



RUBY CANYON ENGINEERING

Verification Report

CAR400 Granger South Jordan Landfill Gas Destruction Project

Reporting Period: January 1, 2012 – December 31, 2012

Prepared for:

Blue Source, LLC

December 10, 2013

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1.0 Introduction

Ruby Canyon Engineering (RCE) was contracted to perform the verification of the Granger South Jordan Landfill Gas Destruction Project (Project) for the reporting period January 1, 2012 through December 31, 2012 to the Climate Action Reserve (Reserve) Landfill Project Protocol 3.0 (Protocol). The Project involves GHG emission reductions from the capture and destruction of landfill gas (LFG) Trans-Jordan Landfill (Landfill) located near South Jordan, UT.

1.1 *Project Background & Site Description*

The Landfill began accepting waste in 1958 and has a design capacity of 16,000,000 tonnes. The current Project includes a gas collection and control system (GCCS) that comprises an interconnected network of vertical extraction and horizontal wells connected via underground header piping to building housing three separate Caterpillar 3520 C (1.6 MW) generator engines. The Landfill also has an open flare on site that was utilized before the engines were installed and was the original Project destruction device. No emission reduction credits are claimed for the current reporting period through the destruction of LFG in the open flare as the device was not operated for the entirety of the reporting period.

1.2 *Responsible Party*

Project Developer: Blue Source, LLC (Blue Source)

Landfill Owner: Trans-Jordan Landfill (Landfill)

Owner of electrical generation equipment: Granger Electric of South Jordan, LLC (Granger)

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

Team Members: Samantha Phillips, Nina Pinette

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 periodic 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 requirements 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 Blue Source 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 (October 8, 2013) • The Reserve Program Manual (October 26, 2011) • The Reserve Verification Program Manual (December 20, 2010)
Verification Process	The Reserve Verification Program Manual and ISO 14064-3 Specification with guidance for the validation and verification of greenhouse gas assertions
Level of Assurance	Reasonable assurance
Materiality	99% accuracy level (less than 1% error) because total annual emission reductions are greater than 100,000 tCO ₂ e.

2.0 Verification Activities Summary

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

- RCE completed a NOVA/COI form to identify any potential conflict of interest with the Project or Project Developer. 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 September 9, 2013.
- RCE held a verification kick-off meeting with Blue Source on September 26, 2013. 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 verification plan and 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 October 2, 2013.
- 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 Blue Source 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 Blue Source on December 10, 2013.

3.0 Verification Findings

3.1 Assessment of the GHG Emission Reductions Project Operations

The Project currently collects LFG from the Landfill and destroys it via combustion through three Caterpillar 3520 electrical generation engines. RCE confirmed that the landfill is not a bioreactor and does not 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 Project activities. The GHG emission sources resulting from the Project activity must be deducted from the Project baseline in order to calculate GHG emission reductions. These GHGs include methane generated from biodegradation of the landfill waste vented to the atmosphere, methane destroyed in the Project destruction device, 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 methane oxidized by soil bacteria. The landfill is not fully capped with a synthetic cover; therefore a 10% oxidation factor is applied.
Project	• CH₄ from the incomplete combustion of LFG sent to the engines. • CO₂ from the combustion of fossil fuels used during operation and maintenance activities for the Project activity. • CO₂ resulting from the consumption of 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 near the town of South Jordan, Utah. It therefore meets this eligibility requirement. RCE confirmed this at the site visit on October 2, 2013.

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

RCE confirmed the Project start date to be June 29, 2005. The Project was originally submitted to the Reserve on August 27, 2008 and therefore meets the requirement of being submitted to the Reserve within 12 months from the effective date of the adoption of Version 2.0 of the Landfill Project Protocol by the Reserve board (the effective date of November 17, 2008).

To confirm the project start date, RCE reviewed initial start-up documentation from the 3rd party company who installed the open flare and log books from landfill personnel.

- **Eligibility 3: Additionality**

- Performance Standard Test

- Prior to the Project activity, the Landfill neither collected nor destroyed any LFG. RCE confirmed this through the site visit. While touring the Landfill, no evidence was observed that would indicate there was ever a pre-project destruction device. In addition, historical photos of the Landfill were viewed on-site and via the internet and no evidence suggested that any collection system or destruction devices existed before the Project was implemented in 2005.

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

- RCE examined the procedures outlined in the Project Monitoring Plan that Blue Source and the Landfill will follow to ascertain and demonstrate that the project at all times passes the Legal Requirement Test. These procedures include a review of any law, statute, rule, regulation or other legally binding mandate by any federal, state, local or foreign governmental or regulatory agency having jurisdiction over the Project and confirmation that the Project was implemented and continues to operate voluntarily.

RCE reviewed specific language in the Title V permit that was issued by the State of Utah to the Landfill which explicitly stated that the destruction devices were not implemented to comply with any emissions limit. Additionally, no evidence was found in any Utah statute that would suggest the Project was required by State law. RCE also reviewed the Attestation of Voluntary Implementation form signed after the end of the reporting period and uploaded to the Reserve which states that the project was implemented and established voluntarily.

The Landfill is subject to the emission reporting requirements under the New Source Performance Standards/Emission Guidelines for Municipal Solid Waste Landfills. RCE reviewed the Non-Methane Organic Carbon (NMOC) Emission Rate Report dated December 29, 2010 and confirmed that the total NMOC emission rate for 2012 is estimated at 22.85 Mg/year.

Additionally, the Landfill is not required to comply with the federal National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulation, and there are no specific local or state regulations for the installation of a gas collection and destruction system. Therefore, the results of the regulatory review indicated that Blue Source and the Landfill are following their Monitoring Plan procedures to ensure they pass the legal requirement test, and the Project is in compliance with all Federal, State and local regulations.

- **Eligibility 4: Regulatory Compliance**

RCE reviewed the procedures described in the Monitoring Plan to ensure that the Project remains in compliance with all applicable local, state, and federal requirements. RCE reviewed air permits, solid waste permits, and storm water permits for evidence that the Project was in compliance with all environmental and regulatory requirements. RCE also used the EPA Enforcement & Compliance History Online database (ECHO) to confirm that there were no outstanding regulatory penalties against the Landfill during the reporting period.

During RCE's review there was no evidence of non-compliance, 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 both the completed Attestation of Title and the contract between the Landfill, Blue Source and Granger Electric of South Jordan, LLC. The contracts between all three entities contained clear language which specified that all rights, title, and benefits of the GHG emission reductions would be transferred to Blue Source. The presented evidence clearly demonstrated that Blue Source, LLC holds the legal title and exclusive ownership rights of the emission reductions associated with the Project.

3.5 GHG Monitoring and Management Systems

During the site visit, RCE reviewed the GHG management systems through observations of onsite procedures and interviews with the Project personnel. The onsite review included an assessment of the Project data collection, processing and handling procedures, recordkeeping and data storage, the quality control and assurance procedures, project maintenance procedures, personnel competency evaluations, and a field tour of the Project.

The primary Project data includes the LFG flow to three Caterpillar 3520 generator engines and the methane content of the LFG. The LFG flow to the engines is measured via a Yokogawa flow meter and the Yokogawa paperless chart recorder automatically corrects all LFG flow readings from the flow meter to 60 °F and 1 atm. The position of the flow meter was also observed to be adequate in order to allow for laminar flow. The methane content of the LFG is measured by a Siemens 23 Ultramat continuous methane analyzer.

The Project Monitoring Plan provides specific details about the monitoring equipment including model and serial numbers, calibration and maintenance procedures, and procedures in event of failure, that are all in compliance with the Protocol. The operational procedures and responsibilities as listed in the Project Monitoring Plan were observed by RCE to be accurately portrayed. The Project Monitoring Plan outlines record management in compliance with the Protocol and RCE verified that the Project was implemented according to the Monitoring Plan.

3.6 Instrument QA/QC

RCE reviewed evidence that the LFG flow meter and continuous methane analyzer met instrument QA/QC requirements as outlined in the Protocol and/or by the manufacturer for cleaning, inspection, and calibration.

The flow meter and continuous methane analyzer were cleaned and inspected quarterly by a field technician on 2/22/12, 5/9/12, 8/15/12, and 11/28/12. RCE reviewed inspection logs and records to confirm these activities.

RCE reviewed documentation of the third-party field check for calibration accuracy for the flow meter and continuous methane analyzer. The flow meter was sent back to the factory for an As Found check and calibration, and was completed on December 15, 2012 which is within two months of the end of the reporting period. The flow meter as found calibration check was within +/- 5% accuracy. The Siemens gas analyzer was field checked by a third party technician with certified calibration gas on December 17, 2012 which is within two months of the end of the reporting period as required by the Protocol. The gas analyzer was reading within +/- 5% accuracy.

RCE reviewed the Yokogawa flow meter manual and found no evidence or guidance on when the flow meter should be calibrated and therefore the Protocol stipulation of every five years is required. The flow meter was originally calibrated by Yokogawa on October 16, 2008 and Blue Source had the flow meter calibrated by Yokogawa again on December 15, 2012. During the factory calibration for the main flow meter, a rental flow meter was installed and it was calibrated prior to installation on November 8, 2012. The Siemens Ultramat 23 continuous methane analyzer requires that calibration with calibration gas be used to verify accuracy on an annual base. The Siemens gas analyzer was field checked by a third-party field technician on a weekly basis. Additionally, the Siemens gas analyzer was also calibrated quarterly by Process Engineered Products. Siemens recommends that calibration with calibration gas be performed at least once every twelve months. Therefore, all QA/QC requirements of all monitoring equipment were met during the reporting period.

3.7 Assessment of GHG Emission Reductions Calculations

The emission reductions 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 is transferred to the calculation spreadsheet. Next the formulas and raw data inputs were reviewed for accuracy and compliance with the Protocol. Lastly, RCE recalculated the GHG emissions and reductions and compared the results to Blue Source's calculations to determine if the GHG emissions were materially correct.

The Project's GHG emission reductions calculations were correctly implemented and were in compliance with the Protocol calculation methodologies. Blue Source chose to use an alternative destruction efficiency for the engines. Air pollution Testing Inc. performed source testing on the three caterpillar 3520C engines on May 1st and 2nd, 2012. The average destruction efficiency for all three engines was calculated as 99.7 percent. RCE confirmed that the source tested destruction efficiency of 99.7 percent was assigned to the Project's three caterpillar 3520C engines and applied accordingly in the emission reductions calculations. A 10% oxidation factor was correctly applied because the landfill does not have a synthetic cap. RCE confirmed that the Project does not claim emission reductions for time periods when all three engines are non-operational.

RCE examined 100 percent of the Project calculation methods and compared them to the Protocol methodologies. The calculation methods were determined to be as described in the Project Monitoring Plan and were complete and transparent.

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 the GHG assertion.

The total GHG reductions in CO₂e were calculated by subtracting the Project emissions from the amount of methane destroyed in the baseline in CO₂e. RCE found no material misstatements in the final Project GHG reductions calculations and results.

4.0 Verification Results

Blue Source provided proper documentation of their emission reductions, data collection procedures and their monitoring and quality control procedures. The verification process focused on verifying the emission reductions claimed and the source data used by Blue Source to quantify the emission reductions in accordance with the Reserve Landfill Project Protocol Version 3.0. The following is a summary of the verification results.

The Project reported emission reductions of **136,521** metric tons CO₂e for the current reporting period. During the verification, RCE identified no material misstatements in the data or emissions calculations. The amounts of emission reductions verified are listed in Table 3. During the verification process, RCE made requests for clarifications, corrective actions and supplemental documentation to complete the verification. Blue Source sufficiently addressed all corrective actions. The details of these requests are documented in RCE's List of Findings provided to the Reserve and Blue Source.

5.0 Conclusion

RCE conducted a risk-based analysis of the CAR400 Granger South Jordan Landfill Gas Destruction 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 landfill gas during the reporting period January 1, 2012 through December 31, 2012 and can be considered:

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

The verified emission reductions are listed in Table 3.

Table 3 - Emission Reductions Verified for January 1, 2012 through December 31, 2012

Emission Reductions	Baseline Emissions CO₂e	Project Emissions CO₂e	Emission Reductions CO₂e
2012	136,532	11	136,521
Total	136,532	11	136,521

Lead Verifier Signature



Phillip Cunningham

Senior Internal Reviewer Signature



Zach Eyler