



Verification Report for

Bi-County Landfill Gas Destruction Project Woodlawn, Tennessee USA

CAR790, Climate Action Reserve

U.S. Landfill Project Protocol Version 3.0

May 7, 2014

Report Prepared for

Bi-County Gas Producers, LLC
10600 Nations Ford Road, Ste
150
Charlotte, NC 28273

Report Prepared by

NSF International Strategic
Registrations, Ltd.
789 N. Dixboro Road
Ann Arbor, MI 48105
USA

Summary

Bi-County Gas Producers, LLC (BCGP) engaged NSF-ISR Strategic Registrations, Ltd. (NSF-ISR) through a third party to verify its methane emission reductions from the Bi-County Landfill Gas Destruction Project reported to the Climate Action Reserve for the reporting period January 1, 2013 to December 31, 2013. The Bi-County Landfill Gas Destruction Project (the Project) is listed in the Reserve's database with the identification number CAR790.

BCGP's methane emission reductions during the cited period resulted from the collection and destruction of landfill gas in engine sets and an open flare at the Bi-County Landfill facility located in Woodlawn, Tennessee.

The Project reduced emissions into the atmosphere by 68,840 metric tons CO₂-e for the reporting period.

1. Introduction

1.1 Objective

The objective of this verification audit was to determine, with reasonable assurance, that BCGP had quantified, monitored, and fairly reported to the Climate Action Reserve its landfill gas emission reductions at the Landfill in accordance with all applicable requirements of the Climate Action Reserve Landfill Project Protocol Version 3.0, including continued eligibility.

1.2 Scope

The scope of the engagement included project eligibility, quantification, monitoring, and reporting of greenhouse gas project emission reductions associated with the operation of engine sets and an open flare at the Bi-County Landfill from January 1, 2013 to December 31, 2013.

1.3 Criteria

BCGP implemented its methane emission reduction project in accordance with the requirements of the Climate Action Reserve's Landfill Project Protocol Version 3.0 (December 2, 2009) and Errata and Clarifications (January 21, 2014). The verification methodology conformed to the requirements of the Climate Action Reserve Program Manual (October 26, 2011), the Climate Action Reserve Verification Program Manual (December 20, 2010), and ISO 14064:2006 Part 3, *Greenhouse gases – Specification with guidance for the validation and verification of greenhouse gas assertions*.

1.4 Materiality

In accordance with the Climate Action Reserve Verification Program Manual, emission reduction reports were considered fairly stated if they varied by no more than 3% from a complete statement of the project's methane emission reductions for projects registering more than 25,000 Climate Reserve Tons (CRTs) but less than 100,000 CRTs in a 12 month period. In

Project Verification Report

addition, qualitative misstatements, where the emission reduction project implementation does not conform to the requirements of the CAR program and protocols were also considered material. For this reporting period, emission reductions were demonstrated for a 12-month period to determine the appropriate materiality threshold of 3%.

1.5 Level of Assurance

This engagement was performed at the reasonable level of assurance.

2. Verification Approach

2.1 Team Appointment and COI Review

This verification was performed by Michael DeBusschere, NSF-ISR Lead Verifier. Conflict of Interest inquiries were completed for NSF-ISR, and for the verification team, which included Tina Sentner, NSF-ISR's internal reviewer. A finding of low COI risk was confirmed by the Climate Action Reserve.

2.2 Document Review

The verification team conducted a document review to inform the planning process in advance of performing verification activities. Documents reviewed this period included BCGP's project documentation submitted to the Climate Action Reserve, project reports, gas flow meter and methane analyzer data, calibration documentation, a project monitoring plan, regulatory compliance attestations and supporting documents, and equipment information related to monitoring equipment.

2.3 Planning

NSF-ISR's verification approach is risk-based. It draws upon our understanding of risks to fair statement of reported emissions and the operation of controls to reduce such risks. As a result of the document review and preliminary conversations with BCGP personnel based in Charlotte, North Carolina and in Woodlawn, Tennessee, a verification plan and a sampling plan were developed for this engagement.

2.4 Verification Activities

NSF-ISR conducted a site visit of the BCGP methane gas collection and destruction project operation in Woodlawn, Tennessee, on January 16, 2014. The nature of verification activities conducted included:

- Verification of the continued eligibility of the BCGP Landfill Gas Project to report emission reductions in accordance with the Climate Action Reserve Landfill Project Protocol Version 3.0;

Project Verification Report

- Verification of evidence presented by BCGP to demonstrate its ongoing knowledge of and assertion of compliance with environmental regulatory requirements applicable to the project. The primary focus of inquiry at the landfill facility was compliance with Clean Air Act requirements and solid waste handling and water discharge facility requirements subject to permitting, inspection, and enforcement by the Tennessee Department of Environment and Conservation (TDEC);
- Verification of applicable methane and carbon dioxide emission sources within the project boundary and their quantification as defined by the Climate Action Reserve Landfill Project Protocol Version 3.0.
- Verification that the Project's monitoring program and data management system addressed and recorded the Landfill Project Protocol required monitoring parameters for the reporting period to produce accurate, reliable and reproducible data and information.
- Review of the system for monitoring flow and methane concentration of collected LFG and monitoring equipment calibration and operation at the landfill;
- Verification that the Project's records management system contained procedures for acquisition and retention of all Landfill Project Protocol required information, and that such procedures have been implemented,
- Determination of the Project's conformity in all material respects with the requirements of the Landfill Project Protocol; and
- Reviewing the basis for and results achieved from the calculated methane emission reductions from its landfill gas collection and destruction project. Recalculation was conducted for samples of calculated variables or intermediary as presented in the Project's calculation spreadsheet.

3. Verification Findings

3.1 Project Description

The Bi-County Landfill is a municipal solid waste facility operated by Bi-County Solid Waste Authority. The landfill began accepting waste in 1992 and has an expected lifespan of forty years. During the project period covered by this report, landfill gas was collected and subsequently combusted in generator/engine sets and a single open flare. The project installed an engine generator set in mid 2011 and an additional generator set in September 2013. The landfill gas collection system consists of extraction wells in currently active landfill areas connected to a header, which delivers landfill gas to the engines and flare location on site. The project well field, engine generator sets, and flare are operated by Bi-County Gas Producers, LLC. The landfill is not considered a bioreactor as defined by the U.S. EPA.

3.2 Eligibility

Project Verification Report

NSF-ISR considered evidence to establish the eligibility of the BCGP Project under the Landfill Gas Protocol Version 3.0. The project continues to meet the eligibility requirements.

Location. The project is located within the United States of America in Woodlawn, Tennessee. The location was previously confirmed after the first BCGP project reporting period and again by a site visit by NSF-ISR on January 16, 2014.

Project Start Date. The project start date was listed as October 7, 2010, the day the open flare became operational. The start date was previously verified in the first reporting period in 2011. During the NSF-ISR visit for this reporting period, BCGP provided various documents to support the evidence of construction of the landfill gas project such as the third party construction reports for the installation of the gas collection and conveyance system, pre-installation design drawings, well field drilling logs for the first phase of well installation, initial data logger reports and a start up service order for the installation of the flare skid. NSF-ISR concluded these documents confirmed the project start date of October 7, 2010. In mid 2011 an engine set was added to the site for purposes of generating electricity from landfill gas destruction. In September 2013 another engine set was constructed and started up to increase electricity production. The new engine set was accompanied by an upgraded skid dehydration and fan fin system to allow for increased LFG flow.

Crediting Period. The crediting period for landfill projects is 10 years from the project start date. The crediting period for the BCGP project extends to October 6, 2020. NSF-ISR has concluded that the reporting period verified in this report is within the first crediting period of the Project.

3.3 Additionality

Legal Requirement Test. During the site visit, BCGP affirmed that the project continued to be implemented voluntarily. The Bi-County Landfill design mass threshold of 9.3 megagrams exceeds 2.5 million MG of Municipal Solid Waste and was therefore, subject to NSPS regulation requiring the facility to conduct Non-Methane Organic Compound (NMOC) emission rate testing. The most recent Tier II NMOC Emission Rate Report for Bi-County Landfill was conducted on March 6-7, 2012 with a result of 23.5 Mg/yr NMOC estimated for 2013. The test results indicated that the Bi-County Landfill is not expected to reach an NMOC level of 50 Mg/year until well beyond 2017. NSF-ISR reviewed the Solid Waste Permit, Title V Permit, Engine Set and Flare Permits from the Tennessee Department of Environment and Conservation (TDEC). In addition, BCGP received a letter from the TDEC stating acceptance of Tier test results and that no LFG destruction was required based on the Tier II results. Therefore, there was no evidence observed requiring a mandatory installation of a gas collection and conveyance system. In addition, NSF-ISR verified the project proponent conducted a legal and regulatory review of the Bi-County Landfill. The review indicated the landfill is in compliance with Federal, State, and Local regulations and that there are no laws, statutes, regulations, court orders, environmental mitigation agreements, permitting conditions, or other legally binding mandates requiring the destruction of landfill gas. Lastly, NSF-ISR reviewed an attestation of voluntary implementation signed by Bi-County Gas Producers, LLC on January 9, 2014 for the period from January 1 through December 31, 2013. From this review NSF-ISR has concluded that the project implementation remains voluntary.

Project Verification Report

Performance Standard Test. NSF-ISR determined during the site visit that the Bi-County Landfill had not collected and destroyed any landfill gas prior to the implementation of the Project. Interviews with the site manager and review of drawings and aerial photography of the site prior to the BCGP project confirmed there were no solar flares devices connected to the leachate riser system or previous qualifying destruction devices installed onsite. In addition, NSF-ISR reviewed the Solid Waste Permit and the Title V Permit for Bi-County Landfill and no evidence of a pre-existing destruction device was observed or required of the site. The project proponent meets the performance standard threshold under option 1: “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.” According to the Protocol, a project developer who has once passed the performance standard test remains eligible to register reductions for the lifetime of the project crediting period, as long as the project is not otherwise determined ineligible due to regulatory changes that impact the project’s voluntary implementation. NSF-ISR has concluded from its review, that the project has met the performance standard test.

3.4 Regulatory Compliance

NSF-ISR reviewed the Attestation of Regulatory Compliance signed by Bi-County Gas Producers, LLC affirming the project’s compliance status throughout the project reporting period of January 1 through December 31, 2013. During the site visit and desk review activities, NSF-ISR reviewed the regulatory review of the Bi-County Landfill conducted by the project proponent. An on-site compliance inspection by a third party had also been conducted in 2013. NSF-ISR interviewed the landfill and project managers regarding legal and regulatory compliance tracking systems and reviewed recent inspections for the landfill. From a sample of inspections reports reviewed over the reporting period of the project, there were no notices of violations observed. In addition, the Project’s monitoring plan was observed to contain procedures for maintaining and monitoring ongoing legal and regulatory compliance. In addition, NSF-ISR reviewed the installation notifications, permits and source test report for the new engine set and found it to be on compliance with TDEC and US EPA requirements. As a cross-check, NSF-ISR reviewed the EPA’s publicly available Office of Enforcement and Compliance History database (ECHO), and found no Notices of Violation had been recorded in the database in this reporting period under the Clean Air Act, National Pollution Discharge Elimination System, or Resources Recovery and Reclamation Act. From this evidence, NSF-ISR has concluded that the Project and the Bi-County Landfill remain in material compliance with applicable laws and regulations during the reporting period.

3.5 Ownership

The Bi-County Solid Waste Authority owns the Bi-County Landfill. Ownership was confirmed through review of organizational documents and various regulatory permits issued from TDEC such as the Solid Waste and Title V Operating permits. NSF-ISR also reviewed the Landfill Gas Purchase Agreement between the Bi-County Solid Waste Authority and BCGP dated October 12, 2009, which transfers all rights to landfill gas reductions, energy production and green house gas reductions to BCGP. During the current reporting period, NSF-ISR confirmed there were no

Project Verification Report

changes to ownership and reviewed the Attestation of Title dated January 9, 2014 concerning ownership of landfill gas emission reduction credits for the period January 1 through December 31, 2013. This document asserts that the project applicant had legal rights to any emission reduction credits to be issued. From this evidence, NSF-ISR has concluded that the project developer, Bi-County Gas Producers, LLC, is entitled to receive the emission reduction credits that may be issued by the Climate Action Reserve for methane destroyed during the project period.

3.6 Project Boundaries and Emission Sources

The Project included all emission sources from the operation of the landfill gas collection system to the ultimate destruction of the landfill gas at an engine set and open flare. The sources of GHG emissions reviewed in the BCGP were as follows.

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

- CH₄ vented to the atmosphere.
- CO₂ from the oxidation of CH₄ by soil bacteria. As the landfill was not completely covered with a synthetic liner, the Climate Action Reserve Landfill Project Protocol Version 3.0 assumption that 10% of the methane produced would be naturally oxidized by soil bacteria has been applied.

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

- CH₄ from the incomplete combustion of CH₄ in the flare and engine sets.
- CO₂ from the combustion of fossil fuels used during operation and maintenance activities for the project.
- CO₂ resulting from the consumption of imported electricity.
- The gases reviewed include CO₂ and CH₄.

All gases have been converted to CO₂ equivalents.

3.7 Performance Against Project Protocol/Methodology

The Project was implemented in conformity with the Climate Action Reserve Landfill Project Protocol Version 3.0 and its errata.

Monitoring and Operations Plan. In accordance with the Landfill Project Protocol requirements, Bi-County Gas Producers, LLC established a monitoring and operations plan which is described in a document entitled “Monitoring Manual for the Bi-County Landfill Gas Destruction Project 4.0”. This document addresses flow and methane concentration monitoring, facility and data management system operations, and describes how relevant parameters required by the Landfill Project Protocol Table 6.1 are to be collected and reported. In addition, Missing Data calculation procedures were reviewed for consistency with the Landfill Project Protocol requirements and the protocol’s Errata and Clarifications document. No discrepancies with requirements were found. The monitoring plan records are kept for a minimum of ten years

Project Verification Report

when the information is first generated. NSF-ISR concluded that the project met the monitoring requirements in version 3.0 of the Landfill Project Protocol.

Monitoring Equipment. Engine sets and flare layout and related monitoring equipment were reviewed for conformity with the LF Protocol requirements. The primary data gathered for the project was landfill gas flow, pressure, temperature, and methane content of the landfill gas. Three Lambda Square Venturi 2350 model mass flow meters were utilized for the project and used alternatively to ensure uninterrupted metering during semi-annual calibration events. The flow meters continuously monitored flow after the blower, a knockout and a demister prior to combustion in the engines, and after the blower and knockout prior to the flare. In addition to the venturi flow meters, temperature and pressure were continuously monitored by a thermocouple and an Endress & Hauser Deltabar PMP41. The Lambda Square flow measurement devices are configured to measure flow at actual conditions and is corrected to 59 deg F and 1 atmosphere. However the project has appropriately adjusted flow to 60 degrees and 1 ATM in the emission reduction calculations. The position of the flow meters were adequate to ensure laminar flow. The flow meters were inspected and cleaned on a quarterly basis by BCGP and calibration checked on-site semi-annually by a third party. Third party inspections/calibrations occurred on June 12 and December 12, 2013. Field inspection and cleaning occurred on January 28, April 26, July 15 and October 22, 2013 showing the activities performed and the as left/as found condition of the instrument documented. The calibration conducted showed all flow meters to be within tolerances for each of the quarterly inspections and both of the third party calibrations. In addition, based on web site OEM manual calibration requirements, the project conducted calibration and field checks in excess of that required by the instrument manufacturers. Based on this review, NSF-ISR concludes the project reported accurate flow data.

Flow metering is conducted at the main landfill outflow to the destruction system, to the flare and one meter to both engines. Both engines have the same default destruction efficiency for lean burn engines of 93.6% in calculating emission reductions. Application of the same destruction efficiency for both engines in the calculation of emission reductions was verified by NSF-ISR.

Methane concentration is measured continuously with a Siemens Ultramat 23 methane concentration analyzer. The Siemens Ultramat 23 instrument was factory calibrated prior to installation in September 2010. The Ultramat 23 was inspected, cleaned, and calibrated semi-annually in the field by a third party and found to be within tolerance thresholds. These events occurred on June 12, 2013 and December 11, 2013 within two months of the end of the reporting period. The Ultramat was also field checked quarterly by on-site BCGP personnel on January 28, April 26, July 15 and October 22, 2013. There were no failures noted from the field checks, and the Ultramat was within acceptable zero and span tolerances. In addition, self-calibration checks to a cylinder of mixed nitrogen, carbon dioxide, and methane were performed automatically on a periodic basis. Calibration procedures and logs for the flow meter and gas analyzer demonstrated consistency with the requirements of the Protocol and manufacturer calibration requirements.

Temperature and hours of operation are continuously monitored via thermocouples mounted after the blower and within the shroud of the flare. The flare operations are programmed to automatically alert project individuals via phone if the flare system goes down. The system will shutdown automatically eliminating flow to the flare if flare temperature drops below 500 deg F.

Project Verification Report

Destruction devices are continuously monitored for operational status. A site wide PLC (programmable logic controller) system records whether the flare or engine(s) are operating. For engines, electric output assumes that the device is operation. When there is no kilowatt output from an engine, no gas may flow through the gas train to that engine. For the flare, the thermocouple installed inside the flare shroud continuously records whether the flare is operating. The PLC automatically shuts down flow to the flare when the temperature drops below a minimum set point of 500 degrees. Further, the PLC also knows when the isolation valve to the flare is open or closed. In the case of a system wide shutdown (power loss), the flare valve closes automatically.

Operation and Performance. Raw data from the flow meters, Ultramat 23 gas analyzer and temperature thermocouples is continuously collected every five minutes automatically onsite by a Eurotherm Chessle 6100A chart recorder which downloads data to the site operator's computer data acquisition device. Once a week, raw data is downloaded from the computer and transmitted to Bi-County Gas Producers, LLC. The raw data is stored for recordkeeping retention and emission reduction calculations. For data control and quality purposes, any measurements when flare temperature recorded below 500°F were excluded from emission reduction calculations. Data is generally stored indefinitely by the project; however at a minimum the data is stored for a period of 10 years after the information is generated or 7 years after the last verification. In addition the site operator reviews daily system operation as shown by a PLC screen display for anomalies, and makes weekly reports of operations to the BCGP carbon manager.

3.7 Project Management System

NSF-ISR verified the Project's management system during document review and during the on-site visit at the Project. NSF-ISR interviewed Bi-County Gas Producers, LLC management in addition to the personnel with specific responsibility for implementing the emission reduction project during this reporting period. In particular, NSF-ISR reviewed for adequacy the following elements:

- Definition and maintenance of an appropriate control environment by landfill management and personnel;
- Inspection regime and use of data cross checks on system operation against norms established for the site;
- Training and competence of landfill project managers and operating personnel, including contractors;
- Identification and management of legal requirements related to landfill operations;
- Identification and maintenance of records required by the landfill project;
- Landfill site and gas collection and combustion equipment specifications;
- Quantification methods and calculations of project emissions; and
- Checking and corrective action mechanisms.

NSF-ISR found a sufficient control environment for the project, including information management, authorizations for key activities, management reviews, and recordkeeping.

Project Verification Report

3.8 Calculation of GHG Emission Reductions

NSF-ISR verified the calculated project emission reductions on a sampling basis from information derived from raw data for the reporting period. The verification team reviewed data downloaded into excel spreadsheets for monthly destruction periods. NSF-ISR verified data for completeness, scanned the data for data gaps and for out-of-range values, reviewed spreadsheet formulas for consistency with protocol equations, and recalculated emission reductions. The verification team also verified the correct calculation of project emissions based upon evidence of fossil fuel consumption, and indirect CO₂ emissions from the use of electricity from the grid. BCGP emission reductions were calculated per the formula defined in the Climate Action Reserve Landfill Gas Protocol Version 3.0. The basic formula was:

Landfill gas destroyed

- the portion of methane oxidized in the baseline scenario (as the landfill is not covered with a synthetic liner, the Landfill Project Protocol assumption that 10% of the methane produced would be naturally oxidized by soil bacteria was applied),
 - carbon dioxide emissions from fossil fuel consumption,
 - methane emissions from incomplete destruction of natural gas (not applicable),
 - indirect carbon dioxide emissions resulting from the use of electricity from the grid,
 - pre-project adjustment for methane destruction in the baseline scenario (not applicable),
 - the discount factor to account for uncertainties associated with the project monitoring equipment (not applicable)
- = Project Emission Reductions.

NSF-ISR verified gas flow was adjusted from 59 degrees F and 1 ATM to standard temperature and pressure of 60 degrees F and 1ATM as required by the Landfill Project Protocol. For data control and quality purposes, any measurements when flare temperature recorded below 500°F were excluded from emission reduction calculations.

NSF-ISR verified the correct calculation and emission factors used for project emissions based upon evidence of fossil fuel consumption (propane as supplemental fuel for the flare), and indirect CO₂ emissions from the use of electricity from the grid using current EPA e-GRID factors, as allowed by the Protocol.

NSF-ISR verified Missing Data calculation procedures were reviewed for consistency with the Landfill Project Protocol requirements and the application Errata and Clarifications document. There were no instances of missing data observed during the reporting period.

As a result of NSF-ISR's verification process, we conclude BCGP emission reductions are fairly quantified and without material error.

3.9 Corrective Action Requests

All requests for corrective action raised by NSF-ISR during this reporting period were addressed to NSF-ISR's satisfaction and closed. These findings are detailed in our List of Findings, a private document.

Project Verification Report

3.10 Approved Variances or Deviations

No variances were requested or deviations approved for the Project.

4. Verification Results

4.1 Verification Team Recommendation

Based on the verification activities described above, the verification team has concluded that the project has achieved the following emission reductions:

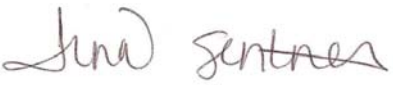
Reductions/Removals during the current reporting period in metric tons CO ₂ -e	01 January to 31 December, 2013
Project Baseline Emissions	69,287
- Project emissions	447
- Project adjustments (explain)	
= Net project emission reductions/removals	68,840

The numbers listed above are summary data, with significant figures shortened for the purpose of providing an overview within this report."

4.2 Verification Audit Summary

Project Developer	Bi-County Gas Producers, LLC 10600 Nations Ford Road, Ste 150 Charlotte, NC 28273
Project Location	Bi-County Solid Waste Authority Landfill 3212 Dover Road Woodlawn, Tennessee 37191
Project Type	Landfill gas collection and destruction
Project Period	January 1, 2013 – December 31, 2013
Protocol/Methodology	Climate Action Reserve Landfill Project Protocol Version 3.0
Emissions/Removals Verified	Vintage 2013: 68,840
Verification Conclusion	Based upon the verification activities described above, NSF-ISR has concluded that Bi-County Gas Producers, LLC's reported 68,840 metric tons reported to the Climate Action Reserve for period of January 1, 2013 - December 31, 2013, are, in all material respects, fairly stated.

Project Verification Report

Lead Verifier	 Michael DeBusschere, May 7, 2014
Internal Reviewer	 Tina Sentner, May 8 2014
<i>This verification statement is valid when signed and dated by an NSF-ISR internal reviewer.</i>	