



Verification Report
Hernando County Landfill Electric Generation Project
CAR422
Reporting Period: April 1, 2012 – March 31, 2013

Prepared for:
Timberline Energy, LLC

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1.0 Introduction

Ruby Canyon Engineering (RCE) was contracted to perform the verification of the Hernando County Landfill Electric Generation Project (Project) for the reporting period April 1, 2012 through March 31, 2013 to the Climate Action Reserve (CAR) Landfill Project Protocol Version 2.0 (Protocol). The Project involves greenhouse gas (GHG) emission reductions from the capture and destruction of methane from the Hernando County Landfill located near Brooksville, Florida.

1.1 Project Background & Site Description

The Hernando County Landfill began waste collection in 1990 and covers an area of approximately 80 acres. As of 2012, the landfill had approximately 1.8 million tons of waste in place. The Project commenced operation in 2008 and consists of a gas collection system which conveys gas to a Caterpillar model G3520C engine (1,600 kW) and an open flare. During the verification process, RCE confirmed that the landfill is not considered a bioreactor.

1.2 Responsible Party

Project Developer: Timberline Energy, LLC

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: Eric Ripley

Internal Reviewer: Philip Cunningham

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 verification consisted of the following independent and objective activities:

- Review the Project Monitoring Plan,
- Conduct a site visit to the Project,
- Review the Project data acquisition and quality control procedures,
- Review the Project's baseline emissions and Project boundaries,
- Review the Project's emission reduction calculations,
- Review the Project documents and data against the verification criteria listed in Table 1,
- Issue requests for additional documentation, clarifications, and corrective actions, as necessary, and
- Issue a verification report, verification statement, and list of findings to Timberline Energy.

1.6 Verification Criteria

Table 1 – Verification Criteria

Criteria	
Standard of Verification	• CAR Landfill Project Protocol Version 2.0 (November 18, 2008) • Errata and Clarifications to Landfill Project Protocol Version 2.0 (October 8, 2013) • CAR Landfill Verification Protocol Version 2.0 (November 18, 2008) • CAR Program Manual (October 26, 2011) • CAR Verification Program Manual (December 20, 2010)
Verification Process	• 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 25,00 tCO₂e but less than 100,000 tCO₂e

2.0 Verification Activities Summary

As the first step in verification activities, 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 CAR and the COI assessment revealed no conflicts of interest and was approved by CAR on April 23, 2013.
- RCE held a verification kickoff meeting with Timberline Energy on May 2, 2013. During the kickoff meeting RCE reviewed the verification objectives, verification process and the verification schedule.
- 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 May 23, 2013. 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 Timberline Energy throughout the verification.
- RCE's 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 Timberline Energy on January 10, 2014.

3.0 Verification Findings

3.1 Assessment of the GHG Reduction Project Operations

LFG is collected via 21 collection wells and is conveyed to a header pipe where it passes through a condensate knockout and to the blower station. LFG is compressed and cooled and ultimately conveyed to the Caterpillar engine or the open flare which is only used during periods when the engine is down or when excess gas is available for combustion.

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 engine and flare 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 only partially 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 engine and flare. • CO₂ from the combustion of fossil fuels (propane, gasoline, 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 three eligibility rules that a GHG Project Developer must meet in order to register reductions with CAR: Location, Project Start Date, and Additionality. 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 U.S.-based project located near Brooksville, Florida, USA. The Project therefore meets this eligibility requirement.
- **Eligibility Rule 2: Project Start Date**

The project start date was previously verified to be October 7, 2008. RCE reconfirmed this start date through a review of project data, contract documents, and permits and concluded that the previously verified date of October 7, 2008 was accurate.

- **Eligibility Rule 3: Additionality**

- Performance Standard Test

The Project was previously verified to meet the Performance Standard Test under Scenario 1 of Protocol section 3.3.1: "If the landfill is not currently collecting and destroying landfill gas, the project is considered additional". RCE reviewed a signed attestation stating that the no GCCS was ever present at the landfill prior to implementation of the Project activity and therefore concluded that the previously verified Scenario 1 was applicable to the Project.

- Regulatory Test

During the site visit, RCE interviewed Timberline Energy about the procedures to ensure that the Project meets environmental compliance requirements and the Regulatory Test. Timberline Energy 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 the Hernando County Landfill to collect and destroy LFG.

The Hernando County Landfill is a municipal solid waste (MSW) landfill that exceeds the design capacity of 2.5 million megagrams (Mg) or 2.5 million cubic meters as specified in the New Source Performance Standards (NSPS) codified in Title 40 of the Code of Federal Regulations (CFR) Part 60, Subpart WWW. The landfill is therefore subject to the requirements of the NSPS for MSW landfills.

RCE reviewed the Hernando County Landfill Tier II report dated October 5, 2009 in order to determine whether the landfill is required to destroy LFG. The total NMOC generation rate for 2012 was 20.78 Mg/yr and for 2013 was 22.02 Mg/yr both of which are below the 50 Mg/yr limit beyond which a gas collection and control system (GCCS) would be required. RCE therefore concluded that the Hernando County Landfill is not required to destroy LFG.

RCE also reviewed the Project's Monitoring Plan which defines how the Project continues to exceed the Regulatory Test. Timberline Energy personnel review local, state, and federal regulations prior to each verification period in order to confirm that there are no new requirements or laws that mandate the GCCS to be in place. RCE searched the Environmental Protection Agency's Enforcement & Compliance History Online (ECHO) database and confirmed that no violations had occurred during the reporting period. RCE also reviewed the Project's Title V permit. Finally, RCE confirmed signature of the Attestation of Regulatory Compliance, after the end of the reporting period, which was uploaded to the CAR registry. The Attestation of Voluntary Implementation form was also signed after the end of the reporting period and uploaded to the CAR registry.

During RCE's review there was no evidence of non-compliance found and RCE confirmed that the procedures for ensuring that the Project passes the Regulatory Test were being properly followed. RCE confirms that Timberline Energy is following its Monitoring Plan procedures to assure that it passes the Regulatory Test and the Project is in compliance with all federal, state and local regulations.

3.4 Ownership of GHG Reductions

RCE reviewed evidence that Timberline Energy has ownership of the GHG emission reductions. RCE reviewed contractual documentation between Timberline Energy and Hernando County which states that Timberline Energy has the rights to all emission reduction credits associated with the Project. RCE also reviewed the completed Attestation of Title which was uploaded to the CAR registry 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 personnel responsible for the Project. 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.

The primary data gathered for the Project includes LFG flow to the engine and open flare, methane content of the LFG, electricity production, and flare temperature. A Rosemount 3095 flow meter/transmitter (serial #28562) is used to measure LFG flow to the engine. A Thermal Instruments 62-9/9500 mass flow meter (serial #2009364) is used to measure LFG flow to the open flare. Standard conditions for both meters are 60 °F and 1 atmosphere. A Siemens Ultramat 23 gas analyzer is used to measure methane concentration on a continuous basis throughout the reporting period.

The operation of the engine is confirmed via engine run hours and kilowatt production data. The operation and temperature of the flare is continuously monitored by a thermocouple. Landfill gas flow, methane content and flare temperature data are continuously recorded via a Honeywell data logger. Additionally, the daily and totalized flow to the engine is also recorded via tracking spreadsheets on a daily basis. The site operator also checks the GCCS on a daily basis in order to confirm that there are no issues with the system. Project data is downloaded to a Timberline Energy server and reviewed on a weekly basis.

During the site visit RCE reviewed the data storage and retention policies of Timberline Energy and verified they were in conformance with the Protocol requirements and followed the Monitoring Plan. All data is kept for a period of ten years after the information is generated or seven years after the last verification.

3.6 Instrument QA/QC

RCE reviewed evidence that the cleaning and inspection of LFG flow meters met Protocol requirements. Project flow meters are also calibrated on an annual basis by the manufacturer of each meter. The gas analyzer is cleaned, inspected, and field calibrated (using calibration gas) on a weekly basis. The dates of the flow meter cleaning and inspections, annual flow meter calibrations, and gas analyzer cleaning, inspection, and field calibrations are listed in Table 3.

During the flare flow meter annual manufacturer calibration, it was determined that the meter was over-reporting flow rates in certain flow ranges. This error was corrected following calibration of the instrument.

During the reporting period, the Protocol-required quarterly calibrations/field checks were not conducted. As a result, a variance request, as discussed in section 3.7, was submitted to CAR and granted subject to certain requirements.

RCE confirmed that the manufacturer's guidance for maintenance of the flow meters and Siemens Ultramat 23 gas analyzer were met during the reporting period.

Table 3 Flow Meter and Gas Analyzer Cleaning and Inspection

Monitoring Equipment	Dates of Cleaning and Inspection
Engine Flow Meter	4/25/12, 6/6/12, 8/29/12, 9/24/12, 11/5/12, 11/8/12, 12/3/12, 2/19/13, 4/8/13
Flare Flow Meter	4/25/12, 6/6/12, 8/29/12, 9/24/12, 11/5/12, 11/14/12, 12/3/12, 2/19/13, 4/8/13
Flow Meter Manufacturer Calibrations	
Engine Flow Meter	9/24/12
Flare Flow Meter	7/16/12
Gas Analyzer Inspection, Cleaning, and Field Calibrations	
Gas Analyzer	<u>2012</u> April 4, 11, 18; May 2, 9, 16, 23; June 6, 13, 20, 28; July 3, 12, 18; August 1, 9, 15, 23, 28; September 5, 11, 19, 27; October 3, 10, 17, 24, 31; November 8, 14, 21, 29; December 5, 13, 20
	<u>2013</u> January 7, 17, 25; February 6, 13, 25; March 6, 14, 20, 27

3.7 CAR Variance Assessment

As previously stated, the Protocol-required quarterly calibrations (or field checks in lieu of calibration) were not conducted during the reporting period. A variance was submitted to CAR and subsequently approved subject to the following conditions (as stated in CAR's variance approval document dated 12/5/2013):

- The flow meters are cleaned and inspected at least once per quarter in which there is no evidence of major contamination or malfunction, as confirmed by the verifier.
- The verifier confirms the flow data from the Thermal Instruments meter is adjusted downwards by 7.4% for the period from 4/1/2012 to 7/16/2012.
- The verifier reviews the calibration certificates and confirms that there are no instances in which either flow meter exceeded the +/-5% accuracy threshold, except in the instance noted above.

RCE confirms that all requirements of the variance approval were met.

3.8 Assessment of GHG Emission Reduction Calculations

The emission reduction calculation assessment included a review of Project assumptions, raw data inputs, and accuracy of calculations. RCE first assessed the completeness of the raw data and how the data are transferred to the calculation spreadsheet. Next, RCE reviewed the formulas and raw data inputs for accuracy and compliance with Protocol requirements. Lastly, RCE recalculated the GHG

emission reductions and compared the results to Timberline Energy's Project calculations and determined that the GHG emission reduction calculations were materially correct.

During the desktop review, RCE compared the raw data to the LFG flow volumes, gas analysis, and kWh production data in the Timberline Energy emission reduction spreadsheet. The fossil fuel use and electricity data were also compared to the information in Timberline Energy's GHG emissions calculations. RCE's review consisted of data transcription tests, data completeness, spreadsheet functionality and accuracy. No errors were found during the review.

Within the emission reduction spreadsheet, data was eliminated when the flare temperature was below a threshold temperature of 500°F. A 93.6% was assigned to the engine and a 96% destruction efficiency was assigned to the open flare. Because the landfill is only partially covered with a synthetic liner, a 10% discount was applied to the baseline scenario for bacterial oxidation of methane under the cap. In accordance with the requirements of CAR's variance approval for the Project, landfill gas flow to the flare was discounted by 7.4% from 4/1/2012 through 7/16/2012 to compensate for the percent error found during the manufacturer calibration of the flare flow meter.

The net amount of methane destroyed by the Project was calculated, summed for the reporting period and converted into CO₂ equivalents (CO₂e). Project emissions consisted of indirect emissions of CO₂ from electricity consumption and direct emissions of CO₂ from the combustion of propane, gasoline and diesel. The Project emissions were calculated from the product of activity data multiplied by an appropriate emission factor. The total Project GHG reductions in CO₂e were calculated by subtracting the Project emissions from the net amount of methane destroyed by the Project in CO₂e.

RCE reviewed the Project GHG emission and GHG reduction calculations for compliance to the Protocol's calculation methodologies. Data was sampled to recalculate the CH₄ destroyed by the Project. RCE found no material misstatements in the final Project GHG reduction calculations and results.

4.0 Verification Results

Timberline Energy provided sufficient evidence and documentation of its emission estimates, data collection procedures, and monitoring and quality control procedures. The verification process focused on verifying the emission reduction calculations and the source data used to quantify the emission reductions in accordance with the CAR Landfill Project Protocol 2.0. The following is a summary of the verification results.

The Project reported emission reductions of **31,936** metric tons of CO₂e from April 1, 2012 to December 31, 2012 and **12,550** metric tons of CO₂e from January 1, 2013 through March 31, 2013 as per the information provided in Timberline Energy's calculation spreadsheets. During final review, RCE identified no material misstatements in the data or emission reductions calculations. Table 4 defines the emission reductions verified for this reporting period.

During the verification process, RCE made requests for clarifications, corrective actions, and supplemental documentation to complete the verification. Timberline Energy sufficiently addressed all requests. The details of these requests are documented in RCE's List of Findings provided to CAR and Timberline Energy.

5.0 Verification Statement

RCE conducted a risk-based analysis of Timberline Energy's GHG emission reductions including a strategic review of the Project data and evidence. Based upon the processes and procedures and the

evidence collected, RCE concludes that the Project emission reductions resulting from the capture and destruction of LFG during the reporting period April 1, 2012 through March 31, 2013 can be considered:

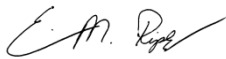
- in conformance with the CAR Landfill Project Protocol 2.0,
- without material discrepancy, and
- verified to a reasonable level of assurance

The verified emission reduction CRTs are listed in **Table 4**.

Table 4 Emission Reductions Verified for April 1, 2012 through March 31, 2013

Emissions Verified	Baseline Emissions CO₂e (metric tons)	Project Emissions CO₂e (metric tons)	Emission Reductions CO₂e (metric tons)
2012 Emission Reductions	31,940	4	31,936
2013 Emission Reductions	12,550	0	12,550
Total	44,490	4	44,486

Lead Verifier Signature



Eric Ripley

Senior Internal Reviewer Signature



Phillip Cunningham