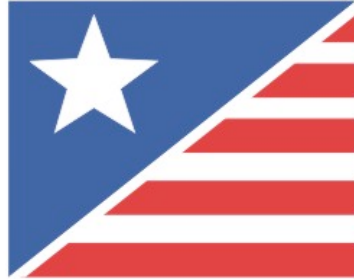


**PERRY JOHNSON REGISTRARS**



**Carbon Emissions Services, Inc.**

**Verification Report for**

Granger South Jordan Landfill Gas Destruction Project  
CAR400

Reporting Period: January 1, 2014 – December 31, 2014

**Prepared for:**

Blue Source, LLC

**Climate Action Reserve**

**June 9, 2015**

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## 1. Introduction

Perry Johnson Registrars Carbon Emissions Services, Inc. (PJRCES) was contracted to perform the verification of the Granger South Jordan Landfill Gas Destruction Project (Project), CAR400, for the reporting period January 1, 2014 through December 31, 2014 to the Climate Action Reserve (Reserve) Landfill Project Protocol Version 3.0 (Protocol). The Project involves GHG emission reductions from the capture and destruction of landfill gas (LFG) at the Trans-Jordan Landfill (Landfill) located near South Jordan, UT.

## 2. Objectives

The goal of the verification was to evaluate the project conformance with verification criteria as defined by Climate Action Reserve protocols, to ensure the data reported is accurate, complete, consistent, transparent, and free of material errors or omissions, and to assess the likelihood that the project has resulted in GHG emissions reductions as stated in the supporting documentation.

## 3. Scope

The scope of the engagement included verification of the quantification, monitoring and reporting of greenhouse gas emission reductions from the project at Trans-Jordan Landfill for the period January 1, 2014 through December 31, 2014. It also included verification of the project's ongoing eligibility and calculated project emissions associated with the project activities.

## 4. Criteria

|                          |                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standard of Verification | <ul style="list-style-type: none"> <li>· The Reserve Landfill Project Protocol Version 3.0 (December 2, 2009)</li> <li>· Errata and Clarifications to Landfill Project Protocol Version 3.0 (June 18, 2015)</li> <li>· The Reserve Program Manual (October 26, 2011)</li> <li>· The Reserve Verification Program Manual (December 20, 2010)</li> </ul> |
| Verification Process     | <ul style="list-style-type: none"> <li>· The Reserve Verification Program Manual and</li> <li>· ISO 14064-3 Specification with guidance for the validation and verification of greenhouse gas assertions</li> </ul>                                                                                                                                    |
| Level of Assurance       | Reasonable                                                                                                                                                                                                                                                                                                                                             |
| Materiality              | 1% because total annual emission reductions are greater than 100,000 tCO <sub>2</sub> e.                                                                                                                                                                                                                                                               |

## 5. Verification Process Overview

The verification process consisted of the following:

- Initial documentation review
- Conflict of Interest assessment
- Selection of verification team
- COI/NOVA submitted to CAR for approval
- Verification Team formally appointed and contract finalized
- Desk review, further background investigation and/or interviews if necessary
- Verification and Sampling Plans developed
- Verification conducted
- Review and evaluation of information systems and controls, data collection, and emissions/emissions reductions calculation
- Corrective actions/clarification requests issued
- Draft verification report/statement developed
- Follow-up of corrective actions/clarification requests



- Independent Technical Review of Verification Report/Statement conducted
- Final Report/Statement issued

## 6. Verification Team

The Verification Team consisted of the following individuals, who were selected based on their experience, knowledge, and competency in the Landfill sector.

Team Leader: Tina Sentner

Team Members: None

Technical Reviewer: Michael DeBusschere

Technical Expert (if applicable): None

## 7. Verification

### 7.1 Kick-off Meeting

PJRCES held a verification kick-off meeting with Blue Source on February 27, 2015. During the kickoff meeting PJRCES reviewed the verification objectives and process, reviewed the verification schedule, and requested the verification background documents.

### 7.2 Verification Plan and Sampling Plan

PJRCES 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.

### 7.3 Documentation/Desktop Review

The verification team conducted a document review to inform the planning process in advance of performing verification activities. Documents reviewed included project documentation submitted to the Climate Action Reserve, including the basis for emission reduction calculations, project design documentation, procedures, reports, raw data, calibration records and regulatory information provided by Blue Source, LLC.

### 7.4 On-Site Visit

PJRCES conducted a site visit of the project on March 10, 2015. The purpose of the site visit was to confirm the project equipment (electricity generator set and open flare) and assess the capability of Project's management system and procedures to produce accurate, reliable, and reproducible data and information from project activities.

### 7.5 Findings

PJRCES submitted requests for corrective actions, additional documentation, and clarifications to Blue Source, LLC throughout the verification.

### 7.6 Verification Report/Statement

The internal reviewer conducted a review of the verification sampling, report, and statement. PJRCES issued a final verification report, verification statement, and list of findings.

## 8. Project Description

The Project included a gas collection and control system (GCCS) comprised of an interconnected network of vertical extraction and horizontal wells connected via underground header piping to 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 reductions are claimed for the current reporting period for destruction of LFG in the open flare as the device was not operating during the reporting period. The landfill is not considered a bioreactor as defined by US EPA.

## 9. Eligibility Requirements

### 9.1 Location

The Project is a US-based landfill located near the town of South Jordan, Utah. It therefore meets this eligibility requirement. PJRCES confirmed this during the site visit.

### 9.2 Project Start Date

PJR 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). PJRCES had confirmed the start date of the Project from review of initial start-up documentation from the third party company who installed the open flare and the startup logbooks (SoJo\_FlareStartUp\_Logbook\_29JUN2005) from landfill personnel that note the flare began burning methane on June 29, 2005. Based on this evidence, PJRCES confirms the start date of the project was correctly identified.

### 9.3 Crediting Period

The Project ten-year crediting period extends to June 28, 2015. PJRCES has concluded that the reporting period verified in this report is within the crediting period of the Project.

### 9.4 Additionality

The following tests were reviewed in conformance with the protocol requirements:

#### 9.4.1 Performance Standard Test

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."

PJRCES consulted as-built drawings and engineering specifications/construction documents, showing the installation of new collection and destruction equipment as of the dates specified in the documents.

#### 9.4.2 Legal Requirement Test

PJRCES reviewed the Attestation of Voluntary Implementation signed by the president of Blue Source, LLC on May 29, 2015. PJRCES reviewed specific language in the Title V permit that was issued by the State of Utah to the Landfill, which 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. PJRCES reviewed internal records generated by Blue Source, LLC as part of its ongoing legal and regulatory project monitoring and interviewed the Regulatory Compliance manager of the Landfill to determine, for the reporting period, whether the State of Utah or any local government had recently modified their regulations to require LFG destruction. PJRCES found no evidence of modified regulations or requirements to collect and destroy LFG methane at the Trans-Jordan Landfill. The Landfill was subject to NSPS regulation (New Source Performance Standard). This conclusion was



based on the landfill's design mass threshold of exceeding the limit 2.5 million Mg of MSW as defined by NSPS. The Non-Methane Organic Carbon (NMOC) Emission Rate Report dated December 29, 2010 conducted by Kleinfelder and confirmed that the total NMOC emission rate for 2014 is estimated at 25.1 Mg/year which is below the NMOC emission rate of 50 Mg/year. The landfill is not required to conduct NMOC testing again until 2015. Through review of regulatory information, along with the completed Attestation of Voluntary Implementation, PJRCES concluded that the Project passed the Legal Requirement Test during this verification period.

### 9.5 Regulatory Compliance

PJRCES reviewed a sample of the monthly solid waste inspection and air inspection reports from the Utah DEQ Division of the Health Department and Division of Air Quality. In addition, PJRCES reviewed the semi-annual Title V Compliance Certification Forms for 2014 and the Solid Waste Compliance review. PJRCES as reviewed the EPA Enforcement & Compliance History Online database (ECHO) to confirm that there were no outstanding regulatory penalties against the Landfill during the reporting period. There was no evidence of non-compliance, and the procedures for ensuring regulatory compliance in the Monitoring Plan were being properly followed. Finally, PJRCES confirmed signature of the Attestation of Regulatory Compliance, after the end of the reporting period, which was uploaded to the Reserve.

### 9.6 Ownership

Trans-Jordan is the owner of the Trans Jordan landfill. Ownership was confirmed through review of various regulatory permits issued from regulatory agencies. Granger Electric of South Jordan, LLC operates the electric generation facility. PJRCES reviewed contracts between the Landfill, Blue Source, and Granger Electric of South Jordan, LLC. The contracts between all three entities contained language that specified that all rights, title, and benefits of the GHG emission reductions would be transferred to Blue Source, LLC. Lastly, PJRCES reviewed the Attestation of Title signed by Blue Source, LLC dated May 29, 2015 concerning ownership of landfill gas emission reduction credits for the reporting period. Based on this review, PJRCES concludes that Blue Source, LLC holds the legal title and exclusive ownership rights of the emission reductions associated with the Project.

## 10. The GHG Assessment Boundary

The Project includes all emission sources from the operation of the landfill gas collection system to the ultimate destruction of the landfill gas. The sources of GHG emissions reviewed include:

The GHG sources, sinks, and reservoirs associated with the baseline scenario are:

- CH<sub>4</sub> vented to the atmosphere.
- CO<sub>2</sub> from the oxidation of CH<sub>4</sub> by soil bacteria. As the landfills are not covered with a synthetic liner, the CAR Landfill Project Reporting Protocol assumption that 10 percent of the methane produced would be naturally oxidized by soil bacteria has been applied.

The GHG sources, sinks, and reservoirs associated with the project are:

- Un-combusted CH<sub>4</sub> from Landfill gas in the internal combustion engines and flare.
- CO<sub>2</sub> from the combustion of fossil fuels used during operation and maintenance activities for the project activity.
- CO<sub>2</sub> resulting from the consumption of imported electricity.

The gases reviewed include CO<sub>2</sub> and CH<sub>4</sub>. All gases are converted to CO<sub>2</sub> equivalents.

## 11. Review of the Project GHG Management Systems



During the site visit, a review of the Project's greenhouse gas management systems was detailed with the Project Proponent. This review included a detailed look at the Project's data handling and processing procedures, recordkeeping and data storage, and the quality control and assurance procedures. A Project Monitoring Plan was created for the Project. The contents of the monitoring plan were thoroughly reviewed and observed to meet the requirements of the Landfill Gas Project Protocol. The monitoring plan records are kept for a minimum of ten years when the information is first generated or seven years after the last verification.

The primary data gathered for the Project is landfill gas flow, pressure, temperature and methane content of the landfill gas. Landfill gas flow was monitored continuously to three Caterpillar 3520 generator engines. The LFG flow to the engines was measured via a Yokogawa Vortex flow meter, and the Yokogawa paperless chart recorder automatically corrects all LFG flow readings from the flow meter to 60 °F and 1 atmosphere as required by the Protocol. The position of the flow meter was also observed to be adequate in order to allow for laminar flow. Flow rates were recorded every at least every 10 minutes. The Yokogawa flow meter was inspected weekly by an onsite technician and field checked and cleaned for accuracy on a quarterly basis by the third-party Process Engineered Products. The field checks occurred on 03/18/14; 06/24/14; 09/17/14; and finally on 12/23/14, within 2 months of the end of the reporting period. During all field check events, the meter was observed to be operating within +/- 5% tolerances.

A Siemens Ultramat 23 infrared gas analyzer measured the methane concentration continuously and was recorded by the Yokogawa paperless chart recorder at least every ten minutes. PJRCES confirmed that two Siemens gas analyzers were used during the reporting period. A loaner analyzer was installed when the site analyzer was sent out for repair. Both analyzers were field checked and calibrated with calibration gas by a field technician on a weekly basis. Additionally, the Siemens gas analyzer was calibrated quarterly by Process Engineered Products on the same schedule as the flow meter. During all field check events, the meter was observed to be operating within +/- 5% tolerances.

PJRCES confirmed that the flow meter and CH<sub>4</sub> analyzer met the manufacturer-recommended or five-year factory calibration schedule requirement noted within the protocol (whichever was sooner) during the reporting period. Blue Source provided an email from Yokogawa Technical Support Center stating that there is no required calibration frequency for the flow meter. The last factory calibration for the instrument was conducted 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 basis. PJRCES noted this requirement was met on a weekly basis as noted above and was also factory calibrated on November 14, 2014. The loaner Siemens was last factory calibrated prior to use on May 21, 2014.

In order to ensure landfill gas destruction, operating hours and the kilowatt-hour output of the engine generator units are recorded every 10 minutes. For verification purposes, PJRCES reviewed the flow meter data to ensure that no credits were being accumulated for periods in which the destruction device was not operational.

Based on this review, PJRCES concluded that the project met the monitoring and metering requirements of the Protocol.

## 12. Review of the Quantification of Emission Reductions

The emission reduction calculation assessment included the review of project assumptions, raw data inputs and accuracy of calculations. The formulas and raw data inputs used to determine emission reduction calculations as described in the monitoring plan and the emission reduction calculation spread sheets were first reviewed for compliance with the Landfill Project Protocol V.3.0.

The main parameters of Equation 5.1 were verified as follows:



### Total Annual Methane Emissions Destroyed By the Project Landfill Gas Collection and Destruction System ( $CH_4$ Dest<sub>PR</sub>)

The amount of methane destroyed is calculated from the continuously metered landfill gas flow data. For the verification period, data was electronically aggregated on 10 minute intervals for the engines. The main monitored parameters needed to calculate the amount of methane destroyed are:

$LFG_{i,t}$  = total quantity of landfill gas fed to the destruction device and  
 $PR_{CH_4 i,t}$  = the average methane fraction of the landfill gas in time interval t as measured

Landfill gas flow is first adjusted by voiding flow when there is no indication of hourly Kwh. Incremental methane flow was calculated by taking the engine flow for each interval period multiplying by the incremental methane content. Total monthly-destroyed methane is carried forward into further calculations for the engine to determine emission reductions for the project

### Adjustment For Landfill Gas Flow Metering Equipment For Temperature And Pressure

The project flow meters are required to correct for the temperature and pressure of the landfill gas. The project flow meters report flow to 80 degrees F and 7 psig. It was observed that flow was adjusted in by the PLC to 60 degrees F and 1 ATM as required by the protocol.

### Default Methane Destruction Efficiency For Device (Dei)

For the engines, the value for lean burn engine of 0.936 was applied, For this period, no emission reductions were claimed for the flare.

### Factor For The Oxidation Of Methane By Soil Bacteria (OX)

The project does not incorporate a synthetic liner in its cover system; therefore a 10% methane soil oxidation factor was applied to the baseline scenario.

### Discount Factor To Account For Uncertainties Associated With The Project Monitoring Equipment (DF)

As per the methodology, DF equals to zero if using continuous methane monitor with no missing data and all calibration tests are within a 5% margin of error. It was verified that measurement readings are continuous and that calibration certificates indicated that instruments were within the thresholds for permissible error (see section above: Review of Project GHG Management Systems).

### Adjustment To Account For Pre-Project LFG Destruction Device ( $PRE_{discount}$ )

An adjustment to the project was not necessary due to the fact that there was no pre-project destruction device.

### Total Annual Indirect Carbon Dioxide Emissions From The Consumption Of Electricity From The Grid ( $EL_{CO_2}$ ) and Total Annual Carbon Dioxide Emissions From The Destruction Of Fossil Fuel ( $FF_{CO_2}$ )

$CO_2$  emissions result from consumption of electricity to power project equipment and activity data for this source was tracked by reviewing utility invoices from the power supplier. Direct  $CO_2$  emissions result from propane, diesel and natural gas. This activity data is taken from purchase invoices. The emission factors for were verified accurate and no material errors were found.

Project emissions consisting of indirect emissions from electricity and direct emissions from propane use are subtracted from the total amount of methane destroyed. The values are presented in the final Calculation Spreadsheets for the verification period.

### Variances or Deviations

The project did not apply for any variances or deviations during the reporting period.



### Missing Data

The project did not have any instances of data substitution.

## **13.Verification Conclusions and Opinion**

The verification of Granger South Jordan Landfill Gas Destruction Project focused on the accurate collection of data and quantification of emission reductions as implemented by Blue Source, LLC in accordance with the Landfill Project Protocol, version 3.0. PJRCES issued corrective action requests and sought clarifications from the project developer during the verification process. All material and immaterial issues were resolved. Details on the corrective actions and clarifications requested were provided to the Project Developer and to the Reserve in a List of Findings, a private document.

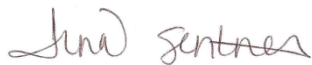
Based upon the processes and procedures and the evidence collected, PJRCES concludes that the GHG assertion is a fair representation of the Project emission reductions resulting from the capture and utilization of landfill gas during the reporting period January 1, 2014 through December 31, 2014 and can be considered:

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

The following provides a summary of the verification results:

| <b>Emissions Verified</b>  | <b>January 1, 2014 to<br/>December 31, 2014</b> |
|----------------------------|-------------------------------------------------|
| Baseline Emissions         | 153,866                                         |
| Project Emissions          | 8                                               |
| Pre-Project Discount       | 0                                               |
| Total Emissions Reductions | 153,858                                         |

The Lead Verifier recommends to issue a verification opinion for the following:

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name of Project Developer              | Blue Source, LLC                                                                                                                                                                                                                                                                                                                                                                                       |
| Scope of Verification                  | Emission reductions arising from the capture and destruction of Landfill Gas Methane from :<br><b>Granger South Jordan Landfill Gas Destruction Project</b>                                                                                                                                                                                                                                            |
| Reporting Period                       | January 1, 2014 to December 31, 2014                                                                                                                                                                                                                                                                                                                                                                   |
| Total GHG Emission Reductions Verified | 153,858 metric tonnes CO <sub>2</sub> e                                                                                                                                                                                                                                                                                                                                                                |
| GHG Protocol(s) Used for Verification  | CAR Landfill Project Reporting Protocol Version 3.0, December 2, 2009<br>CAR Errata and Clarification LPP Version 3.0, June 18, 2015<br>CAR Verification Program Manual, December 20, 2010<br>CAR Program Manual, October 2011<br>All Verification activities carried out followed the requirements of ISO 14064-3 (Specification with guidance for the validation and verification of GHG assertions) |
| Lead Verifier's Approval               | <br>Tina Sentner, June 9, 2015                                                                                                                                                                                                                                                                                        |
| Technical Reviewer's Approval          | <br>Michael DeBusschere, June 18, 2015                                                                                                                                                                                                                                                                              |
| Date of Verification                   | The Verification Statement is to be dated when the technical reviewer accepts the recommendation to issue the statement.                                                                                                                                                                                                                                                                               |