

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

**Reporting Period: January 1 to June 30, 2011**

**American Carbon Registry**

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## 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 January 1 to June 30, 2011. First Environment, Inc. (First Environment) conducted the verification from December 2011 to February 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>	January 1 to June 30, 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	GHG Project Plan for Quantification of GHG Emission Reductions, March 2011 (GHG Project Plan); American Carbon Registry Standard, Version 2.0, February 2010 (ACR Standard) Climate Leaders Greenhouse Gas Inventory Protocol Offset Project Methodology for Project Type: Landfill Methane Collection and Combustion, Version 1.3, August 2008 (Climate Leaders Protocol)
Verification Process	American Carbon Registry Verification Guidelines for GHG Projects, Version 1.0, July 2010 ISO14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006

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;
- review and evaluation of raw data and calculations for period under review;
- 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 December 6, 2011 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, established project deliverables, and presented a data-sampling plan designed to review all project elements in areas of potentially high risk of inaccuracy or non-conformance.

#### **5.5 Site Visit**

Ross MacWhinney conducted a site visit on August 11, 2010 during a previous verification for the Project to assess data management systems and interview relevant personnel. A site visit was not made during this verification period and was deemed unnecessary as no significant changes have been made to landfill gas metering equipment at the project location.

#### **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 also 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 emission through the destruction of methane in LFG during combustion.

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 creates emission reductions by collecting and combusting LFG from the voluntary expansion of the gas collection and control system into new cells of the landfill. 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. Combustion of LFG controlled by the project destroys the methane in the gas, 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 confirmed during the site visit performed in August 2010.

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 tolling with 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. Waste was first placed in this cell 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. Innovative Energy Systems, the operator of the LFG-to-energy plant that destroys LFG from the landfill, has stated they will not claim credit for GHG emission reductions from the Project. Therefore, SMI is entitled 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 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.

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 elements 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 swapped in when calibrations occur. 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. Flow meter S/N 10829-01-001 reported inaccurate flows both times after being installed as part of the site's routine meter rotation. Deductions from emission reduction totals as a result of accuracy issues with this instrument are described in Section 6.6 below.

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

<b>Dates of Service</b>	<b>Flow Meter S/N</b>	<b>Reason for Removal</b>
January 1, 2011 – March 17, 2011	10829-01-002	Routine replacement
March 17, 2011 (11:23 – 15:42)	10829-01-001	Measurement inaccuracy
March 17, 2011 – May 4, 2011	10829-01-002	Routine replacement
May 4, 2011 – May 18, 2011	10829-01-001	Measurement inaccuracy
May 18, 2011 – June 30, 2011	10829-01-002	N/A – in use through end of reporting period

A semi-annual inspection of each meter was performed on March 17, 2011 in accordance with the GHG Project Plan. 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, although flow meter S/N 10829-01-001 was returned to the manufacturer for service during April 2011 due to measurement errors.

SMI also performed almost daily checks of flow meter S/N 10829-01-002 from May 18, 2011 until the end of the reporting period to ensure that the instrument was reading accurately. All

checks showed the instrument to be reading within  $\pm 5$  percent, or underreporting by more than 5 percent, meaning flow measurements obtained during this period are conservative at worst.

Methane concentration in LFG is measured using one of several GEM-2000 or Elkins Envision handheld instruments owned by SMI. Measurements are taken each business day of operation and logged in field computers by site personnel. Data is later downloaded from field PCs into electronic spreadsheets. The GEM-2000 and Elkins Envision handheld instruments are calibrated in the field prior to each use using a reference gas of known concentration and every six months by the manufacturer. During the current reporting period, two Envision instruments were used to record methane concentration measurements.

The manufacturer specifies a calibration interval of one year for the Envision instrument. Both Envision analyzers used by SMI were last calibrated on September 17, 2010, so no calibration is due during the current 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 comingling of these gas streams. 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.

The potential also exists for the collection wells closest to this boundary 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 using a GEM-2000 gas analyzer. 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.

Engine and flare operation are monitored through electrical output and flame temperature, respectively.

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. The formulas 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. Flows 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.

Data substitutions were performed in several instances during the reporting period. All substitutions were performed in accordance with the procedure specified in the GHG Project Plan.

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.

Due to concerns with instrument accuracy for flow meter S/N 10829-01-001, no emission reductions are claimed during the following periods:

- March 17, 2011, 11:23am to March 17, 2011, 3:43pm
- May 4, 2011, 3:52pm to May 18, 2011, 10:59am

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.

## 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 for several items.

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	Please clarify why a correction factor from 70°F was used for flow meter S/N 010829-01-001 when the previous reporting period for the Project corrected from 80°F for the same meter.	The factory calibration certificate for meter # 10829-01-001 (dated Nov 22, 2010) shows that the flow meter was returned to SMI correcting to temperature = 70°F rather than 80°F. The adjustment to 60°F for periods when this meter was used is done correctly in the ER calculations. This satisfies the clarification request and this requirement.	Response is acceptable.
2	Please clarify why the Pitot tube test results from May and June 2011 provided in Appendix E to the Monitoring Report reference flow meter S/N 010829-01-002, while Section 4.1 and the memo in Attachment 3 of the Monitoring Report state that this meter was removed on May 4, 2011 for the remainder of the reporting period.	The Monitoring Report incorrectly stated that flow meter S/N 010829-01-002 was removed on May 18, 2011 and replaced with meter S/N 010829-01-001. Instead, meter S/N 010829-01-001 was removed and replaced with S/N 010829-01-002  A revised version of the project Monitoring Report was submitted correcting the typographical error.	Response is acceptable.

Verified results show 175,625 metric tonnes of CO<sub>2</sub>e from Vintage 2011 from the reporting period from January 1 to June 30, 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:* January 1 to June 30, 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 January 1 to June 30, 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: January 1, 2011 through June 30, 2011	Total
Baseline Emissions (m.t.CO <sub>2</sub> e)	176,403
Project Emissions (m.t.CO <sub>2</sub> e)	778
Emissions Reductions (m.t.CO <sub>2</sub> e)*	175,625

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

**9. Lead Verifier Signature**



Michael M. Carim  
Associate

**10. Independent Internal Review Signature**



James Wintergreen  
Senior Associate