

Verification Report for Sioux Falls Regional Sanitary Landfill Sioux Falls, South Dakota

Climate Action Reserve

Verification Period: January to June 2010

June 2010

**Prepared by: First Environment, Inc.
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1. Introduction

This report is provided to TerraPass, Inc. (TerraPass) as a deliverable of the Climate Action Reserve (CAR) project verification process. This report covers the verification of the Sioux Falls Regional Sanitary Landfill (the Project) for the period from January 1, 2009 to December 31, 2009. First Environment, Inc. (First Environment) conducted the verification from January 2010 to June 2010.

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:

Geographic Boundaries	Sioux Falls Regional Sanitary Landfill in Sioux Falls, South Dakota
Greenhouse Gases Verified	Emissions reductions (expressed in units of Carbon Dioxide equivalents (CO ₂ -e)) resulting from methane destruction; Project emissions of CO ₂ from purchased electricity and fossil fuel combustion
Reporting Period	January 1, 2009 through December 31, 2009
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's (CAR) Landfill Project Verification Protocol, Version 2.0, November 2008; Climate Action Reserve Program Manual, March 2010
Verification Process	Climate Action Reserve Landfill Project Verification Protocol, Version 2.0, November 2008; Climate Action Reserve Verification Program Manual, June 2009
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 TerraPass contact;
- development of the verification plan;
- site visit;
- review and evaluation of raw data and calculations for period under review;
- follow-up interaction with TerraPass 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. First Environment also received determination of a low risk of conflict of interest from CAR in a notification dated December 30, 2009.

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 – Keith Dennis
Verifiers – Heather Moore, Ross MacWhinney, Iris Caldwell
Internal Reviewer – Jay Wintergreen

5.3 Audit Kick-off

The verification audit was initiated with a kick-off meeting on January 5, 2010 with the primary TerraPass contact. 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. TerraPass was afforded the opportunity to comment on the key elements of the plan for verification. Based on items discussed and agreed upon with TerraPass, 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

Iris Caldwell conducted a site visit on January 12, 2010 to assess the Project's data management systems and interview personnel relevant to the project.

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 actions and clarifications during the verification process. TerraPass provided sufficient responses to all corrective actions and clarifications requests. The team also issued requests for supplemental information during the verification process.

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 TerraPass, a verification opinion, and a list of findings to be submitted to the Climate Action Reserve.

6. Project Conformance with Verification Criteria

6.1 Project Description

The Sioux Falls Regional Sanitary Landfill is located at 26727 464th Avenue, in Hartford, South Dakota and is owned and operated by the City of Sioux Falls. The City of Sioux Falls began operating a landfill methane destruction project in April 2006. The project consists of approximately 90 gas extraction wells, lateral and header piping, condensate removal equipment, blowers, an open flare, and a pipeline which conveys the landfill gas to an off-site ethanol plant. Prior to this system, landfill gas was passively vented to the atmosphere.

6.2 Project Eligibility

The Sioux Falls Regional Sanitary Landfill meets the eligibility requirements set forth in the Landfill Project Reporting Protocol, Version 2.0. The project is located within the United States and has a project date after January 1, 2001. The project start date of the project was April 7, 2006. First Environment verified the start date by reviewing a letter to the South Dakota Department of Environment & Natural Resources indicating the initial startup of the open flare.

The City of Sioux Falls entered into a Landfill Gas Purchase and Sale Agreement with Great Plains Ethanol, LLC, d/b/a POET Biorefining-Chancellor (POET), giving The City of Sioux Falls the rights to the emission reductions associated with the LFG combusted by the Project over the given reporting period. TerraPass subsequently entered into a Verified Emission Reduction

Purchase and Sale Agreement (VERPA) with the City of Sioux Falls establishing TerraPass' exclusive ownership rights to Environmental Attributes of any sort arising from LFG combusted by the Project over the given reporting period, including any CRTs generated. First Environment reviewed both contracts during the verification process to confirm Proof of Title. Additionally, the CAR Project Developer's Attestation of Title has been completed by TerraPass and is on file with CAR. First Environment reviewed the Attestation of Title during the verification process and confirmed that it was completed correctly.

Additionally, First Environment reviewed the facility's operating permit, general stormwater discharge permit, Title V air quality operating permit, and most current Tier II report to inform the assessment of regulatory compliance. The cursory review of permits indicated that the site was in compliance and no violations of permits occurred during the reporting period. First Environment also relied in part on the Attestation of Regulatory Compliance, on file with CAR and completed by TerraPass for the current reporting period, in order to confirm the project's regulatory status.

6.3 *Additionality*

The project consists of the installation of a landfill gas collection and combustion/pipeline system that and therefore exceeds the performance standard defined by the CAR protocol.

The landfill's design capacity of approximately 22 million megagrams exceeds 2.5 million megagrams and therefore falls under the NSPS regulations. The most current Tier II test, completed in July of 2008, revealed a site-specific NMOC emissions rate in calendar year 2009 of 22.2 Mg/yr, which is below the NSPS regulatory threshold of 50 Mg/yr. First Environment also reviewed the landfill's state permits, including its permit to operate and stormwater permits, to ensure the voluntary nature of the Project. In order to establish additionality and the project's eligibility under the CAR Protocol, First Environment relied in part on the Attestation of Voluntary Implementation on file with CAR and completed by the TerraPass for the current reporting period. First Environment reviewed this document during the verification process and confirmed that it was completed correctly.

6.4 *Project Performance Against Protocol/Methodology and Project Management System*

The project was implemented in conformity with the CAR Protocol.

Landfill gas collected by the active gas collection and control system is either destroyed by the open flare or conveyed off site through a pipeline to a nearby ethanol plant. The landfill gas destroyed in the open flare is continuously measured using a FCI ST-98 Thermal Mass Flow Meter and recorded in 10-second intervals. The Thermal Mass flow meter corrects the flow rates from ambient conditions to a standard temperature and pressure of 70°F and one atmosphere of pressure. The landfill gas sent off site is continuously measured by a Veris Verabar V100 Pitot Differential Pressure Sensor, and totalizer readings are recorded daily. The Veris Verabar flow meter corrects the totalizer readings from ambient conditions to a standard temperature and pressure of 59°F and one atmosphere of pressure. Data from both flow meters are connected to a supervisory control and data acquisition (SCADA) system.

Before the installation of the pipeline in February 2009, methane concentration was measured at least weekly using a portable gas analyzer. Along with the installation of the pipeline, a

continuous CAI L Series gas analyzer was installed which allowed methane concentration data to be continuously measured and transmitted via the SCADA system.

The flow meters are factory calibrated according to manufacturer's specifications and field checked quarterly using a pitot tube. Field checks of the Thermal Mass flow meter during this reporting period occurred on February 25, May 27, September 15, and December 29, 2009. Field checks of the Veris Verabar flow meter during this reporting period occurred on May 27, September 15, and December 30, 2009. All field checks showed the flow meters to have remained within five percent accuracy for the entire reporting period. The portable gas analyzer was factory calibrated on June 4, 2009. Field checks against a gas with a known concentration are performed on the portable gas analyzer more than quarterly. In addition, bump tests are performed before each use. All field checks and the factory calibration show that the portable gas analyzer remained within five percent accuracy for the entire reporting period. The continuous CAI L Series gas analyzer auto-calibrates daily to a gas with a known concentration. The gas analyzer is programmed to set off alarms if any errors are detected in the daily calibrations. No alarms were set off during the reporting period, indicating that the continuous gas analyzer was operating within the acceptable range for accuracy.

Hourly operation of the open flare is monitored by the flare's thermocouple. If the temperature drops below 400°F, the blower and valves will shut down. Shut down periods are noted in the SCADA system. The delivery of landfill gas through the pipeline is confirmed from sale invoices from the landfill to the ethanol plant.

TerraPass prepared a monitoring plan which meets the requirements of the CAR Protocol and accurately reflects the activities conducted at the landfill. The monitoring plan includes a mechanism to annually evaluate and attest to the status of the regulatory test, the frequency of data acquisition and instrument calibrations, the roles and responsibilities of the personnel involved with the project, the quality assurance/quality control procedures conducted, and a record keeping plan consistent with the CAR Protocol requirements.

6.5 Emissions Reduction Calculation Assessment

As part of the emissions reduction calculation assessment, the Project's assumptions and calculations were reviewed. The Project used justifiable assumptions when defining the baseline scenario as the partial or total release of LFG to the atmosphere. First Environment confirmed that no pre-existing combustion device existed on the site during the project's first verification.

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 CAR Protocol. In accordance with the CAR Protocol, a 10 percent methane soil oxidation factor was applied in emission reduction calculations. Before February 26, 2009, a 10 percent discount factor was employed to account for weekly methane measurements. Data substitution methodologies were correctly applied when methane readings were missing. A 96 percent destruction efficiency is assigned to the project's open flare and a 98 percent destruction efficiency is assigned to the project's pipeline. All destruction efficiencies are applied accordingly in emission reduction calculations.

Landfill gas flow to the open flare was calculated by taking the 10-second standard cubic feet per minute (SCFM) readings from the Thermal Mass flow meter, removing all readings when either the flow rate was less than zero or the thermocouple temperature was below 500°F indicating inoperativeness of the open flare, and converting the SCFM to SCF. Landfill gas flow to the pipeline was determined from the Veris Verabar totalizer readings.

Before February 26, 2009, the fraction of methane in landfill gas during each weekly interval was determined by averaging the methane readings taken during that week. After February 26, 2009, the continuous gas analyzer methane content readings, recorded every 10 seconds, were averaged and applied to the emission reduction calculations on a daily basis. The volume of methane destroyed was calculated by multiplying the metered data for landfill gas collected by the applicable methane contents. This volume is converted to a mass flow using the density of methane at 60°F and one atmosphere of pressure. Total volume of gas flow during a given interval measured by the Thermal Mass flow meter to the open flare was corrected from a temperature of 70°F and one atmosphere of pressure to 60°F and one atmosphere of pressure. The temperature correction to 60°F and one atmosphere of pressure for the Veris Verabar flow meter measurements, which records flow at 59°F and one atmosphere of pressure, was omitted from the emission reduction calculation and resulted in an immaterial misstatement of less than a tenth of one percent. The total volume of methane destroyed by the Project is computed in weekly intervals before February 26, 2009 and daily intervals after February 26, 2009.

Data substitution methodologies were employed at various times during the project when either weekly or continuous methane concentration data was missing. The project developer correctly employed data substitution methodologies on the length of the period of missing data.

Project emissions were subtracted from total volume of methane destroyed. Project emissions were calculated by multiplying activity data by an appropriate emission factor. Project emissions sources consisted of purchased electricity to power project equipment and stationary combustion of propane for the flare's pilot light.

For data control and quality purposes, any measurements when flare temperature was recorded below 500°F or flow rate fell below zero standard cubic feet per minute were excluded from emission reduction calculations. Additional quality assurance checks were performed to ensure that emission reductions were not claimed during periods where the thermocouple temperature reading was stuck on a constant temperature. A comparison was also performed between the total landfill gas invoiced to the ethanol plant and the total flow measured by the Veris Verabar flow meter, showing that all landfill gas measured in the pipeline was delivered to the ethanol plant.

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. All raw data sources and 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.

6.6 Approved Variance or Deviations

The CAR Protocol requires that methane content and flow be measured on the same basis – either “wet” or “dry.” Since evidence could not be provided that the gas entering the knockout tank is “dry” like the gas at the point of flow measurement, TerraPass obtained a variance from CAR on November 19, 2009 for the period of March 1, 2008 through February 26, 2009. As part of the variance approval, the verifier must confirm the inherent conservativeness of the monitoring system arrangement. Based on First Environment’s review, measuring methane content on a “wet” basis and total flow volume on a “dry” basis results in a conservative quantification of emission reductions.

7. Audit Results

TerraPass 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 corrective actions and clarifications for several items. The responses given by TerraPass were sufficient to resolve the issues raised by the Audit Team.

Verified results show 115,047 metric tonnes of CO₂e from Vintage 2009 from the reporting period of January 1, 2009 to December 31, 2009 eligible for registration with the Climate Action Reserve.

8. Verification Conclusion

Based on the assessments performed and the 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, 2009 to December 31, 2009, can be considered with a reasonable level of assurance:

- consistent with the Project Methodology,
- without material discrepancy, and
- meeting the minimum level of accuracy of at least 95 percent.

Verified results show:

Reporting Period: January 1, 2009 to December 31, 2009	Total*
Baseline Emissions (tCO ₂ e)	116,677
Project Emissions (tCO ₂ e)	1,630
Emissions Reductions (tCO ₂ e)	115,047

*as measured and calculated in accordance with the Project Methodology

9. Lead Verifier Signature



Keith Dennis
Associate

10. Independent Internal Review Signature



James T. Wintergreen
Senior Associate