Verification Report for Sustainable Energy Solutions, LLC Eagle Point Landfill Project—CAR 476

Climate Action Reserve

February 2015

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1. Introduction

This report is provided to Sustainable Energy Solutions, LLC (SES) as a deliverable of the Climate Action Reserve (CAR) project verification process. This report covers the verification of the Eagle Point Landfill – CAR476 (the Project) for the period from July 1 through December 31, 2014. First Environment, Inc. (First Environment) conducted the verification from the date of the kick-off meeting until February 2, 2015.

2. Objectives

The purpose of this verification was, through review of appropriate evidence, to establish that:

- the Project conforms to the requirements of the verification criteria, including all eligibility requirements, discussed in Section 4 of this report; and
- the data reported are accurate, complete, consistent, transparent, and free of material error or omission.

3. Verification Scope

Specific scope metrics for the verification are outlined in the table below:

Geographic Boundaries	Eagle Point Landfill, Ball Ground, Georgia
Emission Reduction Sources, Project Emissions, and Greenhouse Gases	Emissions reductions (expressed in units of Carbon Dioxide equivalents (CO_2e)) resulting from methane destruction. Project emissions of CO_2 from fossil fuel combustion and purchased electricity.
Reporting Period	July 1 through December 31, 2014
Data Sources	Metered Data and Emissions Reduction Calculations

4. Standards Used to Verify Emissions (Criteria)

The following table outlines the guidance and protocols used to conduct this verification:

Standard of Verification	• Climate Action Reserve U.S. Landfill Project Protocol, Version 3.0, December 2, 2009 (CAR Protocol) • Climate Action Reserve U.S. Landfill Project Protocol Version 3.0 Errata & Clarification, January 14, 2015 (Errata and Clarification) • Climate Action Reserve Program Manual, October 26, 2011
Verification Process	• Section 8 of the CAR Protocol • Errata and Clarification • Climate Action Reserve Verification Program Manual, December 20, 2010 • ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006

Level of Assurance	• Reasonable assurance
Materiality	• Misstatements greater than one percent of the Project's emission reductions assertion are considered material for the verification period • Qualitative non-conformities with the CAR Protocol are also considered material

5. Overview of the Verification Process

The verification process was utilized to gain an understanding of the Project's emission sources and reductions and to evaluate and verify the collection and handling of data, the calculations that lead to the results, and the means for reporting the associated data and results.

The following verification process was used:

- conflict of interest review;
- selection of Verification Team;
- initial interaction and kick-off meeting with SES;
- development of the verification and sampling plan;
- review of management and data collection system;
- site visit;
- assessment of raw data and calculations for period under review;
- follow-up interaction with SES for corrective action, clarification, or supplemental data as needed; and
- final statement and report submittal.

5.1 Conflict of Interest Review

Prior to beginning any verification project, First Environment conducts an evaluation to identify any potential conflicts of interest associated with the Project. No potential conflicts were found for this Project. First Environment also received authorization to proceed with verification activities for the project developer from CAR in a notification dated November 7, 2014.

5.2 Verification Team

First Environment's Verification Team consisted of the following individuals who were selected based on their verification experience, as well as familiarity with landfill operations.

Lead Verifier – Jeff Daley
Verifiers – Luca Nencetti
Senior Internal Reviewer – Michael Carim

5.3 Verification Kick-off

The verification was initiated with a kick-off meeting on November 24, 2014 with the project developer. The meeting focused on confirming the scope, schedule, and data required for verification.

5.4 Development of the Verification Plan

The Verification Team formally documented its verification plan as well as determined the data-sampling plan. The verification plan was developed based on the discussion of key elements of the project verification process during the kick-off meeting. SES was afforded the opportunity to comment on the key elements of the plan for verification. Based on items discussed and agreed upon with SES, the plan identified the First Environment project team members, project level of assurance, materiality threshold, and standards of evaluation and reporting for the verification. It also provided an outline of the verification process and established project deliverables. A separate data-sampling plan was designed to review all project elements in areas of potentially high risk of inaccuracy or non-conformance.

5.5 Site Visit

Mr. Luca Nencetti conducted a site visit on December 11, 2014 to assess the Project's data management systems and interview personnel relevant to the Project for the verification period.

5.6 Emissions Reduction Data and Calculation Assessment

This assessment used information and insights gained during the previous steps to evaluate the collected data and the reported emissions reduction quantities, and identify if either contained material or immaterial misstatements.

5.7 Corrective Actions and Supplemental Information

The team issued corrective action requests during the verification process. SES provided sufficient responses to all corrective action requests.

5.8 Verification Reporting

Verification reporting, represented by this report, documents the verification process and identifies its findings and results. Verification reporting consists of this report for SES, a verification statement, and a list of findings, all of which are submitted to the Climate Action Reserve.

6. Site's Conformance with Verification Criteria

6.1 Project Description

The Eagle Point Landfill is an active municipal landfill located at 8880 Old Federal Road, Ball Ground, Georgia. The landfill began accepting waste in 2002 and currently consists of the following cells:

- MSW Cells: Cells 1A, 1B, 2A, 2B, 5, 6, 7, 8, 9, 10, 11, and 12
- C & D Cells: Cells 3A, 3B, and 4

In the future, the landfill will be expanded into Cells 13 through 16. The gas collection system consists of horizontal and vertical gas collection wells and leachate risers from which gas is collected and sent to the flare for destruction.

The project collects and combusts landfill gas in an open flare. No combustion devices existed on site prior to the initiation of the project activity. The baseline scenario, defined as the total release of landfill gas to the atmosphere, was verified during the project's initial reporting period.

6.2 Eligibility

SES meets the eligibility requirements set forth in the CAR Protocol, as described below.

6.2.1 Ownership and Title

Ownership of the emission reductions was demonstrated through a Landfill Gas Collection and Combustion Agreement between SES and Eagle Point Landfill, LLC (a subsidiary of Advanced Disposal) establishing SES' exclusive ownership rights to Environmental Attributes arising from gas captured and destroyed at the Eagle Point Landfill, including any credits generated. First Environment also reviewed the landfill's Title V Permit and Solid Waste Handling Permit to confirm that Eagle Point Landfill, LLC is the owner and operator of the landfill and therefore owner in the first instance of the emission reduction credits associated with the landfill gas.

Additionally, First Environment relied on the Attestation of Title completed by SES for the current reporting period to establish ownership of greenhouse gas (GHG) emission reductions. The Attestation is on file with CAR and was reviewed to confirm that it was completed correctly.

6.2.2 Project Start Date

First Environment confirmed that the Project meets CAR's start date requirements. The project start date is October 1, 2009, which was confirmed during the initial verification through review of the flare commissioning report.

6.2.3 Additionality

The Project passes both the Performance Standard Test and the Legal Requirements Test, as described below.

6.2.3.1 Performance Standard Test

The Project consists of the installation of a landfill gas collection and control system and therefore exceeds the performance standard defined by the CAR Protocol, specifically Scenario 1 from the list provided in Section 3.4.1 of the CAR Protocol, because landfill gas had never been collected or destroyed prior to the project start date. It was also confirmed during the site visit that the landfill is not a bioreactor.

6.2.3.2 Legal Requirements Test

The landfill's Title V Permit, Solid Waste Handing Permit, and Tier 2 test results were reviewed during this verification period to confirm conformance with the Legal Requirement test. The Eagle Point Landfill is subject to New Source Performance Standard (NSPS) rules requiring the facility to conduct Non-Methane Organic Compound (NMOC) emission rate testing. The most recent Tier II emissions rate testing occurred on April 12, 2011. The most recent emission rate estimates were calculated on February 24, 2014 for annual reporting. This report indicated that NMOC emission rates were projected to be 50.4 Mg/yr for 2014, which is above the 50 Mg/yr

threshold that would require the installation of a gas collection and control system. Because the landfill has exceeded the NMOC threshold, per 40CFR 60.752 the landfill is required to operate a gas collection and control system within 30 months of the date of the NMOC emissions rate report. Because the landfill is still within the 30-month time period, landfill gas collection and destruction is not required by regulation and the Project is still eligible under the Landfill Protocol for this reporting period.

To further inform the assessment of regulatory additionality, First Environment performed a cursory review of the landfill's operating permits and relevant Georgia Department of Natural Resources regulations for municipal solid waste landfills. This cursory review indicated that the Project is not required by regulation; therefore, the Project passes the CAR Protocol's Legal Requirements Test.

Additionally, First Environment relied on the Attestation of Voluntary Implementation completed by SES for the current reporting period. The Attestation is on file with CAR and was reviewed to confirm that it was completed correctly.

6.2.4 Regulatory Compliance

First Environment reviewed the landfill's original solid waste permit and the Environmental Protection Agency's (EPA) Enforcement and Compliance History Online (ECHO) database to determine regulatory compliance. The cursory review indicated that the site was in compliance and no violations of permits occurred during the reporting period.

Additionally, First Environment relied on the Attestation of Regulatory Compliance completed by SES for the current reporting period. The Attestation is on file with CAR and was reviewed to confirm that it was completed correctly.

6.3 Project Performance Against CAR Protocol and Project Management System

The Project was implemented in conformity with the CAR Protocol. SES developed and implemented a Monitoring Plan to track relevant project parameters and data sources. The Monitoring Plan, including the Project Diagram, was reviewed to determine compliance with the protocol requirements. Based on observations made during the site visit and review of relevant project documentation, First Environment found the Monitoring Plan and Project Diagram to meet the requirements set forth by the CAR Protocol and the Project to be implemented in accordance with the Monitoring Plan.

6.3.1 Project Monitoring

A Rosemount Mass ProBar flow meter continuously measures differential pressure, temperature, and pressure of the gas stream. The meter standardizes flow readings to a pressure of one atmosphere and a temperature of 60ºF.

A Siemens Ultramat 23 Continuous Gas Analyzer measures gas composition for methane, oxygen, and carbon dioxide.

As per the Monitoring Plan, if the Siemens Ultramat 23 gas analyzer is not functioning properly, a GEM2000 portable gas analyzer will be used to take weekly methane readings during these periods of down time. The Siemens Ultramat 23 gas analyzer experienced operational issues at

the end of the reporting period and therefore a GEM-2000 portable methane analyzer was used from November 30 through the end of the reporting period.

Both gas flow rates and methane concentration are measured on the same relative moisture basis.

The candlestick flare incorporates a Pyromation thermocouple that is designed to shut down the flare when the flare temperature drops below the set point of 400°F.

A PLC system continuously records gas flow, continuous methane concentration, and flare temperature data on a Yokogawa digital chart recorder.

Table 1 summarizes the project monitoring system parameters and monitoring equipment employed by the Project.

TABLE 1: Monitoring Equipment

Parameter	Monitoring Equipment	Frequency of Measurement	Frequency of Recording	Recording Device
Landfill gas flow	Rosemount Mass ProBar flow meter	Continuous	Every 30 seconds	Yokogawa digital chart recorder
Methane Concentration	Siemens Ultramat 23 Continuous Gas Analyzer GEM2000 portable gas analyzer	Continuous Periodic	Every 30 seconds As measured	Yokogawa digital chart recorder Field logs
Hourly Operation of Destruction Device	Pyromation thermocouple	Continuous	Every 30 seconds	Yokogawa digital chart recorder

6.3.2 Instrument Quality Assurance/Quality Control

SES' instrument quality assurance/quality control (QA/QC) plan for the Project's monitoring equipment complies with CAR's requirements.

The flow sensor associated with the Rosemount flow meter is field checked for calibration accuracy by a third party once per reporting period, but no more than two months prior to the end of the reporting period. The field check performed during the current reporting period indicated the instrument was within the five percent accuracy range required by the CAR Protocol. First Environment also reviewed documentation to confirm that the flow meter was inspected and cleaned on a quarterly basis with as-found/as-left conditions of the meter documented. The manufacturer does not recommend a specific interval to perform calibrations on an ongoing basis so the instrument is calibrated at a minimum every five years.

The Siemens Ultramat gas analyzer is field checked by a third party at least once per reporting period, but no more than two months prior to the end of the reporting period and is inspected and cleaned on a monthly basis with as-found/as-left conditions documented. First Environment reviewed documentation of the monthly cleaning and inspection and the gas analyzer field calibration accuracy check. The field calibration check performed during the current reporting

period confirmed that the analyzer was operating accurately, with the reported drift within the five percent threshold established by the CAR Protocol. The manufacturer does not recommend a specific interval to perform calibrations on an ongoing basis; however, the instrument is calibrated annually according to the manufacturer's procedure by either a third party or the manufacturer. First Environment reviewed records of an annual calibration that occurred in February 2014 which indicated the analyzer was operating within the five percent threshold established by the CAR Protocol.

As identified above, a Landtec GEM was used at the end of the reporting period to record weekly methane measurements. The manufacturer of the GEM-2000 recommends factory calibration every six months. First Environment reviewed evidence of calibrations, demonstrating that the portable analyzer used was calibrated and maintained per the manufacturer's requirements.

Additionally, First Environment confirmed that the Landtec GEM-2000 used by the third party to perform the field calibration accuracy check of the flow meter and continuous methane analyzer was calibrated and maintained per the manufacturer's requirements.

Table 2 shows the dates relevant to the current reporting period when instrument QA/QC was performed.

TABLE 2: Instrument QA/QC

Monitoring Equipment	Calibration	Field Checked	Inspected/Cleaned
Rosemount Mass ProBar flow meter	1/16/2013	11/18/2014	7/15/2014; 9/12/2014; 11/15/2014
Siemens Ultramat 23 gas analyzer	2/20/2014	11/18/2014	7/29/2014; 8/26/2014; 9/30/2014; 10/29/2014; 11/15/2014
Landtec GEM-2000 (s/n 12120)	10/21/2014	Prior to use	Prior to use

6.3.3 Project Emissions

Project emissions sources and the associated monitoring methodology are summarized in Table 3.

TABLE 3: Project Emissions

Project Emissions Source	Monitoring
Purchased Electricity	Monthly utility invoices
Propane consumption	Estimate based on tank volume

6.4 Emissions Reduction Calculation Assessment

The emission reduction calculations were reviewed to ensure accuracy in the formulas used and the raw data used as inputs. The formulas were tested to ensure consistency with the calculation methodology described in the CAR Protocol.

Total landfill gas flow is computed by multiplying the average landfill gas flow rate in a given interval by the length of the interval. Flow totals are aggregated on a daily basis. Metered gas

flow volumes were automatically corrected to standard conditions at one atmosphere of pressure and a temperature of 60ºF by the Rosemount instrument. The total volume of methane destroyed by the Project was computed in daily intervals by multiplying the daily gas flow to the flare by the daily or weekly average of methane concentration measurements and is converted to a mass flow using the density of methane at 60ºF and one atmosphere of pressure. The total quantity of methane destroyed by the Project is aggregated monthly and summed over the reporting period to obtain the total baseline emissions. Project emissions were calculated by multiplying activity data by an appropriate emission factor. The total emission reductions were determined by subtracting the project emissions from the baseline emissions.

Table 4 summarizes the input parameters used in the emission reduction calculations.

TABLE 4: Input Parameters

Input Parameter	Name	Description/ Value
$LFG_{i,t}$	Total quantity of landfill gas fed to flare	Summed daily from metered data, internally corrected to 60ºF and one atmosphere of pressure
$PR_{CH4,t}$	Methane content	Averaged daily from continuously recorded data, or averaged weekly from periodic Landtec GEM methane concentration readings
DE_i	Default destruction efficiency for open flare	96%
OX	Oxidation Factor	10%
DF	Discount Factor	0 -or- 10% during periods when weekly methane readings are applied
Flare Temperature Cut-off	Metered data below corresponding temperature cut-off are excluded from calculations.	500ºF
EF_{FF}	Propane emission factor	5.74 kg CO_2/gal
EF_{EL}	Purchased electricity emission factor	1,354.09 lb CO_2/MWh

Copies of the raw data used in the calculations, including flow data, methane content data, and utility and other fossil fuel invoices, were compared with the data used in the final calculations and tested for transcription or mathematical errors. A representative sample of raw data sources and all calculations over the entire verification period were reviewed. First Environment performed recalculations of emission reductions for the entire reporting period to assess whether they were free of material misstatement. First Environment found the emission reduction calculations to be free of material misstatement.

6.5 Approved Variance or Deviations

No variances or deviations were requested for the Project in this reporting period.

7. Verification Conclusion

Based on the evidence collected and the assessments performed, First Environment concludes that the Project's GHG emissions reductions, achieved through the collection and combustion of landfill gas for the period July 1 through December 31, 2014, can be considered with a reasonable level of assurance:

- in conformance with the verification criteria, and
- without material discrepancy.

Verified results show:

Reporting Period: July 1 to December 31, 2014	Total
Baseline Emissions (tCO_2e)	118,967
Project Emissions (tCO_2e)	260
Emissions Reductions (tCO_2e)	118,707

8. Lead Verifier Signature

Jeff Daley
Environmental Specialist

9. Senior Internal Reviewer Signature

Michael Carim
Senior Associate