RUBY CANYON ENGINEERING

Verification Report

CAR838 IESI-Trinity Timber Ridge Landfill Carbon Project

Reporting Period: October 11, 2017 – October 10, 2018

Prepared for:

Trinity Carbon Management, LLC

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1.0 Introduction

Ruby Canyon Engineering, Inc. (RCE) was contracted to perform the verification of the IESI-Trinity Timber Ridge Landfill Carbon Project (Project) for the reporting period October 11, 2017 through October 10, 2018 to the Climate Action Reserve (Reserve) Landfill Project Protocol 3.0 (Protocol). The Project is located in Richwoods, Missouri at the Timber Ridge Landfill (Landfill).

1.1 Project Background & Site Description

The Landfill opened in 2003 and is expected to close in 2100. The landfill was originally owned by the IESI MO Landfill Corporation which transferred legal ownership to the Timber Ridge Landfill Company on 6/19/18. The Landfill has a design capacity of 10,886,160 MG. The Project consists of the collection of landfill gas (LFG) from the landfill and its subsequent destruction by combustion in an open flare at the site.

1.2 Responsible Party

Project Developer: Formerly: IESI – Trinity Timber Ridge Landfill; Currently: Timber Ridge Landfill Company
Landfill Owner: Formerly: IESI – Trinity Timber Ridge Landfill; Currently: Timber Ridge Landfill Company
Consultant: Trinity Carbon Management, 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: David LaGreca
Senior Internal Reviewer: Zach Eyler

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 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 TCM and the Reserve.

1.6 Verification Criteria

Table 1 – Summary of Verification Criteria

Criteria	Details
Standard of Verification	• The Reserve Landfill Project Protocol Version 3.0 (December 2, 2009) • Errata and Clarifications to Landfill Project Protocol Version 3.0 (June 18, 2015) • The Reserve Program Manual (September 1, 2015) • The Reserve Verification Program Manual (February 8, 2017)
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_2e.

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, TCM, 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 May 17, 2019.
- RCE held a verification kick-off meeting with TCM on May 24, 2019. 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 site visit on June 27, 2019. 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 TCM 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 TCM.

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 through an open flare mounted on a flare skid adjacent to the landfill. The LFG is pulled from 31 vertical 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 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	• CH_4 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	• CH_4 from the incomplete combustion of LFG sent to the flare. • CO_2 from the combustion of fossil fuels used during operation and maintenance of the Project activity. • CO_2 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 Richwoods, MO. 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 Parnel Biogas Inc. Destruction delivery and initial combustion notice as well as Project Submittal form to confirm that the Project first began continuous methane destruction on March 2, 2011. The Project submittal form was completed and submitted to the Reserve on May 16, 2011.

- **Eligibility Rule 3**: Additionality

  Performance Standard Test

  Prior to the Project activity, the Landfill neither collected nor destroyed any LFG. RCE confirmed this through review of the State of Missouri DNR Operating permit. In addition to satellite imagery, RCE observed no evidence of a previous landfill gas collection system while on site.

  Thus, the Project passes the Performance Standard Test number 1 since it involves:

  "Installation of a landfill gas collection system and a new qualifying destruction device at an eligible landfill where landfill gas has never been collected and destroyed prior to the project start date."

  Legal Requirement Test

  During the site visit, RCE interviewed TCM about the procedures to ensure that the Project meets environmental compliance requirements and the Legal Requirement Test. TCM 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 rates for 2017 and 2018, of 42.19 and 44.65 Mg/year respectively, are below the 50 Mg/year threshold for a required gas collection and combustion system. The NMOC Tier II test was completed in March 2017. RCE therefore concluded that the Landfill is not required to destroy LFG until 2021 when it surpasses the threshold set by EPA.

  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 TCM 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 TCM'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 Missouri Department of Natural Resources that there were no notices of violation or unresolved compliance issues. RCE reviewed Missouri Department of Natural Resources quarterly inspections for 2017 and 2018 along with 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 Timber Ridge Landfill Company owns the emission reduction credits generated by the Project. RCE also reviewed the Verified Emissions Reductions Development Agreement between the Landfill and TCM and the amendments to confirm ownership.

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

The primary project data include the LFG flow to the open flare, thermocouple temperature of the flare, and methane content of the LFG. The LFG flow is continuously measured by one Thermal Instrument 62-9/9500 flow meter installed in the horizontal section of pipe leading from the blowers. During the site visit, RCE observed the position of the flow meter is correct to allow for laminar flow of landfill gas. The flow meter internally correct for temperature and pressure at 60°F and 1 atm. The flare temperature is continuously measured by a thermocouple installed in the flare housing. All continuously monitored data is recorded continuously by a Honeywell data recorder and a SCADA PLC System. The methane content of the landfill gas was measured weekly with a LANDTEC GEM5000 methane analyzer (GEM) until June 2018 from which point an Elkins ENV100 model was used for the remainder of the reporting period.

During the site visit RCE reviewed the data storage and retention policies of TCM 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.

3.6 Instrument QA/QC

RCE reviewed evidence that the flow meters and portable 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. LANDTEC recommends the GEM5000 analyzers to be calibrated annually. The landfill owned GEM5000 (G501576) was calibrated by LANDTEC on 9/18/17, which was the last calibration prior to its last use in June 2018. Elkins Earthworks recommends the ENV100 units used during the reporting period to be factory calibrated annually. The Elkins ENV100 units (SN 1410201 and 1212005) were factory calibrated on 10/27/17 and 9/5/18 respectively, falling within the recommended time frame. All GEMs and Elkins units had as found % drift <5% at all factory and field checks.

Landfill staff performed quarterly cleanings and inspections of the flow meters on 10/4/17, 2/22/18, 6/1/18, 9/18/18, and 10/25/18 which was documented in inspection forms reviewed by RCE. These forms properly document the "as found" and "as left" condition of the equipment. All calibration accuracy checks performed on the flow meters were within the +/- 5% accuracy level, including the 6/1/18 check. This check indicated that the flow meter was not operable, at which time the Landfill received a factory calibration check by Thermal Instrument Company, Inc. confirming +/- 1% accuracy. Though confirmed as a wiring issue, not as a

flow meter issue, no credits were generated from 5/29/18 through 6/12/18. The last accuracy check on 9/18/2018 falls within the last two months of the reporting period. The flow meter manufacturer, Thermal Instruments, recommends a calibration accuracy check every 12 – 18 months. In addition to being checked for accuracy, the project flow meter was calibrated by Thermal Instrument Company, Inc. on 10/25/18. This factory calibration accuracy check was within 18 months of the previous calibrations on 10/30/16, 10/30/17, and 6/6/18. The Project flow meter is calibrated annually, which is more frequent than manufacturer recommendations.

3.7 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 flare flow, handheld methane analyzer measurements, and the calculation workbooks. RCE compared data in the flare spreadsheets to the respective daily sums, and then compared those data and the weekly methane readings to the calculation workbooks. RCE confirmed that a 10 percent discount was applied for weekly methane readings. RCE confirmed that a 96 percent destruction efficiency was assigned to the Project's open flare. RCE also ensured that operational checks for flare temperature (>500 °F) was correctly applied.

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

RCE confirmed that the single instance of weekly methane substitution properly used the lower measurement taken the week following the missing data.

RCE recalculated the GHG emission reductions and compared the results to TCM'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 flare, 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 decreased approximately 38% from the previous reporting period in part due to a wiring issue between the flow meter and the Honeywell data recorder in the third quarter of 2018 that resulted in a loss of data transmission and consequently reduced emission reductions, and in part due to reduced gas flows from the synthetically-covered portion of the landfill.

4.0 Verification Results

TCM 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 3.0. The following is a summary of the verification results.

The Project reported emission reductions of 13,274 metric tons of CO_2e from October 11, 2017 to December 31, 2017 and 38,376 metric tons of CO_2e from January 1, 2018 through October 10, 2018 as per the information provided in TCM's calculation spreadsheets. During final review, RCE identified no material misstatements in the data or emission reductions calculations. Table 3 defines the emission reductions verified for this reporting period. During the verification process, RCE made requests for additional documentation and clarifications to complete the verification. TCM sufficiently addressed all requests. The details of these requests are documented in RCE's List of Findings provided to the Reserve and TCM.

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 October 11, 2017 through October 10, 2018 can be considered:

- In conformance with the Reserve Landfill Project Protocol 3.0,
- Without material discrepancy, and
- Verified to a reasonable level of assurance

Table 3 - Emission Reductions Verified for October 11, 2017 through October 10, 2018

Year	Baseline Emissions CO_2e (tonnes)	Project Emissions CO_2e (tonnes)	Emission Reductions CO_2e (tonnes)
2017	13,296	22	13,274
2018	38,463	87	38,376
Total	**51,759**	**109**	**51,650**

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

David LaGreca

Senior Internal Reviewer Signature

Zach Eyler