

# **Verification Report for the Seneca Meadows Landfill Expansion Project Waterloo, New York**

**Reporting Period: July 1, 2011 to  
December 31, 2011**

**American Carbon Registry**

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## TABLE OF CONTENTS

1. Introduction .....	1
2. Objectives .....	1
3. Verification Scope .....	1
4. Standards Used to Verify Emissions (Criteria) .....	1
5. Overview of the Verification Process .....	2
5.1 Conflict of Interest Review .....	2
5.2 Audit Team .....	2
5.3 Audit Kick-off.....	2
5.4 Development of the Verification Plan .....	3
5.5 Site Visit.....	3
5.6 Emissions Reduction Data and Calculation Assessment .....	3
5.7 Corrective Actions and Supplemental Information.....	3
5.8 Verification Reporting.....	3
6. Project Conformance with Verification Criteria .....	3
6.1 Project Description.....	3
6.2 Eligibility.....	4
6.3 Offset Title .....	4
6.4 Additionality .....	4
6.5 Project Monitoring and Management System.....	5
6.6 Emissions Reduction Calculation Assessment.....	6
7. Audit Results.....	8
8. Verification Conclusion.....	8
9. Lead Verifier Signature .....	9
10. Independent Internal Reviewer Signature.....	10

## 1. Introduction

This report is provided to Seneca Meadows, Inc. (SMI) as a deliverable of the American Carbon Registry (ACR) project verification process. This report covers the verification of the Seneca Meadows Landfill Expansion Project (the Project) for the period from July 1 to December 31, 2011. First Environment, Inc. (First Environment) conducted the verification from May to July 2012.

## 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 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:

<b>Geographic Boundaries</b>	Seneca Meadows Landfill Waterloo, New York, USA
<b>Greenhouse Gases Verified</b>	Emissions reductions (expressed in units of Carbon Dioxide equivalents (CO <sub>2</sub> -e) resulting from methane destruction; Project emissions of CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O from purchased electricity and fossil fuel combustion
<b>Reporting Period</b>	July 1 to December 31, 2011
<b>Data Sources</b>	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	<ul style="list-style-type: none"><li>• ACR Standard, Version 2.0, February 2010</li><li>• EPA Climate Leaders Greenhouse Gas Inventory Protocol Offset Methodology for Landfill Methane Collection and Combustion, Version 1.3, August 2008</li><li>• GHG Project Plan, Dated March 2011</li></ul>
Verification Process	<ul style="list-style-type: none"><li>• ACR Verification Guideline for GHG Projects, Version 1.1, June 2012</li><li>• ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006</li></ul>

Level of Assurance	Reasonable assurance
Materiality	Misstatements greater than five percent of the Project's emission reductions assertion are considered material. Qualitative non-conformities with the verification criteria are also considered material.

## 5. Overview of the Verification Process

To review the Project's GHG information, the following verification process was used:

- conflict of interest review;
- selection of Audit Team;
- initial interaction and kickoff meeting with primary SMI contact;
- development of the verification plan and sampling plan;
- review and evaluation of GHG information systems and data;
- site visit;
- follow-up interaction with SMI contact for corrective action or supplemental data as needed; and
- final statement and report development.

The verification process was utilized to gain an understanding of the Project's emission sources and reductions, 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.

### 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. A project-specific conflict of interest form was also filed with ACR during the first verification for the Project.

### 5.2 *Audit Team*

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

Lead Verifier – Michael Carim  
Verifiers – Ross MacWhinney, Ellen Reid  
Internal Reviewer – James Wintergreen

### 5.3 *Audit Kick-off*

The verification audit was initiated with a kick-off meeting on May 7, 2012 with the primary SMI contacts. The meeting focused on confirming the scope, schedule, and data required for verification.

#### **5.4 Development of the Verification Plan**

The 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 verification process during the kick-off meeting. SMI was afforded the opportunity to comment on the key elements of the plan for verification. Based on items discussed and agreed upon with SMI, 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**

Michael Carim conducted a site visit on June 5, 2012 to survey the project area, assess data management systems, and interview personnel relevant to project monitoring.

#### **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 made requests for corrective action and clarification during the verification process. SMI provided sufficient responses to all corrective action and clarification requests. These requests and SMI's responses are described in detail in Section 7 of the report.

#### **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 SMI, along with a verification statement. Both the report and statement are submitted to ACR as part of the verification reporting process.

### **6. Project Conformance with Verification Criteria**

#### **6.1 Project Description**

The Seneca Meadows landfill is owned and operated by Seneca Meadows, Inc. and is located in Waterloo, New York. The Project consists of the installation of a gas collection and control system at the landfill. The Project collects landfill gas (LFG) generated from solid waste and combusts it in engines to produce electricity or in auxiliary flares. This process results in a permanent reduction in CO<sub>2</sub>-equivalent emissions through the destruction of methane in LFG.

Although the landfill is subject to NSPS regulations regarding LFG emissions, gas collection and destruction is not mandated in expansion cells of the landfill for the first five years from the initial placement of waste in the cell or after two years from the time the cell reaches final grade, whichever is sooner. The project can only create emission reductions in these cells in the years before they become subject to NSPS requirements.

The baseline scenario is defined as the unmitigated release of LFG from the landfill to the atmosphere, less methane that is oxidized by soil bacteria. Combustion of LFG controlled by the project destroys the methane in the LFG, resulting in a reduction in CO<sub>2</sub>-e emissions.

The GHG Project Plan provides additional details about the Project.

## **6.2 Eligibility**

The Project meets the eligibility requirements set forth in the ACR Standard and Climate Leaders Protocol. Project boundaries are consistent with those identified in the GHG Project Plan and were reconfirmed during the site visit performed in June 2012.

The Project is located within the United States and has a start date after January 1, 2000. The Project occurs in several phases as the landfill is expanded into new cells; therefore, each cell has its own start date and crediting period. The crediting period for each expansion begins on the date of the first placement of waste in the cell.

The current reporting period only includes gas collected from the Southeast Bumpout (SBO) cell of the landfill; the Project has not expanded beyond this cell to date. Waste was first placed in the SBO on December 17, 2008; therefore, this serves as the start date for the crediting period for this cell. The start date for this cell was confirmed in correspondence with the New York State Department of Environmental Conservation. Additionally, the GHG Project Plan includes discounting of any gas collected from ineligible cells of the landfill within the radius of influence of wells in the SBO; the methodology and calculations for this adjustment to gas flow totals are described in Section 6.5 and 6.6 below.

The GHG Project Plan describes the process that SMI will employ to identify and address negative community or environmental impacts. No negative impacts were recorded during the current reporting period.

## **6.3 Offset Title**

SMI owns and operates the landfill, the gas collection system, and the two enclosed flares. Because SMI owns the emission source controlled by the Project, they are appropriately identified as the entity holding offset title. Additionally, Innovative Energy Systems, the operator of the LFG-to-energy plant that destroys LFG generated by the landfill, provided correspondence waiving any right to claim credit for GHG emission reductions from the Project. Therefore, First Environment concluded that SMI holds title to emission reduction credits associated with the Project.

## **6.4 Additionality**

The Project satisfies the requirements for the demonstration of additionality specified by the ACR Standard by passing an approved performance standard and a regulatory additionality test.

The project consists of the voluntary expansion of a landfill gas collection and combustion system that collects LFG and destroys it in engines to produce electricity or in enclosed flares and therefore exceeds the performance standard defined by the Climate Leaders Protocol.

Because the Project occurs at expansion cells at an NSPS site, gas collected is not subject to control requirements until five years from the first placement of waste in an expansion cell or two years after it reaches final grade. During the current reporting period, the project involves collection of LFG only from the SBO. Waste was first placed in this cell on December 17, 2008 and gas collection activities began in 2010. Based on the dates of expansion into the SBO, LFG collected and combusted during the current reporting period is considered additional because it is not yet required under NSPS regulations until 2013.

No state or local laws mandate the collection and destruction of landfill gas prior to the timelines established by federal NSPS regulations.

### **6.5 Project Monitoring and Management System**

The project was implemented in conformity with the GHG Project Plan. Significant aspects of the project's monitoring plan are discussed below.

Total LFG destroyed by the project is measured continuously using a Magnetrol Thermo Model TA2 mass flow meter. The site owns two meters and operates one with the other meter rotated in as needed due to ongoing meter maintenance or every two years for calibration. Flow meter S/N 10829-01-002 corrects ambient flow conditions to a standard temperature and pressure of 60°F and one atmosphere, while flow meter S/N 10829-01-001 corrects to 70°F and one atmosphere. Flow data is recorded electronically through a SCADA system and downloaded by SMI personnel.

Table 1 below shows the dates during the reporting period that each meter was installed during the reporting period.

**Table 1: Flow Meter Dates of Service**

Dates of Service	Flow Meter S/N	Reason for Removal
July 1, 2011 – August 12, 2011, 13:09	10829-01-002	Routine replacement
August 12, 2011, 13:10 – 12/31/2011	10829-01-001	N/A – in use through end of reporting period

A semi-annual inspection of meter No. 10829-01-002 was performed on August 12, 2011 in accordance with the GHG Project Plan. Meter No. 10829-01-001 was also inspected on August 12, 2011 when it was reinstalled. Flow meter accuracy checks performed with a Pitot tube showed both instruments to be reporting within  $\pm 5$  percent.

The instruments' manufacturer recommends factory calibration every two years. Because each meter was last calibrated in 2010, no factory calibration is due during the current reporting period.

Methane concentration in LFG is measured using either a GEM-2000 or one of two Elkins Envision handheld instruments owned by SMI. Measurements are taken each business day of operation and logged in the monitoring instrument. Data is later downloaded from field PCs into electronic spreadsheets. The GEM-2000 and Elkins Envision handheld instruments are calibrated in the field using a reference gas of known concentration prior to each use and internal calibrations are performed according to manufacturer's recommendations.

The GHG Project Plan specifies a calibration interval of one year for the Envision instrument. Both Envision analyzers used by SMI were calibrated on July 21, 2011. The GHG Project Plan identifies a calibration interval of six months for the GEM-2000. The GEM-2000 was last calibrated in April 2011 and was not used after July 22 in this reporting period. This gas analyzer, therefore, was not due for a semi-annual internal calibration during the reporting period.

Because combustion devices destroy gas from both eligible and ineligible cells of the landfill, gas flow and methane measurements must be taken prior to any co-mingling of these gas streams. First Environment confirmed that the flow meter and point of measurement are both located along the header pipe for the SBO prior to tie-in to larger headers that carry gas from other sections of the landfill. Proper placement of metering equipment was confirmed through a review of engineering diagrams for the gas collection system and observations made during the site visit.

The potential also exists for the collection wells closest to this boundary of the SBO to influence and collect gas from adjacent, ineligible cells of the landfill. Temperature, pressure, and vacuum readings are taken at each of the horizontal and vertical collectors for the SBO primarily using one of the Elkins Envision instruments or the GEM-2000 gas analyzer as a backup. These readings are used to calculate the monthly radius of influence (in feet) using Darcy's Law as presented in the GHG Project Plan. First Environment reviewed SMI's calculations to determine the effective radius of influence of perimeter wells, and performed recalculations of radii of influence for each affected well and concluded that appropriate deductions are made in emission reduction calculations.

Both gas flow and methane concentration measurements are taken on a wet basis. Because the points of measurement on the header pipe completely isolate gas flow and methane data from the SBO, no additional measurements or adjustments are necessary to capture eligible project data.

Activity data for purchased electricity and fossil fuel consumption are monitored according to the GHG Project Plan. Monthly quantities of purchased electricity for project equipment are obtained from meter reads by project personnel. Fuel consumption during project construction and propane consumed for flare assistance is logged on field forms.

The monitoring approach described in the GHG Project Plan and implemented on site meets the requirements of the Climate Leaders Protocol and the ACR Standard.

## **6.6 Emissions Reduction Calculation Assessment**

As part of the emissions reduction calculation assessment, the Project's assumptions and calculations were reviewed.

Emission reduction calculations were reviewed to ensure accuracy in the formulas used and the raw data used as inputs. Formulae were tested to ensure they were consistent with the calculation methodology described in the Climate Leaders Protocol and GHG Project Plan. A 10 percent methane soil oxidation factor was applied in emission reduction calculations in accordance with the Climate Leaders Protocol. A destruction efficiency of 98.34 percent is



assigned to all combustion devices within the project boundary. This value was obtained from research performed by the Solid Waste Industry for Climate Solutions and was approved in the GHG Project Plan. Because this value is lower than the 99 percent destruction efficiency specified by the Climate Leaders Protocol, it is conservative to apply it to all combustion devices.

The amount of methane destroyed was calculated from metered data for landfill gas collected. Totalized flow was calculated from data obtained in 60-second intervals from the SCADA system. Flow data are aggregated into weekly totals. The fraction of methane in landfill gas during a given interval was determined by averaging all measurements taken in a given week.

The gas collection from the SBO may capture small amounts of ineligible gas from adjacent cells that are subject to NSPS regulations. Therefore, the radius of influence calculation described in the GHG Project Plan is required for the current reporting period. A radius of influence was calculated for each of the vertical and horizontal collector wells along with the percentage of the collectors influencing the adjacent ineligible cells. This percentage represents the amount of ineligible gas potentially collected, and the corresponding discount is then applied to monthly volume of methane destroyed.

The total volume of methane destroyed by the Project is computed using Equation A from the Climate Leaders Protocol. No independent correction of the pressure and temperature of LFG flow totals is required for dates when flow meter No. 10829-01-002 was used because the flow meter corrects to standard conditions of 60°F and one atmosphere, which is consistent with the assumptions of the Climate Leaders Protocol. Meter No. 10829-01-001 corrects flow measurements from ambient conditions to standard conditions of 70°F and one atmosphere. In the emissions reduction calculations, SMI correctly performed the calculations as required by Climate Leaders Equation A to correct flow values from this meter to a standard temperature of 60°F and pressure of one atmosphere for data recorded by meter No. 10829-01-001.

Data substitutions were performed for gas flow and methane concentration data in several instances during the reporting period. All substitutions were performed in accordance with the procedure specified in the GHG Project Plan. The Project also achieved the minimum data recording thresholds described in the GHG Project Plan as eligibility conditions for performing data substitution.

Project emissions were subtracted from total volume of methane destroyed and quantified using Equation B from the Climate Leaders Protocol. Project emissions were calculated by multiplying activity data by an appropriate emission factor. Project emissions sources consisted of purchased electricity to power project equipment, propane used to start flares, and mobile combustion of gasoline and diesel from project-related construction activities.

There are no leakage emissions associated with the Project; therefore, these are assigned a value of zero in Equation C from the Climate Leaders Protocol.

Total emission reductions were computed using Equation D from the Climate Leaders Protocol. All emission sources within the project boundaries are properly accounted for in calculations.

Copies of the raw data used in the calculations, including flow data and methane content data, were compared with the data used in the final calculations and tested for transcription or

mathematical errors. 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.

## 7. Audit Results

SMI provided good documentation for its emissions estimates as well as its procedures surrounding the data collection process. To complete the verification process, First Environment requested additional clarification. Through communications with the Audit Team, SMI was able to resolve all clarification requests made by First Environment during the validation process.

The following tables summarize the clarifications requested, as well as SMI's responses:

ID	Clarification Request	Summary of Participant Response	Verification Conclusion
1	In the radius of influence calculations, please clarify how the average concentrations for CH <sub>4</sub> , CO <sub>2</sub> , O <sub>2</sub> , and balance gas used in the calculation of LFG viscosity are determined in each month of the reporting period, and provide supporting documentation as necessary.	<p>SMI clarified that gas composition measurements taken on the main header pipe for the SBO are used to compute monthly averages for CH<sub>4</sub>, CO<sub>2</sub>, O<sub>2</sub>, and balance gas in LFG viscosity calculations.</p> <p>SMI also provided data on gas composition monitoring at each wellhead in the SBO during the reporting period.</p>	<p>Calculation of LFG viscosity using gas compositional data obtained from the wellfield's header pipe instead of each wellhead results in an immaterial difference with respect to total reported emission reductions.</p> <p>Response is acceptable.</p>

Verified results show 234,162 metric tonnes of CO<sub>2</sub>e from Vintage 2011 from the reporting period from July 1 to December 31, 2011 eligible for registration with the American Carbon Registry.

## 8. Verification Conclusion

First Environment was retained to provide verification services for the Project's GHG emission reductions assertion based on the following fundamentals:

- *Level of assurance:* Reasonable assurance.
- *Objectives of verification:* To assure project conformance with the verification criteria and ACR requirements.
- *Verification criteria:* American Carbon Registry Standard, Version 2.0, February 2010; Climate Leaders Greenhouse Gas Inventory Protocol Offset Project Methodology for Project Type: Landfill Methane Collection and Combustion, Version 1.3, August 2008.

- *Definition of materiality:* Misstatements of greater than five percent of the GHG reduction assertion and qualitative non-conformities with verification criteria are considered material.
- *Scope, including:*
  - *Boundaries of the assertion:* Seneca Meadows landfill operations;
  - *The physical infrastructure, facilities, and activities within the assertion:* LFG collection and destruction operations;
  - *GHG sources, sinks, and reservoirs included within the assertion:* CH<sub>4</sub> emissions from anaerobic decomposition of waste; CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions from combustion of fossil fuels; and CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions from purchased electricity; and
  - *The time period for the assertion:* July 1 to December 31, 2011.

Based on the assessments performed and the historical evidence collected, First Environment concludes that the Project GHG emissions reductions, due to the capture and combustion of methane gas for the period July 1 to December 31, 2011, can be considered with a reasonable level of assurance:

- consistent with the GHG Project Plan and identified verification criteria,
- without material discrepancy, and
- meeting the minimum level of accuracy of at least 95 percent.

Verified results show:

Reporting Period: July 1 through December 31, 2011	Total
Baseline Emissions (m.t.CO <sub>2</sub> e)	235,152
Project Emissions (m.t.CO <sub>2</sub> e)	990
Emissions Reductions (m.t.CO <sub>2</sub> e)*	234,162

\*as measured and calculated in accordance with the Project Methodology

## 9. Lead Verifier Signature



Michael M. Carim  
Senior Associate

**10. Independent Internal Reviewer Signature**

A handwritten signature in black ink, appearing to read "Jay Wintergreen", with a large, stylized initial "J" and a long horizontal flourish extending to the right.

James Wintergreen  
Senior Associate