

- RCE began receiving the background verification documents by email from EcoSecurities on February 24, 2012.
- RCE performed a strategic review and risk assessment of the received data and support documents in order to understand the scope and areas of potential risk in the GHG emissions reductions.
- RCE developed a risk-based sampling plan based upon the strategic review and risk assessment. The verification plan and sampling plan were used throughout the verification and were revised as needed based upon additional risk assessments.
- RCE conducted a site visit on March 1, 2012. During the site visit RCE performed key personnel interviews, inspected the Project equipment, and observed the onsite GHG management systems, and data gathering, monitoring, and handling practices.
- RCE performed a risk-based desktop review of the submitted verification documents including an assessment of the GHG calculation methods and inputs, source data completeness, GHG management and monitoring systems, evidence of regulatory compliance, continued additionality, and record retention practices.
- RCE submitted requests for additional documentation, clarifications, and corrective actions to EcoSecurities throughout the verification.
- RCE's senior internal reviewer conducted a review of the verification sampling, verification report and verification statement.
- RCE developed a final verification report, verification statement, and list of findings.
- RCE held an exit meeting with EcoSecurities on May 25, 2012.

3.0 Verification Findings

3.1 *Assessment of the GHG Reduction Project Operations*

The Gaston County Landfill Gas Destruction Project currently collects LFG from the Gaston County Landfill and destroys it via combustion in a 4-inch open candlestick flare, a 10-inch open candlestick flare, and three electricity generating internal combustion engines. The LFG is pulled by a blower located at the flare skid through a gas collection system that consists of 78 wellheads connected by lateral piping to the main header pipe.

3.2 *GHG Project Boundary (sources, sinks and/or reservoirs)*

According to the Protocol, carbon dioxide and methane are the only GHGs included in the Project boundary from both the baseline and Project activities. The emissions resulting from the Project activity must be deducted from the Project baseline emissions in order to calculate total emission reductions. These Project emissions include carbon dioxide resulting from both the consumption of electricity from the grid and from the on-site destruction of fossil fuel related to project activities. The calculation of baseline emissions takes into account the total methane destroyed based on the destruction efficiency of the Project flares and engines and the oxidation of methane by soil bacteria.

Table 2 lists the sources of GHG emissions reviewed during the verification of the Project.

Table 2 – Summary of the Project GHG Sources, Sinks and Reservoirs

Activity	GHG Sources, Sinks & Reservoirs
Baseline	• CH₄ vented to the atmosphere. • Percent methane oxidized by soil bacteria. As the landfill is not covered with a synthetic liner, a 10% oxidation factor resulting from natural oxidation by soil bacteria was applied to the baseline emissions.
Project	• CH₄ from the incomplete combustion of LFG in the flares and engines. • CO₂ from the combustion of fossil fuels (propane and diesel) used during operation and maintenance activities for the Project activity. • CO₂ resulting from the consumption of imported electricity.

3.3 Project Eligibility Criteria

The Protocol specifies four eligibility rules that a GHG Project Developer must meet in order to register reductions with CAR: Location, Project Start Date, Additionality, and Regulatory Compliance. During RCE's first verification of the Project, the Project's location and the Project start date were verified. At that time, RCE also confirmed that the Project passed the Performance Standard Test. During this verification, RCE reconfirmed that the Project continues to meet these eligibility requirements and observed no changes since the previous reporting period related to these requirements.

Below is a summary of the CAR eligibility requirements and the Project's compliance to each requirement.

- **Eligibility Rule 1: Location:**

The Project is a US-based landfill located in the town of Dallas in Gaston County, North Carolina, USA and therefore meets this eligibility requirement.

- **Eligibility Rule 2: Project Start Date:**

During RCE's first verification of the Project, RCE reviewed email communications between the Project startup technicians and the design engineering firm stating that the qualifying destruction device began flaring gas on November 18, 2008.

- **Eligibility 3: Additionality:**

Performance Standard Test

During the first verification of the Project, RCE confirmed that prior to Project activity, the Gaston County Landfill did not combust any landfill gas and only collected and passively vented the gas through the nine passive vents. The current Project involved the installation of a new qualifying destruction device, which satisfies the requirement for the Performance Standard Test.

Legal Requirement Test

During the site visit, RCE interviewed the Project Developer about the procedures to ensure that the Project meets environmental compliance requirements and the Legal Requirement Test. The Project Developer monitors federal, local, and state regulations to ensure that the Project is in environmental compliance and that there is no mandate to collect and combust LFG. RCE confirmed that there are currently no laws or ordinances requiring Gaston County to collect and

destroy landfill gas. RCE also reviewed the Project's Monitoring Plan which defines how the Project continues to exceed the Legal Requirement Test including having an administrator maintain compliance and knowledge of any changes in regulatory requirements.

RCE also reviewed the Attestation of Voluntary Implementation form signed after the end of the reporting period and uploaded to the CAR website which states that the project was implemented and established voluntarily.

The Gaston County Landfill expanded its operations in 2010 and is now constructed and permitted to operate at a design capacity of 5,748,470 Mg of municipal solid waste. The new design capacity triggered the NSPS Tier II NMOC emissions estimates reporting requirement. According to the Design Capacity and Emissions Projection Report from March 3, 2011, the NMOC emission rate for 2011 and 2012 are 36 Mg per year and 37 Mg per year respectively and are below the requirements of the NSPS 50 Mg/yr NMOC threshold.

During the review of the supporting evidence, RCE did not observe any indication that the Gaston County Landfill was mandated to collect and combust their LFG. Additionally, there are no local, state or Federal mandatory requirements for the installation of a gas collection and combustion system. Therefore the results of the regulatory review indicated that Gaston County is following their Monitoring Manual procedures to assure they pass the Legal Requirement Test and the Project is in compliance with all Federal, State and Local regulations.

Eligibility 4: Regulatory Compliance:

RCE reviewed the procedures described in the Gaston County Monitoring Manual to ensure that the Project remains in compliance with all applicable local, state, and Federal requirements. RCE reviewed environmental and operating permits including the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Air Quality air permit and the NCDENR Municipal Solid Waste Landfill Facility permit to operate. During RCE's review there was no evidence of non-compliance found, and the procedures for ensuring regulatory compliance in the Monitoring Manual were being properly followed. Finally, RCE confirmed signature of the Attestation of Regulatory Compliance, after the end of the reporting period, which was uploaded to the Reserve.

3.4 Ownership of GHG Reductions

RCE reviewed evidence that EcoSecurities has ownership of the GHG emission reductions. Ownership documentation reviewed includes the contract agreement between Gaston County and Duke Carolinas—the buyer of the electricity generated by the Project—which states that Gaston County retains all emission reduction credits. RCE also reviewed the redacted contract agreement between EcoSecurities Group, PLC and Gaston County, North Carolina for evidence of ownership of the generated emission reductions. The presented evidence clearly demonstrates that EcoSecurities holds the legal title and exclusive ownership rights of the emission reductions associated with the Project. All rights, interests, title and benefits of the agreement have been assigned by EcoSecurities Group, PLC to EcoSecurities International Limited under a corporate restructuring, which is acceptable under the terms of the agreement with Gaston County. Finally, RCE reviewed the completed Attestation of Title which was uploaded to the CAR website following the end of the reporting period.

3.5 GHG Monitoring and Management Systems

RCE reviewed the data management systems during the site visit and desktop review. RCE completed the majority of the GHG management systems review during the site visit by observing the onsite procedures and interviewing the landfill and EcoSecurities personnel. The onsite review included an assessment of the Project data collection, processing and handling procedures, recordkeeping and data storage, quality control and assurance procedures, record retention systems, and a field tour of the Project equipment. The desktop review included a detailed review of the Project monitoring plan and its conformance to Protocol requirements. RCE also confirmed that the Project was implemented according to the monitoring plan.

The primary data gathered for the Project during this reporting period includes LFG flow to the 4-inch flare, the 10-inch flare, and the engines; methane content of the LFG; the flare temperatures; and the operation of the engines. The new destruction devices and new monitoring equipment became operational on April 21, 2011. For the first 18 days of the reporting period (April 1 – April 18) the old destruction device and flow meter were used: a Yokogawa Model EJX910A flow meter that continuously monitors the LFG flow at a temperature and pressure of 59 °F and 1 atm. The system was not operating between April 18-21 when it was taken offline to set up the new equipment. Beginning April 21, 2011, three new Veris Verabar V100 differential pressure flow meters in conjunction with Rosemount differential pressure transmitters were used to record flow to the two flares and engines at a standard temperature and pressure of 60°F and 1 atm. RCE confirmed that the position of the flow meters are adequate to ensure laminar flow. The continuous methane analyzer—a Siemens Ultramat 23 gas analyzer—was used both before and after the installation of the new flares and engines.

The operation and temperature of the flares are continuously monitored by thermocouples. Operation of the engines is monitored through the power plant's SCADA system which records electricity production data for each engine on a 15-minute basis. The LFG flow, concentration, and temperature data is recorded continuously via a PLC system which sends data to an electronic chart recorder. The data is exported in 10-minute intervals on a weekly basis. The Environmental Analyst at the landfill also records manual measurements in a Project logbook on a daily basis.

During the site visit RCE reviewed the data storage and retention policies of the Gaston County Landfill and verified they were in conformance with the protocol requirements and followed the Monitoring Manual and Monitoring Report.

3.6 Instrument QA/QC

RCE reviewed evidence that the LFG flow meters and methane analyzer met all instrument QA/QC requirements outlined in the protocol (including the old flow meter that was used for the first 18 days of the reporting period). EcoSecurities provided quarterly calibration documentation for the old Yokogawa flow meter and the three new Veris Verabar flow meters and differential pressure transmitters. The calibrations were conducted by PASS II which, in addition to calibration, included cleaning and inspection. The certificates indicate that the flow meters did not read outside of the ± 5 percent threshold as required by the Protocol, and the "as found/as left" conditions of the meters were documented. PASS II also conducted quarterly calibrations of the Siemens Ultramat analyzer which also did not exceed the ± 5 percent threshold. The March 20, 2012 field check for calibration accuracy of all monitoring equipment was performed within two months of the end of the reporting period.

3.7 Assessment of GHG Emissions Reductions Calculations

The emission reduction calculations assessment included a review of the Project assumptions, raw data inputs, and accuracy of calculations. RCE first assessed the completeness of the raw data and how the data is transferred to the calculation spreadsheet. Next, the formulas and raw data inputs were reviewed for accuracy and compliance with the Protocol. RCE sampled monthly selections of data and recalculated the monthly methane destroyed by the Project and compared these values to the EcoSecurities values in the spreadsheet. RCE also reviewed the check built into the spreadsheet that totalizes flow only at times when the flare is operational (thermocouple readings greater than 500°F). RCE confirmed that appropriate destruction efficiencies were applied for the open flares and lean-burn internal combustion engines and that a 10 percent discount was applied for the oxidation of methane by soil bacteria because the landfill does not have a synthetic cover.

The volume of gas flow metered by the Yokogawa flow meter for the first 18 days of the reporting period was recorded at a temperature of 59 °F and 1 atm. RCE confirmed that the flow readings were appropriately adjusted to a standard temperature and pressure of 60 °F and 1 atm per the Protocol's requirements.

RCE confirmed that no credits were claimed for the time period from April 18-21 when the system was taken offline to set up the new Project equipment. Data substitutions were applied for methane concentrations for three days in December. RCE confirmed that the data substitution methods were applied according to the requirements of the Protocol.

RCE reviewed source documentation for Project emissions from purchased electricity, propane, and diesel; confirmed that appropriate emission and conversion factors were used; and reviewed the use of Protocol equations for Project emissions in the GHG assertion.

Lastly, RCE recalculated the GHG emission reductions and compared the results to EcoSecurities' calculations to determine if there was a material difference. The difference between RCE's and EcoSecurities' emission reductions was non-material.

4.0 Verification Results

EcoSecurities provided sufficient evidence and documentation of their emission estimates, data collection procedures, and their monitoring and quality control procedures. The verification process focused on verifying the emissions estimates and the source data used by EcoSecurities to quantify the emissions reductions in accordance with the CAR Landfill Project Protocol 3.0. The following is a summary of the verification results.

The Project reported emission reductions of 49,761 metric tons CO₂e in 2011 and 20,774 metric tons of CO₂e in 2012 as per the information provided in the Gaston County calculation spreadsheets dated May 3, 2012. During final review, RCE identified no material misstatements in the data or emissions calculations. Tables 3 and 4 define the emission reductions verified for this reporting period.

Table 3 Emission Reductions Verified for April 1, 2011 through December 31, 2011

Emissions Verified	CO₂e (metric tons)
Baseline Emissions	50,041
Project Emissions	280
Emission Reductions	49,761

Table 4 Emission Reductions Verified for January 1, 2012 through March 31, 2012

Emissions Verified	CO₂e (metric tons)
Baseline Emissions	20,891
Project Emissions	117
Emission Reductions	20,774

Table 5 Total Emission Reductions Verified for April 1, 2011 through March 31, 2012

Emissions Verified	CO₂e (metric tons)
Total Emission Reductions	70,535

4.1 Findings Overview

During the verification process, RCE made requests for clarifications, corrective actions, and supplemental documentation to complete the verification. According to RCE's verification procedures all material corrective actions must be addressed by EcoSecurities before a positive verification statement will be submitted. The details of these requests are documented in RCE's List of Findings provided to CAR and the Project Developer.

5.0 Verification Statement

RCE conducted a risk-based analysis of the Gaston County Landfill Gas Destruction Project emission reduction calculations including a strategic review of the Project data and evidence. Based upon the processes and procedures and the evidence collected, RCE concludes with a reasonable level of assurance that the Project emission reductions resulting from the capture and destruction of landfill gas during the reporting period April 1, 2011 through March 31, 2012 can be considered:

- in conformance with the CAR Landfill Project Protocol 3.0 standards,
- without material discrepancy, and
- verified to a reasonable level of assurance

The verified emission reduction CRTs are listed in **Table 6**.

Table 6 Emission Reductions Verified for April 1, 2011 through December 31, 2012

Emissions Verified	CO ₂ e (metric tons)
2011 Emission Reductions	49,761
2012 Emission Reductions	20,774
Total Emission Reductions	70,535

Lead Verifier Signature



Nina Pinette

Senior Internal Reviewer Signature



Bonny Crews