



Verification Report

CAR422 Hernando County Landfill Electric Generation

Reporting Period: January 1, 2018 – October 7, 2018

Prepared for:

Timberline Energy, LLC

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1.0 Introduction

Timberline Energy, LLC (Timberline) contracted Ruby Canyon Engineering, Inc. (RCE) to perform the verification of the CAR422 Hernando County Landfill Electric Generation Project (Project) for the reporting period January 1, 2018 through October 7, 2018 to the Climate Action Reserve (Reserve) Landfill Project Reporting 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 2014, the landfill had approximately 1.9 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 a bioreactor.

1.2 Responsible Parties

Project Developer: Timberline Energy, LLC

Landfill Owner: Hernando County, FL

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: Phillip Cunningham

Senior Internal Reviewer: Zach Eyster

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 the Reserve's 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 consists of the following independent and objective activities:

- Review the reporting period's Project Monitoring Plan;
- Review the Project data acquisition and quality control procedures;
- Review the Project's baseline emissions and confirm the baseline and Project boundaries;
- Review the Project's evidence of environmental and regulatory requirements to ensure that the Project is additional;
- Review the Project's emission reduction calculations;
- Review the Project documents and data against the criteria listed in Table 1;
- Issue requests for additional documentation, clarifications, and corrective actions as necessary; and
- Issue a verification report, list of findings, and verification statement to Timberline and the Reserve.

1.6 Verification Criteria

Table 1 – Summary of Verification Criteria

Criteria	Details
Standard of Verification	• The Reserve Landfill Project Reporting Protocol Version 2.0 (November 18, 2008) • Errata and Clarifications to Landfill Project Reporting Protocol Version 2.0 (June 18, 2015) • The Reserve Landfill Project Verification Protocol Version 2.0 (November 18, 2008) • The Reserve Program Manual (September 1, 2015) • The Reserve Verification Program Manual (February 8, 2017) • Policy Memorandum: Use of Global Warming Potentials for all Project Protocols (May 1, 2018)
Verification Process	ISO 14064-3 Specification with guidance for the validation and verification of greenhouse gas assertions
Level of Assurance	Reasonable assurance
Materiality	97% accuracy level (less than 3% error) because total annual emission reductions are greater than 25,000 tCO ₂ e and less than 100,000 tCO ₂ e.

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 Notification of Verification Activities/Conflict of Interest (NOVA/COI) form to identify any potential conflict of interest with the Project or Project developer. RCE submitted the NOVA/COI form to the Reserve and the COI assessment revealed no conflicts of interest and was approved on September 19, 2018.
- RCE held a verification kickoff meeting with Timberline on November 2, 2018. During the kickoff meeting RCE reviewed the verification objectives and process, reviewed the verification schedule, and requested the verification background documents.
- 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 calculations.
- 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 for the previous reporting period on February 8, 2018 and the Reserve confirmed that a desk review with no site visit was acceptable for the final reporting period of the Project. During the previous 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, and record retention practices.

- RCE submitted requests for one corrective action to Timberline during the verification.
- RCE's Senior Internal Reviewer conducted a review of the verification sampling, verification report, and verification statement.
- RCE issued a final verification report, verification statement, and list of findings.
- RCE held an exit meeting with Timberline.

3.0 Verification Findings

3.1 Assessment of the GHG Reduction Project Operations

The Project currently collects landfill gas (LFG) via 27 collection wells and is conveyed to a header pipe where it passes through a condensate knockout. LFG is compressed and cooled through a blower station and ultimately conveyed to the Caterpillar engine or the open flare. The open flare 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 the carbon dioxide resulting from the consumption of electricity from the grid related to Project activities, propane used for the pilot light of the flare and a small amount of diesel for mobile vehicles. The calculation of baseline emissions takes into account the total methane destroyed based on the destruction efficiency of the Project destruction devices and the oxidation of methane by soil bacteria. The open flare was not used during this reporting period. Table 2 lists the sources of GHG emissions reviewed during the verification of the Project.

Table 2. 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 sent to the engine • CO₂ from the combustion of fossil fuels used during operation and maintenance of the Project activity. • CO₂ resulting from the consumption of imported electricity.

3.3 Project Eligibility Criteria

The Protocol specifies four eligibility rules that a project must meet in order to register emission reductions with the Reserve: Location, Project Start Date, Additionality, and Regulatory Compliance. Below is a summary of the Reserve 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 LFG, the project is considered additional". RCE reviewed a signed attestation stating that no GCCS was ever present at the landfill prior to implementation of the Project activity.

Legal Requirement Test

During the site visit, RCE interviewed Timberline about the procedures to ensure that the Project meets environmental compliance requirements and the Legal Requirement Test. Timberline 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 mega grams (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 August 7, 2014 in order to determine whether the landfill is required to destroy LFG. The total NMOC generation rate for 2018 was 32.1 Mg/year, which is below the 34 Mg/year threshold above which a gas collection and control system (GCCS) would be required. RCE 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 Legal Requirement Test. Timberline 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. The Attestation of Voluntary Implementation form was also signed after the end of the reporting period and uploaded to the Reserve which states that the project was implemented and established voluntarily.

During the review of the supporting evidence, RCE did not observe any indication that the Hernando County Landfill was mandated to destroy LFG. Additionally, there are no local, state or federal requirements for the installation of a GCCS at the Hernando County Landfill.

- **Eligibility Rule 4: Regulatory Compliance**

RCE reviewed the procedures described in Timberline's monitoring plan to ensure that the Project remains in compliance with all applicable local, state, and federal requirements. RCE searched the Environmental Protection Agency's Enforcement & Compliance History Online (ECHO) database, the Florida Department of Environmental Protection (FDEP) database and contacted FDEP officials to confirm compliance at the Hernando County Landfill during the reporting period.

During RCE's review there was no violations found within the timeframe of the reporting period. RCE confirmed that procedures for ensuring regulatory compliance in the Monitoring Plan 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 Timberline has sole ownership of the GHG emission reductions. RCE reviewed contractual documentation between Timberline and the Hernando County Landfill which states that Timberline has the rights to all emission reduction credits associated with the Project. RCE also reviewed the purchase power agreement between Timberline and the purchaser of electricity generated by the engine. RCE confirmed that there is language in the agreement that specifies Timberline is the sole owner of emission reductions created from the destruction of GHGs. Finally, RCE confirmed signature of the Attestation of Title which was uploaded to the Reserve after the end of the reporting period.

3.5 GHG Monitoring and Management Systems

RCE reviewed the data management systems during the previous reporting period's 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. RCE also confirmed that the Project was implemented according to the Monitoring Plan.

The primary data gathered for the Project includes LFG flow to the engine and flare when operating, methane content of the LFG, and electricity production. However, Timberline is not claiming LFG flow to the flare during the reporting period. Timberline used two Kurz flow meters interchangeably to continuously measure LFG flow to the engine. Both flow meters are set to standard conditions of 60 °F and 1 atmosphere. Timberline uses a Siemens Ultramat 23 gas analyzer to measure methane concentration on a continuous basis.

The data collection and handling system records flow and methane concentration every minute. The site operator also checks the GCCS on a daily basis in order to confirm that there are no issues with the system. Timberline downloads project data to a company server and reviews this data on a weekly basis.

Timberline confirms the hourly operation of the engine through kilowatt production data and hourly operation of the flare when the thermocouple temperature is above 500 degrees F° (no emission reductions from the flare are being claimed for the reporting period). In addition, the piping that feeds LFG to the engine includes valves that automatically close if the engine is not operating. No LFG can pass through the engine without being combusted because of engineering safety design.

During the previous site visit RCE reviewed the data storage and retention policies 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 LFG flow meters and methane analyzer met instrument QA/QC requirements as outlined in the Protocol for cleaning, inspection, and field accuracy checks. The project operator cleaned, inspected, and performed field accuracy checks for the two Kurz flow meters on 1/26/18, 5/16/18, 9/10/18 and 11/13/18. The project operator used a Fluke 922 to check the flow meter accuracy quarterly, and calculated drift did not indicate that the flow meters were recording outside +/-

5%. The Kurz flow meters were factory calibrated on 7/20/17 and 11/7/17. The project operator cleaned, inspected, and field calibrated (with calibration gas) the continuous methane analyzer on a weekly basis. None of the field checks indicated that the methane analyzer ever drifted outside +/- 5%. The Project developer did not claim any flow from the flare flow meter because there were no accuracy checks or calibrations during the time periods when LFG was sent to the flare.

Kurz calibration policy states that, “after sale meter calibration is not required provided the meter has been operated within its design specification and the sensors are clean, free from corrosion, erosion, or other physical damages.” The project operator inspects and cleans the Kurz flow meter probe quarterly. Siemens recommends using calibration gas annually and this activity is performed weekly. Fluke Corporation calibrated the Fluke 922 on 2/5/2018. RCE confirmed that the project equipment met the manufacturer’s guidance for maintenance during the reporting period.

3.7 Assessment of GHG Emissions Reductions 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.

Within the emission reduction spreadsheet, Timberline eliminated erroneous data and flows without corresponding hourly kW production or thermocouple temperature readings below 500 °F. Timberline assigned a 93.6% destruction efficiency to the engine. Because the landfill is only partially covered with a synthetic liner, Timberline applied a 10% discount to the baseline scenario for bacterial oxidation of methane. Timberline did not claim emission reductions from the flare.

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 gasoline and diesel which is used in mobile equipment dedicated to the project. 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 assertion spreadsheet and corresponding GHG calculations for compliance to the Protocol’s calculation methodologies. RCE also reviewed raw data from four random months throughout the reporting period to compare against summary data in the assertion spreadsheet and found no material misstatements in the final Project GHG reduction calculations and results.

4.0 Verification Results

Timberline provided sufficient documentation of its emission reduction calculations, data collection procedures, and monitoring and quality control procedures. The verification process focused on verifying

the emission reductions claimed and the source data used by Timberline to quantify the emission reductions in accordance with the Reserve Landfill Project Reporting Protocol Version 2.0. The following is a summary of the verification results.

The Project reported emission reductions of **41,708** metric tons CO₂e for the current reporting period. During the final review, RCE identified no material misstatements in the data or emission reduction calculations. The emission reductions verified are listed in Table 3. During the verification process, RCE made a request for one corrective action to complete the verification. Timberline sufficiently addressed the request. The details of this request are documented in RCE's List of Findings provided to the Reserve and Timberline.

5.0 Verification Statement

RCE conducted a risk-based analysis of the CAR422 Hernando County Landfill Electric Generation project GHG assertion including a strategic review of the Project data and evidence. Based upon the processes and procedures and the evidence collected, RCE concludes that the GHG assertion is a fair representation of the Project emission reductions resulting from the capture and utilization of LFG during the reporting period January 1, 2018 through October 7, 2018 and can be considered:

- In conformance with the Reserve Landfill Project Reporting Protocol Version 2.0,
- Without material discrepancy, and
- Verified to a reasonable level of assurance.

The verified emission reductions are listed in Table 3.

Table 3 - Emission Reductions Verified for January 1, 2018 through October 7, 2018

Year	Baseline Emissions CO ₂ e (tonnes)	Project Emissions CO ₂ e (tonnes)	Emission Reductions CO ₂ e (tonnes)
2018	41,710	2	41,708

Lead Verifier Signature



Phillip Cunningham

Senior Internal Reviewer Signature



Zach Eyler