



Verification Report

CAR495 Greenville County Landfill Gas Utilization Project

Reporting Periods: September 1, 2019 – August 31, 2020

September 1, 2020 – December 31, 2020

Prepared for:

Element Markets, LLC

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1.0 Introduction

Ruby Canyon Environmental, Inc. (RCE) was contracted to perform the verification of the Greenville County Landfill Gas Utilization Project (Project) for the reporting periods September 1, 2019 – August 31, 2020 and September 1, 2020 – December 31, 2020 to the Climate Action Reserve (Reserve) Landfill Project Protocol 5.0 (Protocol). The Project is located in the town of Greer, SC at the Enoree Landfill (Landfill).

1.1 Project Background & Site Description

The Landfill was opened in 1991 and was closed in 2007. Phase I of the landfill accepted waste from 1991 until 1993. Phase II of the landfill accepted waste from 1996 until 2007. Greenville Gas Producers (GGP) owns and operates the gas collection and control system. The Landfill has 2,595,808 Mg (2,855,389 Tons) of waste in place as of closure. The Project consists of the collection of landfill gas (LFG) from the landfill and its subsequent destruction by combustion in one-1.6 MW CAT Generators with an open flare as backup at the site.

1.2 Responsible Party

Project Developer: Element Markets Emissions, LLC (EM)

Landfill Owner: Greenville County

Gas Collection and Control System Owner: Greenville Gas Producers, LLC (GGP)

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: Jessica Stavole

Team Member: Garrett Heidrick

Senior Internal Reviewer: David LaGreca

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 consisted of the following independent and objective activities:

- Review the reporting period's Project Monitoring Plan;
- Conduct a virtual site visit to the Project location;
- 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, verification statement, and list of findings to EM and the Reserve.

1.6 Verification Criteria

Table 1 – Summary of Verification Criteria

Criteria	Details
Standard of Verification	• CAR Landfill Project Protocol, Version 5.0 (April 24, 2019) • CAR Offset Program Manual (October 23, 2020) • The Reserve Verification Program Manual (February 3, 2021)
Verification Process	The Reserve Verification Program Manual and ISO 14064-3:2006 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 between 25,000 and 100,000 tCO ₂ e.

2.0 Verification Activities Summary

The Verification process consisted of the following activities as outlined in the verification plan:

- RCE completed a NOVA/COI form to identify any potential conflict of interest with the Project, GGP, or technical consultants. The NOVA/COI form was submitted to the Reserve and the COI assessment revealed no conflicts of interest and was approved by the Reserve on March 5, 2021.
- RCE held a verification kick-off meeting with EM on April 8, 2021. During the kick-off 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.
- 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 virtual site visit on May 24, 2021. 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. The desktop review included 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 additional documentation and clarifications to EM throughout the verification.
- RCE's senior internal reviewer conducted a review of the verification sampling, report, and statement.
- RCE issued a final verification report, verification statement, and list of findings.
- RCE held an exit meeting with GGP.

3.0 Verification Findings

3.1 Assessment of the GHG Emission Reductions Project Operations

The Project currently collects landfill gas from the Landfill and destroys it via combustion in one-CAT 1.6 MW capacity electricity generating engine and an open flare for engine startups. The LFG is pulled from 68 wells at the landfill and passes through a clean-out that removes condensate which is transferred to the landfill's condensate collection system. RCE confirmed that the open flare can combust all landfill gas produced in the case of engine outage.

RCE confirmed that the landfill is not a bioreactor and does not re-circulate leachate nor add any liquid other than leachate in a controlled fashion to accelerate or enhance the anaerobic biodegradation of the waste.

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 and consumption of propane related to Project activities. Baseline emissions are the total methane vented to the atmosphere less 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 sent to the flare. - 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 US-based landfill located in the town of Greer, SC. The Project therefore meets this eligibility requirement. RCE confirmed this information with a site visit.

- Eligibility Rule 2: Project Start Date**

The Landfill Project Protocol states a project start date is the date when methane was first continuously destroyed in a qualifying destruction device at the site. RCE reviewed the GGP destruction delivery and initial combustion notice as well as Project Submittal form to confirm that the Project first began continuous methane destruction on August 1, 2007. The Project submittal form was completed and submitted to the Reserve on September 1, 2009.

Eligibility Rule 3: Additionality

Performance Standard Test

Prior to the Project activity, the Landfill was collecting and venting gas, but was not destroying gas. RCE confirmed this through time-stamped satellite imagery prior to the project start date. RCE also observed no evidence of a previous landfill gas collection system while on site.

Thus, the Project passes the Performance Standard Test number 2 since it involves:

“Installation of a new qualifying destruction device at an eligible landfill where landfill gas is currently collected and vented, but has never been destroyed in any manner prior to the project start date.”

Legal Requirement Test

During the site visit, RCE interviewed GGP about the procedures to ensure that the Project meets environmental compliance requirements and the Legal Requirement Test. GGP 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 Landfill to collect and destroy LFG.

The 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. The Landfill has not been permitted for an expansion from the original design capacity, nor has any construction been undertaken towards an expansion since July 17, 2014, therefore the Landfill is not subject to the NSPS XXX Regulations.

RCE examined the NMOC modeling results for the landfill and found that the calculated NMOC emission rate for 2018 of 7.83 Mg/year is below the 50 Mg/year threshold for a required gas collection and combustion system. A more recent NMOC test was not provided to RCE, however, the Landfill is a closed site, which means that the NMOC emission rates for 2020 will be less than the rates for 2018.

RCE also reviewed the Project’s Monitoring Plan which defines how the Project continues to exceed the Legal Requirement Test. Landfill 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 registry 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 Landfill was mandated to destroy LFG. Additionally, there are no local, state, or federal requirements for the installation of a GCCS at the Landfill. Therefore, the results of the review indicated that GGP is following its Monitoring Plan procedures to assure that it passes the Legal Requirement Test.

- **Eligibility Rule 4: Regulatory Compliance**

RCE reviewed the procedures described in GGP’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 and confirmed with the Solid Waste Compliance division of the South Carolina Department of Health & Environmental Control that there were no notices of violation or unresolved compliance issues. RCE reviewed environmental and operating permits including Landfill’s operating permit and the Municipal Solid Waste permit. During

RCE's review there was no evidence of noncompliance found, and the 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 Generated Emission Reductions

RCE reviewed the completed Attestation of Title which states that Greenville Gas Producers LLC owns the emission reduction credits generated by the Project. RCE also reviewed the Verified Emissions Reductions Development Agreement between the Landfill and GGP and the amendments to confirm ownership.

3.5 Virtual Site Visit

Typically, an in-person site visit is required under the Reserve Landfill Project Protocol Version 5.0. However, due to the current COVID-19 pandemic, it was decided that completing an in-person site visit for CAR is impractical. The remote site visit with Greenville consisted of a combination of reviewing the Project site and data systems in place. Greenville agreed that they would be able to use a screen-sharing service for the review of their data and systems. As Element Markets takes care of the data and calculation portion of the Project, it was agreed upon that these interviews would be held as conference calls mainly to confirm Greenville's internal QA/QC processes and data accuracy. Greenville has confirmed that no changes to the Project site have taken place since the previous site visit. Conducting a virtual verification did not impact the integrity of the verification, nor did it prevent RCE from reaching a reasonable level of assurance.

RCE also assessed the impacts Information and Communication Technology (ICT) may have on the validity and objectivity of the information gathered during remote verification. Per International Accreditation Forum Mandatory Document 4:2018 Section 4.2.4, "When using ICT, auditors/assessors and other involved persons (e.g. drone pilots, technical experts) shall have the competency and ability to understand and utilize the information and communication technologies employed to achieve the desired results of audit(s)/assessment(s). The auditor/assessor shall also be aware of the risks and opportunities of the information and communication technologies used and the impacts that they may have on the validity and objectivity of the information gathered." Greenville confirmed that they were familiar with Microsoft Teams, the client-chosen platform for the virtual site visit, and that the platform did not impact the integrity of RCE's review. The RCE team was provided with a tour of the Project Site and was able to confirm all necessary components. As the remote verification took place in real time, Microsoft Teams had no impact on the validity or objectivity of data gathered and presented.

3.6 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. RCE also confirmed that the Project was implemented according to the Monitoring Plan.

The primary project data include the LFG flow to the one engine and methane content of the LFG. The LFG flow is continuously measured by three flow meters: one Yokogawa U1K803220 flow meter for the engine; one Yokogawa U1K502457 flow meter for the flare; and one Yokogawa U1SC01304 for total LFG flow. During the virtual site visit, RCE observed that the positions of the flow meters to allow for laminar flow of landfill

gas. The flow meter internally corrects for temperature and pressure at 60°F and 1 atm. All monitored data is recorded continuously by a SCADA PLC system as well as a chart recorder. The methane content of the landfill gas was measured continuously with a Siemens Ultramat 23 gas analyzer, with daily comparison readings taken by landfill staff with a GEM2000 methane analyzer (GEM). All project emissions reductions exclusively incorporate readings made by the Siemens analyzer.

During the virtual site visit, RCE reviewed the data storage and retention policies of GGP and the LF 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.

3.7 Instrument QA/QC

RCE reviewed evidence that the flow meters and methane analyzers met instrument QA/QC requirements as outlined in the Protocol for cleaning, inspection, and calibration. The Project Monitoring Plan describes the procedures for instrument field checks and calibrations. These procedures in the Monitoring Plan are in compliance with the Protocol requirements. Siemens recommends checking the calibration one time per year with calibration gas. It was calibrated by third-party calibration service, PASS II, on 6/4/2020 and 12/22/2020 and found within a +/- 2% accuracy. Inspections with the calibrated GEM unit had an as found % drift of less than 5% at all field checks.

Landfill staff performed quarterly cleanings and inspections of the flow meters on 8/21/2019, 12/23/2019, 3/12/2020, 6/3/2020, and 8/18/2020, which was documented in inspection forms reviewed by RCE. These forms properly document the “as found” and “as left” condition of the equipment.

RCE reviewed the PASS II flow meter and methane analyzer inspection and calibration forms dated 6/4/2020 and 12/22/2020. The Protocol requires that flow meters and analyzers are checked for calibration accuracy at the end of but not greater than 2 months prior to or after – the end date of the reporting period. The first reporting period ended on 8/31/2020, which is greater than two months from 6/4/2020. The Project applied for and received a variance from the Reserve to accept the missing accuracy check (see section 4.1). The second reporting period ended on 12/31/2020, which is within two months of 12/22/2020.

3.8 Assessment of GHG Emission Reductions Calculations

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

The Project data consisted of raw data in the form of spreadsheets of engine flow, methane analyzer measurements, and the calculation workbooks. RCE compared raw data in the spreadsheets to the respective daily sums, and then compared those data and the methane readings to the calculation workbooks. RCE confirmed operational activity of the engine using kW production readings supplied in the raw data. RCE confirmed that a 0 percent discount was applied for continuous methane readings. RCE confirmed that a 93.6 percent destruction efficiency was assigned to the Project’s engine.

RCE reviewed source documentation for Project emissions from purchased electricity and gasoline, confirmed that appropriate emission and conversion factors were used, and reviewed the use of Protocol equations for Project emissions in GGP’s calculation workbook.

RCE recalculated the GHG emission reductions and compared the results to GGP’s calculations to determine if the GHG emission reductions were materially correct. RCE’s calculations involved recalculation of the daily total of LFG flow to the engine, calculation of monthly methane destroyed, and recalculation of the project

and baseline emissions. RCE found no material misstatements in the final Project GHG reductions calculations. Emissions reductions increased approximately 10% from the previous reporting period.

4.0 Verification Results

GGP provided sufficient evidence and documentation of its emission reductions, 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 Reserve Landfill Project Protocol 5.0. The following is a summary of the verification results.

The Project reported emission reductions of 52,099 metric tons of CO₂e from September 1, 2019 to August 31, 2020 and 15,296 metric tons of CO₂e from September 1, 2020 to December 31, 2020. During final review, RCE identified one variance and no material misstatements in the data or emission reductions calculations. Table 3 defines the emission reductions verified for the reporting period. During the verification process, RCE made requests for additional documentation and clarifications to complete the verification. GGP sufficiently addressed all requests. The details of these requests are documented in RCE's List of Findings provided to the Reserve and GGP.

4.1 Variance Determination

The Project submitted a variance to the Reserve for missing the protocol requirement that all flow meters and analyzers must be field checked for calibration accuracy at the end of – but no more than two months prior to or after – the end date of the reporting period. The Reserved granted the variance pursuant to the following conditions:

1. The verifier must review the calibration certificates from June 2020 and December 2020 and confirm the flow meter and methane analyzer were within the 5% accuracy threshold.
2. The verifier confirms that the Monitoring Plan specifies an appropriate flow meter and methane analyzer field check schedule to ensure that future reporting periods will meet protocol monitoring requirements.
3. The verifier confirms all other QA/QC requirements were met.

RCE confirmed that all conditions of the variance acceptance were met.

5.0 Conclusion

RCE conducted a risk-based analysis of the Project'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 September 1, 2019 – December 31, 2020 can be considered:

- In conformance with the Reserve Landfill Project Protocol 5.0,
- Without material discrepancy, and
- Verified to a reasonable level of assurance

Table 3 - Emission Reductions Verified for September 1, 2019 – December 31, 2020

Year	Baseline Emissions CO ₂ e (tonnes)	Project Emissions CO ₂ e (tonnes)	Emission Reductions CO ₂ e (tonnes)
2019	19,063	75	18,988
2020	48,559	152	48,407
Total	67,622	227	67,395

Note: Due to rounding, individual values might not equal totals and values are not representative of raw data used in the emission reductions calculation.

Lead Verifier Signature



Jessica Stavole

Senior Internal Reviewer Signature



David LaGreca