



RUBY CANYON ENVIRONMENTAL

Verification Report

CAR406 Moccasin Mike Landfill Gas Project

Reporting Period: January 1, 2020 – December 31, 2020

Prepared for:

Element Markets, LLC

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Ruby Canyon Environmental, Inc.

743 Horizon Ct. Suite 385

Grand Junction, Colorado 81506

(970) 241-9298

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1.0 Introduction

Element Markets contracted Ruby Canyon Environmental, Inc. (RCE) to perform the verification of the Moccasin Mike Landfill Gas Project (Project) for the reporting period January 1, 2020 through December 31, 2020 to the Climate Action Reserve (Reserve) Landfill Project Protocol Version 4.0 (Protocol). The Project is located in Superior, WI at the Moccasin Mike Landfill (Landfill).

1.1 Project Background & Site Description

The Landfill opened in 1976 and is estimated to close in 2025. It is owned by the City of Superior, WI. The landfill has a permitted waste area of 200 acres. The landfill design capacity is 2.88 million Mg (4.4 million cubic yards). 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: City of Superior (City)

Landfill Owner: City of Superior (City)

Carbon Credit Manager: Element Markets, LLC (EM)

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-Carter

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 followed 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.
- 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 the Element Markets, the City, and the Reserve.

1.6 Verification Criteria

Table 1 – Summary of Verification Criteria

Criteria	Details
Standard of Verification	• The Reserve Landfill Project Protocol Version 4.0 (June 29, 2011) • Errata and Clarifications to Landfill Project Protocol Version 4.0 (June 18, 2015) • The Reserve Verification Program Manual (February 3, 2021) • The Reserve Offset Program Manual (October 23, 2020)
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 25,000 tCO ₂ e < ERs ≤ 100,000 tCO ₂ e annually

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, The County, 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 February 11, 2021.
- RCE held a verification kick-off meeting with Element Markets on March 3, 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 March 30, 2021. RCE reviewed the Project site, data management and monitoring systems, and interviewed key personnel.
- 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 corrective actions, additional documentation, and clarifications to The County throughout the verification.
- RCE's 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 Element Markets.

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 an open flare mounted on a flare skid adjacent to the landfill. The LFG is pulled from 19 vertical and 6 horizontal 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)

The Protocol designates that CO₂ and CH₄ are the only GHGs included from the baseline and the project activities. The project emissions must be deducted from the baseline emissions to calculate GHG emission reductions. These GHG sources include methane generated from biodegradation of the landfill waste vented to the atmosphere, methane consumed by soil bacteria through natural oxidation, incomplete combustion of methane via Project destruction devices, fossil fuel use, and electricity use. The sources of GHG emissions reviewed during the verification of the Project are listed in Table 2.

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

Activity	GHG Sources, Sinks & Reservoirs
Baseline	• CH₄ vented to the atmosphere. • Percent CH₄ 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 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 Superior, WI. The Project therefore meets this eligibility requirement.

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

The Landfill Project Protocol states a project start date is defined by the project developer but must be no more than 45 days after landfill gas is first destroyed in a destruction device, regardless of whether sufficient monitoring data are available to report reductions. RCE confirmed the Project start date of April 28, 2009. RCE reviewed Project start date documents including the original construction permit for the flare, a 2009 compliance inspection report, and a 2009 memo from the

City of Superior indicating the project start date to confirm that the Project first began continuous methane destruction on April 28, 2009. The Project submittal form was completed and submitted to the Reserve in November 2008 and listed on December 11, 2008.

- **Eligibility Rule 3: Additionality**

Performance Standard Test

RCE confirmed that the Project meets the Performance Standard Test, Scenario 2. Prior to the Project activity, the Landfill collected and passively vented LFG, with no combustion occurring. RCE confirmed this through review of the State of Wisconsin Air Pollution Control Construction Permit dated November 18, 2008, and through historical satellite data. While on site, RCE observed no evidence of a previous landfill gas collection system.

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

RCE interviewed the City about the procedures to ensure that the Project meets environmental compliance requirements and the Legal Requirement Test. The City 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, Section 60.752. The landfill is therefore required to conduct Tier II testing, but due to permitting of the landfill prior to the 1977 CAA Amendments, Title V permits are not required. RCE reviewed the Air and Operating Permit for this facility and confirmed compliance with all pertinent WI state DNR air quality requirements.

RCE examined the NMOC modeling results for the landfill. The NMOC emission rate for 2020 was 10.9 Mg/year and well below the 50 Mg/year threshold for a required gas collection and combustion system. The NMOC Tier II test was renewed in August 2019 and is valid through 2023. SEH performed testing in 2019 in accordance with Condition I.B.3 of air operation permit 816041600-P11. RCE therefore concluded that the 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. 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 a GCCS be in place. The Attestation of Voluntary Implementation form was signed after the end of the reporting period and uploaded to the Reserve on April 6, 2021, stating 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 the City is following its Monitoring Plan procedures to assure that it passes the Legal Requirement Test.

- **Eligibility Rule 4: Regulatory Compliance**

The City works with a variety of 3rd party consultants at the landfill that provide regulatory compliance assistance. RCE reviewed the procedures described in EM'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 through examining the Wisconsin Department of Natural Resources (DNR) 2020 inspection reports that there were no compliance issues during the reporting period. Previous direct inquiries with WI DNR redirected RCE to the State compliance database. RCE confirmed that no noncompliance events occurred during the 2020 RP. RCE reviewed several environmental and operating permits including the Solid Waste License and confirmed that all leachate and wastewater is sent to the City of Superior's wastewater treatment plant, thus negating the requirement for a wastewater permit.

During RCE's review there was no evidence of noncompliance found. The Landfill is following procedures from the Monitoring Plan for ensuring regulatory compliance of Project activities. Finally, RCE confirmed signature of the Attestation of Regulatory Compliance, after the end of the reporting period, which was uploaded to the Reserve on April 6, 2021.

3.4 Ownership of Generated Emission Reductions

RCE reviewed the completed Attestation of Title which states that the City owns the emission reduction credits generated by the Project, which was uploaded to the Reserve on April 6, 2021. RCE also reviewed the Carbon Credit Purchase and Sale Agreement between the Landfill and EM, confirming original ownership of emission reductions by the Project Developer, The City of Superior, WI.

3.5 Virtual Site Visit

Typically, an annual, in-person site visit is required under the Reserve Landfill Project Protocol Version 4.0. However, due to the current COVID-19 pandemic, it was decided that completing an in-person site visit for CAR is impractical. The virtual site visit at Moccasin Mike consisted of a combination of reviewing the Project site and data systems in place. The City and Element Markets 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 The City's internal QA/QC processes and data accuracy. The City 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." Both The City and Element Markets 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 lead verifier 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 virtual site visit and desktop review. RCE completed the majority of the GHG management systems review during the virtual 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 assessment of the Project monitoring plan and its conformance to Protocol requirements. RCE confirmed that the Project was implemented according to the Monitoring Plan.

The primary project data include the LFG flow to the flare, thermocouple temperature of the flare, and methane content of the LFG. The LFG flow is continuously measured by a Rosemount 3051 flow meter installed in the horizontal section of pipe leading from the blowers. During the site visit, RCE observed the position of the flow meters is correct to allow for laminar flow of landfill gas. The flow meter underwent repairs in 2016 during which the standard flow temperature was adjusted to 85 degrees F by calibration technicians to prevent subsequent system failures. The flow meter is calibrated at 1 atm, though calculations are adjusted according to the Protocol to account for temperature readings taken at 85 degrees F. The flare temperature is continuously measured by a thermocouple installed in the flare housing. All continuously monitored data is totaled and queried every 8 minutes by a Yokogawa data recorder, averaging the minimum and maximum flow for that period. The methane content of the landfill gas is measured continuously by a Siemens Ultramat 23 methane analyzer and recorded every 8 minutes along with the flow rate and flare temperature.

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

3.7 Instrument QA/QC

RCE reviewed evidence that the LFG flow meter and methane analyzer met instrument QA/QC requirements as outlined in the Protocol for cleaning, inspection, and field calibration checks. The dates for the quarterly cleanings, inspections, and field calibration checks for each piece of monitoring equipment are listed in Table 3. RCE confirmed that Section 4.4.3 and 4.4.4 of the Monitoring Plan have been updated to meet the flow meter and methane analyzer calibration and accuracy checks as required by the version 4.0 of the protocol.

Table 3 – Cleaning, Inspection and Calibration Checks

Monitoring Equipment	Quarterly Maintenance Checks			
Flow Meter	3/13/2020	7/2/2020	9/15/2020	11/19/2020
Gas Analyzer				
Monitoring Equipment	Factory Calibration Checks			
Rosemont Flow Meter 434191	5/21/19			
Ultramat-23 Gas Analyzer X4-442	7/29/15, 6/16/2020			
GEM5000 G505153	1/14/2020			

The landfill gas flow meter at the flare (Rosemount 3051 Serial # 434191) was inspected and calibrated by third-party contractor, Aspect Electrical Engineering & Services, LLC, during which all drifts were found to be within the Protocol stipulated +/- 5% threshold. All continuous project methane readings were taken by an

UltraMat23 IR Gas analyzer, model # 7MB2337-3D10-5CR1, Serial # X4-442. The same third party carried out calibration of the methane analyzer during quarterly inspections and all drifts were found to be within the Protocol stipulated +/- 5% threshold. Weekly methane readings were taken with a GEM500 (S/N G505153), where necessary. The device was calibrated on 1/14/2020 by Landtec and “as left” results were documented. No readings were taken prior to the calibration date during the reporting period.

Aspect Electrical Engineering & Services, LLC performed quarterly cleaning and inspections of the flow meter and methane analyzer and documented the results; specifically, the “as found” and “as left” condition of Project equipment. In addition, the flow meter was checked for calibration accuracy by Aspect Electrical Engineering & Services, LLC during each of the quarterly inspections. The last accuracy check on 11/19/2020 falls within the last two months of the reporting period.

The flow meter manufacturer, Emerson Process Management, requires a factory calibration check every 3 years, with the last factory calibration occurring on 5/21/2019. The UltraMat23 Gas analyzer was factory calibrated 7/29/2015 and again on 6/16/2020, within the 5-year calibration frequency required by the Protocol. In addition, the K-type thermocouple mounted on the flare was inspected and calibrated on a quarterly basis, ensuring accuracy of the temperature readings throughout the reporting period.

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 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 Element Market’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 methane analysis, and energy production readings in Element Market’s emission reduction spreadsheet. The fossil fuel use and electricity data were also compared to the information in Element Market’s GHG emissions calculations. RCE’s review consisted of data transcription tests, data completeness, spreadsheet functionality, and accuracy. RCE reviewed the annual Monitoring Report and confirmed that QA/QC was conducted on a regular basis by landfill staff throughout the period since last verification. In addition, because the landfill is not covered with a synthetic liner, a 10% discount was applied to the baseline scenario for oxidation of methane by soil bacteria. A 10% discount was also taken during time periods using weekly handheld methane readings. Lastly, RCE confirmed that there were no instances of data substitution for this reporting period.

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. The Project emissions were calculated from the product of activity data multiplied by an appropriate emission factor for eGRID region MROW. 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. The total emission reductions in this reporting period decreased by approximately 15.6% compared to the last verified ERs from 2019 due to reduced gas availability.

RCE reviewed the Project GHG emission and the GHG reduction calculations for compliance to the Protocol’s calculation methodologies. There are no material misstatements in the final Project GHG reduction calculations and results.

4.0 Verification Results

Element Markets provided sufficient documentation of its emission reductions, 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 Element Markets and The City to quantify the emission reductions in accordance with the Reserve Landfill Project Protocol Version 4.0. The following is a summary of the verification results.

The Project reported emission reductions of 40,967 metric tons of CO₂e from January 1, 2020 to December 31, 2020. During the final review, RCE identified no material misstatements in the data or emission reduction calculations. The emission reductions verified are listed in Table 4. During the verification process, RCE made requests for corrective actions, additional documentation and clarifications to complete the verification. The County sufficiently addressed all requests. The details of these requests are documented in RCE's List of Findings provided to the Reserve and Element Markets.

5.0 Conclusion

RCE conducted a risk-based analysis of the CAR406 Moccasin Mike Landfill Gas 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, 2020 and December 31, 2020 can be considered:

- In conformance with the Reserve Landfill Project Protocol 4.0,
- Without material discrepancy, and
- Verified to a reasonable level of assurance

The verified emission reductions are listed in Table 5.

Table 4 – Emission Reductions Verified for January 1, 2020 through December 31, 2020

Year	Baseline Emissions CO ₂ e (tonnes)	Project Emissions CO ₂ e (tonnes)	Emission Reductions CO ₂ e (tonnes)
2020	41,036	69	40,967
Total	41,036	69	40,967

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-Carter

Senior Internal Reviewer Signature



David LaGreca