
**Verification Report for CAR462
Sioux Falls Regional Sanitary
Landfill Project
Sioux Falls, South Dakota**

Climate Action Reserve

December 2009

**Prepared First Environment,
 91 Fulton
 Boonton, New Jersey**



1. Introduction

This report is provided to TerraPass, Inc. (TerraPass) as a deliverable of the Climate Action Reserve's (CAR) project verification process. This report covers the verification of emission reductions from the capture and destruction of landfill gas (LFG) for the period of March 1, 2008 through December 31, 2008 at the Sioux Falls Regional Sanitary Landfill (the Project) in Sioux Falls, South Dakota. First Environment, Inc. (First Environment) conducted the verification from June to November 2009.

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 Boundary	Sioux Falls Regional Sanitary Landfill in Sioux Falls, SD
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 consumption
Reporting Period	March 1, 2008 through December 31, 2008
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 Landfill Project Reporting Protocol, Version 2.0, November 2008 (CAR Protocol)
Verification Process	Climate Action Reserve Landfill Verification Protocol, Version 2.0, November 2008
Level of Assurance	Reasonable assurance
Materiality	Misstatements greater than five percent of the Project's emission reductions assertion are considered material

5. Overview of the Verification Process

To review the Project's greenhouse gas (GHG) information, the following verification process was used:

- conflict of interest review;
- selection of Audit Team;
- interaction with TerraPass' team;
- development of the verification and sampling plan;
- review and evaluation of raw data and calculations for period under review;
- site visit;
- follow-up interaction with TerraPass' team 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 (including the risk for leakage), 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.

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 a determination of a low potential for conflict of interest from CAR prior to initiating verification activities.

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 – Iris Caldwell, Eric Ripley, Greg Kozak
Internal Reviewer - Jay Wintergreen

Audit Kick-off

The verification audit was initiated with a kick-off conference call on June 19, 2009 between First Environment and the primary TerraPass contacts, Peter Freed and Tim Varga. The discussion focused on confirming the scope and schedule and identifying the data required for the verification.

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 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 reporting and 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.

Site Visit

Eric Ripley and Iris Caldwell conducted a site visit on July 15, 2009 to assess the Project's data management systems and interview personnel relevant to the project.

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.

Corrective Actions and Supplemental Information

The team requested supplemental information, clarifications, and corrective actions during the verification process. TerraPass was given the opportunity to respond to each request.

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 and a verification statement and attestation to be submitted to the Climate Action Reserve.

6. Site's Conformance with Verification Criteria

Site Overview

The Sioux Falls Regional Sanitary Landfill is located at 126727-464th Avenue, in Hartford, South Dakota. The landfill is the largest in South Dakota. The City of Sioux Falls began operating a landfill methane destruction project in April 2006. The methane is collected and directed to an open flare on site.

The project consists of 42 gas extraction wells which double as leachate collection wells. The LFG is separated from the leachate at six lift stations, effectively cleaning leachate and condensate from the gas before it is sent to the flare for destruction. Continuous operation of the flare began on April 7, 2006 as evidenced by the letter to the Department of Environment

and Natural Resources (Appendix A). Therefore, the Project meets the CAR Protocol's requirement for start date after January 1, 2001. Prior to this system, no gas was collected or combusted at the landfill.

The landfill's design capacity is greater than 2.5 million megagrams (Mg) and is therefore subject to New Source Performance Standards (NSPS) rules. The latest Tier II emissions report, completed in September 2008, indicated non-methane organic compounds (NMOC) emissions were 21.1 Mg in 2007, below the 50 megagram threshold that would require landfill gas collection and control at the landfill. A signed summary of the Tier II report is provided as Appendix B. The next Tier II report is scheduled for late 2013.

In addition to reviewing documents pertaining to the site's NSPS status, First Environment performed a cursory review of EPA report data, enforcement and compliance history, and permits. First Environment did not find any evidence that the site was not in compliance with all operating permits. First Environment also relied on the Attestation of Regulatory Compliance signed by TerraPass and provided as Appendix C. First Environment verified that an executive-level representative formally attested to compliance with the Regulatory Test to conform with CAR requirements.

TerraPass and the City of Sioux Falls entered a Verified Emission Reductions Purchase and Sales Agreement effective April 30, 2009, by which TerraPass owns the emissions reductions associated with the LFG combusted by the Project over the given verification period. First Environment reviewed a redacted version of this contract as part of the verification process. The Attestation of Title signed by TerraPass is provided as Appendix D. The City of Sioux Falls previously registered 13,400 mt CO₂e of vintage 2008 emissions reductions on the Chicago Climate Exchange (CCX) as indicated in Appendix H, Project Transfer Attestation. First Environment reviewed evidence confirming that these emissions reductions occurred during the period between January 1, 2008 and February 28, 2008, before the crediting period covered in this report.

Data Collection and Monitoring Processes

The Audit Team discussed the following topics with site staff during the site visit in July 2009 and confirmed the information during this verification process:

- the data collection process; and
- internal documents and protocols that set guidelines for the data collection process.

Information gathered during these discussions was used to assess the Project's GHG information system and its controls for sources of potential errors and omissions.

LFG is continuously monitored at the flare inlet using a FCI ST98 flow meter. The meter reads in standardized cubic feet per minute at 70°F and one atmosphere. As backup, the site also has a Honeywell Truline circle chart recorder. The meter transmits flow data to the facility's SCADA system every 10 seconds via wireless signal. The SCADA system is designed by Telemetry and Process Controls, Inc. Data files are backed up on hard drives and flash drives that are maintained on site. Additionally, data are periodically sent to TerraPass for review and quantification.

During the verification period, RW Beck performed flow checks for the first two quarters on February 27, 2008 and June 17, 2008. Aquaterra performed flow checks for the third and fourth quarters on September 19, 2008 and December 19, 2008. The flow checks indicated that the meter was operating within the allowable five percent margin of error. While the flow checks fall within each quarter of the 2008 calendar year, the time period between checks is more than 90 days in some cases. Moving forward, there is opportunity for improved data management systems by increasing the consistency of periods between flow checks. Evidence of the flow checks is provided in Appendix E.

Methane content readings are taken with a portable gas analyzer from a port located immediately before the knockout tank. 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 for the period of March 1, 2008 through February 26, 2009. A copy of the variance approval is provided as Appendix F.

Methane content was measured using a Landtec GEM 500 up until mid-November 2008. Going forward, methane content is measured using a Landtec GEM 2000. Methane content measurements are typically taken weekly, however, in some cases a monthly average was applied instead. Results are stored on an internal memory device and then transferred to digital operational spreadsheets. Data files are backed up on hard drives and flash drives that are maintained on site. Additionally, data are periodically sent to TerraPass for review and quantification. Moving forward, there is an opportunity for improved data management systems by increasing the regularity of methane content measurements.

The Landtec GEM 500 was calibrated by the manufacturer on April 9, 2008. Evidence of this factory calibration is provided in Appendix E. The Landtec GEM 2000 was ordered new in November 2008. First Environment reviewed evidence of field calibrations using a gas of known concentration. These records indicated a typical calibration frequency of at least monthly; however, site staff generally aim to calibrate the instrument prior to each use. Moving forward, there is an opportunity for improved recordkeeping of gas analyzer field calibrations.

Flare temperature is monitored by a 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 Monitoring Plan provided by TerraPass conforms to the requirements of the CAR Protocol and accurately reflects the procedures evidenced during the site visit.

Emissions Reduction Calculation Assessment

Emission reduction calculations, provided in Appendix G, 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. First Environment confirmed that no pre-existing combustion device existed on the site through interviews conducted during the site visit. Because no pre-existing combustion devices existed at the site, per the CAR protocol, the baseline scenario is defined as the total release of LFG to the atmosphere.

In accordance with the CAR Protocol, a 10 percent discount factor is applied to the total quantity of methane destroyed during periods when the site employed weekly methane content readings,

and similarly, a 20 percent discount factor is applied over periods when the monthly average methane content is used. The destruction efficiency of the open flare was set at 96 percent and is applied in the emission reduction calculations accordingly. An additional 10 percent discount is applied for bacterial oxidation of methane under the cap because the landfill does not have a synthetic liner.

The amount of methane destroyed is calculated from metered data for LFG collected. Since the flow meter records data at 70°F and one atmosphere, the flow readings are adjusted to 60°F at one atmosphere per the CAR Protocol. The weekly LFG flow volumes are multiplied by the average methane concentration for the corresponding week, or month, as necessary. This volume is converted to a mass flow using the density of methane at 60°F and one atmosphere. The total amount of methane destroyed by the Project is tabulated in weekly intervals.

As part of the variance approval obtained from CAR, 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.

Project emissions are subtracted from the total volume of methane destroyed. Project emissions consisted of indirect emissions of CO₂ from electricity consumption and direct emissions of CO₂ from propane combustion by the flare pilot. Utility invoices were used to determine electricity consumption during the verification time period. Propane consumption was conservatively estimated using the entire volume of the propane tank located at the flare skid. Project emissions were calculated by multiplying this activity data by an appropriate emission factor.

Copies of the raw data used in the calculations, including flow data, methane content data, and utility invoices, were compared with the data used in the final calculations and tested for transcription or mathematical errors. The short timeframe being verified allowed for review of all reported raw data sources over the entire verification period. Calculations for the entire period were reviewed.

7. Audit Results

TerraPass provided good documentation for their emissions estimates as well as its procedures surrounding the data collection process. The verification process focused on verifying the data and quantification methodology that was used by TerraPass to calculate the emissions reductions, as shown on the spreadsheets in Appendix G.

To complete the verification process, First Environment requested several clarification and supplemental document requests, as well as 15 corrective actions. The responses given by TerraPass were sufficient to resolve the issues raised by the audit team.

During the verification process, minor transcription errors were also identified; however, these errors did not have a material impact on the Project's emission reduction assertion and therefore did not require corrective action. Additionally, it was noted that the manufacturer's correction factors were not applied to flow volumes to account for drift from changing methane concentrations. Again, this did not have a material impact on the Project's emission reduction assertion and did not require corrective action.

Verified results show 74,600 metric tonnes of CO₂e from vintage 2008 are 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 of March 1, 2008 through December 31, 2008, can be considered to 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:

2008	Total
Baseline Emissions (tCO ₂)	75,049
Project Emissions (tCO ₂)	449
Emissions Reductions (tCO ₂)	74,600

*as measured and calculated in accordance with the Project Methodology

As per CAR requirements, only a CAR-approved verifier can provide an independent assessment of projects applying for approval under the CAR Landfill Project Reporting Protocol. First Environment currently has accreditation from CAR.

9. Lead Verifier Signature



Keith Dennis
Senior Engineer

10. Independent Internal Review Signature



James T. Wintergreen
Senior Associate

APPENDIX A

April 10, 2006



Brian Gustafson
Department of Environment and Natural Resources
Joe Foss Building
523 East Capitol
Pierre, SD 57501-3182

Subject: Initial Start-up of Open Flare
Sioux Falls Regional Sanitary Landfill
Title V Air Quality Operating Permit
Permit #: 28.1101-01

Dear Brian:

In accordance with Section 9.4, Initial startup of open flare, of the above referenced permit, this letter has been prepared to notify the Department of Environment and Natural Resources (DENR) of the start-up of the open flare.

Initial start-up of the flare was on Friday, April 7, 2006. It should be noted that testing of the flare was completed on April 5 and 6, 2006.

If you have any questions, please do not hesitate to contact me at 651-994-8415 or mevans@rwbeck.com.

Sincerely,

R. W. BECK, INC.

A handwritten signature in black ink, appearing to read 'Matthew J. Evans'.

Matthew J. Evans, P.E.
Project Manager

c: Jason Chan, City of Sioux Falls
DJ Buthe, City of Sioux Falls
Marlys Heidt, DENR
Steven Kropp, DENR

APPENDIX B

September 4, 2008

Ms. Marlys Heidt
SD Department of Environment and Natural Resources
Joe Foss Building
523 E. Capitol
Pierre, SD 57501

Re: **Tier 2 NMOC Emission Rate Report**
Sioux Falls Regional Sanitary Landfill
Sioux Falls, South Dakota

Ms. Heidt:

Aquaterra Environmental Solutions, Inc. (Aquaterra), on behalf of the City of Sioux Falls, is pleased to present the attached report to summarize the results of the Tier 2 Non Methane Organic Compounds (NMOC) Emissions Testing conducted at the above referenced site.

The Tier 2 sampling was performed in general accordance with the sampling procedures as detailed in 40 CFR Part 60, Subpart WWW – New Source Performance Standards (NSPS) for Municipal Solid Waste Landfills. The 2007 calculated NMOC emission rate using the site-specific NMOC concentration and the NSPS Tier 2 equation is 21.1 megagrams per year (Mg/yr); which is below the regulatory compliance limit of 50 Mg/yr. Further, the modeled emission rate for the next five years is expected to remain below the 50 Mg/yr limit and, as such, the attached report shall serve to meet the five year reporting requirement as required by 40 CFR 60.757(b)(1). No further NMOC emission estimates will be completed until 2013 unless the actual refuse acceptance rate exceeds the estimated value used in the calculations and causes an increase in the NMOC emission rate above 50 Mg/yr.

If you have any questions or comments, please feel free to contact us with any questions or comments you may have at 402-884-6202.

Sincerely,

Aquaterra Environmental Solutions, Inc.



Joel Stenberg, E.I.T.
Project Engineer



Michael J. Miller, CHMM
Environmental Practice Leader

Attachment: Tier 2 Report

cc: Mr. Dave McElroy, Landfill Superintendent – Sioux Falls Regional Sanitary Landfill
Mr. Bob Kappel, Environmental Manager – Sioux Falls Regional Sanitary Landfill

APPENDIX C

Project Developer's Regulatory Attestation

Reference is made to the Terms of Use (the "Terms of Use") by and between [____ TerraPass Inc. ____], a [Delaware corporation] (the "Project Developer"), and the Climate Action Reserve, a California nonprofit public benefit corporation (the "Reserve"), with respect to [____ Sioux Falls Regional Sanitary Landfill ____] (the "Project") located at 26727 464th Ave, Harford, SD (the "Property"). The undersigned, [____ Erin Craig ____], in [his/her] capacity as an officer of the Project Developer, in the name and on behalf of the Project Developer, hereby attests, certifies, represents and warrants to the Reserve, as of the date set forth below, and for the reporting period 3/1/2008 (beginning Month, Day, Year) to 12/31/2008 (ending Month, Day, Year) as follows:

1. The Project was implemented and established voluntarily and, at all times thereafter, has been operated and conducted voluntarily. None of such implementation, establishment, operation or conduct of the Project are or at any time have been required by any law, statute, rule, regulation, ordinance, court order, governmental agency action, enforcement action, or other legally binding mandate, including without limitation any of the foregoing issued, enacted or otherwise rendered effective by any federal, state, local or foreign governmental or regulatory agency, commission, department, board, court or other authority having jurisdiction over the Project ("Law").
2. Except as otherwise expressly permitted under the protocol developed by the Reserve that applies to the Project, the Project was not established or implemented and has not at any time been operated or conducted in anticipation of, or to avoid or satisfy the anticipated requirements of, any Law that would require or would have required the Project Developer to use the Property in the manner contemplated by the Project.
3. The Project is in material compliance with all Laws.
4. The Project Developer has disclosed to the Project Verifiers in writing any and all instances of non-compliance of the Project with any Law. For purposes hereof, "Project Verifiers" shall mean any and all third party verifiers approved by the Reserve and assigned to the Project.
5. The undersigned is the duly elected, qualified and acting [____ CEO ____] of the Project Developer and is authorized to execute and deliver this Attestation in the name and on behalf of the Project Developer, thereby rendering this Attestation binding on the Project Developer.

The Project Developer recognizes, acknowledges and agrees that (i) this Attestation may be relied upon by the Reserve and/or any user of the Climate Action Reserve program of the Reserve (the "Program"), and each of their successors and assigns (including, without limitation, reliance in connection with the issuance and transfer of CRTs (as defined in the Terms of Use) in respect of the Project); (ii) the statements set forth in paragraphs 1 through 5 hereof shall, for all purposes of the Terms of Use, be deemed to be additional representations and warranties made thereunder by the Project Developer to the Program; (iii) in the event of any breach of any of any paragraphs 1 through 5 hereof, the Reserve shall be entitled to pursue any rights and remedies available at law or in equity (including, without limitation, rights to indemnification pursuant to the Terms of Use) in any court of competent jurisdiction; and (iv) if at any time the Reserve determines, in its sole discretion, that any such breach has occurred, the Reserve shall have the right to immediately close the Project Developer's account on the Program.

[Signatures on Next Page]

IN WITNESS WHEREOF, the undersigned, in the name and on behalf of the Project Developer, has executed this Attestation this [30] day of October], 2009 .

PROJECT DEVELOPER¹

By:  _____
Name: Erin Craig
Title: CEO
Address: 527 Howard St 4th Floor
San Francisco, CA 94105

¹ If the Project Developer is a corporation, partnership or other legal entity, this Attestation must be executed by an officer of the Project Developer. If the Project Developer is an individual, this Attestation must be executed by the individual and revised accordingly.

APPENDIX D

Project Developer's Attestation of Title

The undersigned, on behalf of TerraPass Inc., (the "Project Developer"), represents and warrants to the California Climate Action Registry ("California Registry"), as of the date set forth below, and throughout the period during which the Carbon Reduction Tons ("CRTs") related to Sioux Falls Regional Sanitary Landfill (the "Project") are posted on the California Registry's Climate Action Reserve ("Reserve"), that:

1. it is the owner of full, unencumbered legal and beneficial title to CRTs registered in its name;
2. it has the right to sell and shall convey good title to the CRTs and will transfer the CRTs to a buyer via the Reserve only;
3. it agrees that all emission reductions related to the Project that are submitted for registration on the Reserve will be independently verified by a California Registry accredited third party verifier ("Verifier"), and will meet all the California Registry's requirements and protocols;
4. it has not made or provided knowingly false, fraudulent or misleading statements or information to the Verifier or the California Registry;
5. the Project has not been implemented and maintained as the result of any law, statute, regulation, court order, or other preexisting legally binding mandate;
6. for all vintage years that the Project is registered with the Reserve by the Project Developer, any CRTs issued by the California Registry for the Project, or the greenhouse gas emission reductions or removals associated with the CRTs issued for the Project, have not been, nor will be, registered with or claimed by other registries or under a different project title or location or previously sold to any third party prior to registration with the Reserve; and
7. for all vintage years that the Project is registered with the Reserve by the Project Developer, it has not, and will not in the future, retire, sell, claim, represent elsewhere, or use to satisfy obligations outside of the Reserve any of the CRTs issued by the California Registry for the Project or the greenhouse gas emission reductions or removals associated with the CRTs issued for the Project that would create the relevant CRTs unless retired through the Reserve for that purpose.

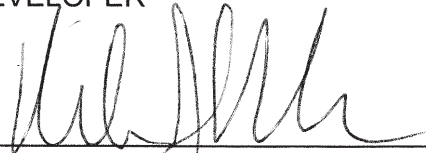
The following attestations apply to projects that: (a) have previously been registered with other registries, registry entities or similar systems; or (b) have generated emission reductions that were previously sold to a third party:

8. it will complete and sign the Project Transfer Form.
9. it agrees that the Project and all emission reductions must be verified by a Verifier per the relevant California Registry project protocol in order to be registered on the Reserve.

I declare that all statements contained herein are true and correct, to the best of my knowledge, and are made with full knowledge that the California Registry and all users of the Reserve rely upon the truth of the statements contained in this attestation. I am authorized to make this declaration on behalf of Project Developer. I understand and acknowledge that if any of the above representations made by or on behalf of the Project Developer in or pursuant to this Attestation of Title is false in any material respect when made or deemed repeated upon the making of each request for the CRTs to be issued for the Project or posted on the Reserve, Project Developer may be subject to penalties and potential indemnification damages under the Terms of Use, and that the California Registry would have the right to close Project Developer's account on the Reserve.

PROJECT DEVELOPER¹

Signature: _____



Name: _____

Mark Mondik

Title: _____

Chief Financial Officer

Address: _____

568 Howard St, San Francisco, CA 94105

Date: _____

27 May 2009

¹ If Project Developer is a corporation, partnership or other legal entity, this Consent must be executed by a company officer of the Project Developer. If Project Developer is an individual, this Consent must be executed by the individual.

APPENDIX E

Quarterly Landfill Gas Monitoring Report

Sioux Falls Regional Sanitary Landfill

Sioux Falls, South Dakota

Pipe Material: 6" CS Sch 40

LFG Temp.*: NR

Method of Mesurement:

Dwyer Model 160 SS Pitot tube

Dwyer Model 400 Inclined Manometer

Date: 2/27/08

Time: 937

Traverse ID:	Horiz. Run #1	Vert.Run #1
Distance:	Pitot tube	Pitot tube
Velocity:	FPM*	FPM*
Wall	4,900	5,800
1"	5,600	5,700
2"	5,300	5,500
3"	5,400	5,400
4"	5,700	5,500
Wall	5,200	4,900

Notes:

NR - Not Recorded

FCI Reading SCFM	FCI Reading SCFM
1060	1060
Average Velocity FPM	Average Velocity FPM
5,283	5,283
Dwyer Inc. Mano. Average Velocity	Dwyer Inc. Mano. Average Velocity
5,364	5,364
Percent Error	Percent Error
1.52	1.52
ACTUAL FLOW SCFM	ACTUAL FLOW SCFM
1076	1076

Quarterly Landfill Gas Monitoring Report

Sioux Falls Regional Sanitary Landfill

Sioux Falls, South Dakota

Pipe Material: 6" CS Sch 40

LFG Temp.*: NR

Method of Mesurement:

Dwyer Model 160 SS Pitot tube

Dwyer Model 400 Inclined Manometer

Date: 6/17/08

Time:

Traverse ID:	Horiz. Run #1	Vert.Run #1
Distance:	Pitot tube	Pitot tube
Velocity:	FPM*	FPM*
Wall	5,874	5,769
1"	5,769	5,559
2"	5,559	5,454
3"	5,454	5,454
4"	5,664	5,769
Wall	4,720	5,035

Notes:

NR - Not Recorded

FCI Reading SCFM	FCI Reading SCFM
1059	1058
Average Velocity FPM	Average Velocity FPM
5,279	5,274

Dwyer Inc. Mano. Average Velocity	Dwyer Inc. Mano. Average Velocity
5,477	5,477
Percent Error	Percent Error
4	4

ACTUAL FLOW SCFM	ACTUAL FLOW SCFM
1099	1099

**City of Sioux Falls Landfill
Flow Rate Calculations
September 19, 2008**

Pre-readings

FIELD DATA	
PIPE I.D. (X-INCH SDR XX HDPE) (IN) =	6.070
GAS TEMP* (DEG. F) =	88.0
GAS PRES. ("W.C.)=	3.4
%CH ₄ =	55.2
% O ₂ =	0.4
AVERAGE PITOT TUBE DIFF. PRES ("W.C.)=	2.01

CALCULATED DATA	
AREA OF PIPE (FT ²) =	0.201
ACTUAL GAS STATIC PRES. (PSIA) =	14.819
%H ₂ O IN THE GAS =	4.425
AVG. MOL. WT. OF THE GAS =	28.181
GAS VISCOSITY (LB/(FT*MIN))=	0.00044
GAS DENSITY (LBM/FT ³)=	0.071

LFG FLOW RATE DATA	
ACTUAL LANDFILL GAS VELOCITY (FT/MIN)=	5829.540
ACTUAL LANDFILL GAS FLOW RATE (CFM)=	1171.491
LANDFILL GAS CORRECTED FLOW RATE (SCFM)=	1141.5

BTU DATA	
LANDFILL GAS FLOW RATE (CFM)=	1141.496
Gas Composition (% Methane)	55.200
BTU Production (BTU/MIN)	637,667
BTU Production (BTU/HR)	38,260,019
BTU Production (mmBTU/DAY)	918

DIFFERENTIAL PRESSURE READI

1"	1.750
2"	1.940
3"	2.140
4"	2.310
5"	2.050
6"	1.850
Average	2.01

Landfill Flare Flow Testing

Date	9/19/2009
Tester	DAH
Time	1400
Ambient Air Temperature	75
SCADA	1195
Flare	1210
Aquaterra Calcs	1171
Gas Temp:	88.0

Difference	
Aquaterra/SCADA	-2.01%
Aquaterra/Gas compressor screen	-3.29%

City of Sioux Falls Landfill
Flow Rate Calculations
December 19, 2008

Pre-readings

FIELD DATA	
PIPE I.D. (X-INCH SDR XX HDPE) (IN) =	6.070
GAS TEMP* (DEG. F) =	58.0
GAS PRES. ("W.C.)=	3.6
%CH ₄ =	57.1
% O ₂ =	0.1
AVERAGE PITOT TUBE DIFF. PRES ("W.C.)=	2.44

CALCULATED DATA	
AREA OF PIPE (FT ²) =	0.201
ACTUAL GAS STATIC PRES. (PSIA) =	14.826
%H ₂ O IN THE GAS =	1.608
AVG. MOL. WT. OF THE GAS =	28.471
GAS VISCOSITY (LB/(FT*MIN))=	0.00042
GAS DENSITY (LBM/FT ³)=	0.076

LFG FLOW RATE DATA	
ACTUAL LANDFILL GAS VELOCITY (FT/MIN)=	6213.120
ACTUAL LANDFILL GAS FLOW RATE (CFM)=	1248.575

BTU DATA	
LANDFILL GAS FLOW RATE (CFM)=	1248.575
Gas Composition (% Methane)	57.100
BTU Production (BTU/MIN)	721,491
BTU Production (BTU/HR)	43,289,482
BTU Production (mmBTU/DAY)	1,039

**City of Sioux Falls Landfill
Flow Rate Calculations
December 19, 2008**

Pre-readings

FIELD DATA	
PIPE I.D. (X-INCH SDR XX HDPE) (IN) =	6.070
GAS TEMP* (DEG. F) =	58.0
GAS PRES. ("W.C.)=	3.6
%CH4 =	57.1
% O2=	0.1
AVERAGE PITOT TUBE DIFF. PRES ("W.C.)=	2.44

DIFFERENTIAL PRESSURE READINGS

1"	2.750
2"	2.684
3"	2.480
4"	2.351
5"	2.255
6"	2.105
Average	2.44

CALCULATED DATA

AREA OF PIPE (FT2) =	0.201
ACTUAL GAS STATIC PRES. (PSIA) =	14.826
%H2O IN THE GAS =	1.608
AVG. MOL. WT. OF THE GAS =	28.471
GAS VISCOSITY (LB/(FT*MIN))=	0.00042
GAS DENSITY (LBM/FT3)=	0.076

Landfill Flare Flow Testing

Date	12/19/2008
Tester	DAH
Time	1330
Ambient Air Temperature	5
Screen	1275
Meter	1289
Aquaterra Calcs	1249
Gas Temp:	58
Difference	-3.24%
Aquaterra/Meter	-2.12%
Aquaterra/Screen	

LFG FLOW RATE DATA

ACTUAL LANDFILL GAS VELOCITY (FT/MIN)=	6213.120
ACTUAL LANDFILL GAS FLOW RATE (CFM)=	1248.575

BTU DATA

LANDFILL GAS FLOW RATE (CFM)=	1248.575
Gas Composition (% Methane)	57.100
BTU Production (BTU/MIN)	721,491
BTU Production (BTU/HR)	43,289,482
BTU Production (mmBTU/DAY)	1,039



LANDTEC

CERTIFICATE OF CALIBRATION

Certificate number:

GM223_2/829

Date of check:

Wednesday, April 09, 2008

Product:

GEM500

Serial number:

GM223

Calibration checked at:

72.8°F to 90.9°F

Primary Gas Channels

Methane (CH4)		Carbon Dioxide (CO2)	
Certified Gas (%)	Reading (%)	Certified Gas (%)	Reading (%)
50.01	51.4	49.99	50.0
15.04	15.5	15.00	14.7
5.02	5.4	4.98	4.8

Oxygen (O2)	
Certified Gas (%)	Reading (%)
20.95	21.1

Barometer	
Certified (mb / "/>hg)	Reading (mb / "/>hg)
977 / 28.85	977 / 28.85

Approved by:

D. Hill

(Name)

[Signature]

(Signature)

All gases are traceable to certified National Standards

This unit must be serviced at regular 6 monthly intervals by a Landtec approved service facility.



Quality Control Check List

Options

Software Version: ☒

Key 3 Cold Start: ☒

Key 8 Options: ☒

Service Date: ☒

Display

Function: ☒

Contrast Adjustment: ☒

Company Name: ☒

'Ex' Warning Screen: ☒

Time/Date

Current Time: ☐

Current Date: ☒

Date Format: ☒

Display

Cal Cert Figure Check: ☒

Baro. Press. Reading: ☒

Temp Reading: ☒

Gas Pod Registers: ☒

Flow Pod Registers: ☐

CH4 Zero: ☒

Raw Values CH4 CO2: ☒

Gas Check

O2 Air: ☒

O2 5%: ☒

O2 0%: ☒

0.5% CH4/CO2: ☒

5.0% CH4/CO2: ☒

15.0% CH4/CO2: ☒

60.0/40.0% CH4/CO2: ☒

(GEM Only) Balance%: ☒

Model No.: GEM-500

Serial No.: 223

RA No.: 21538

Technician: dhill

Date: 4/10/2008

Repair Tech : amoreno

Time: 10:44 AM

Transducer Check (GEM Only)

Differential Leak Test: ☒

Static Leak Test: ☒

Differential Press. Test: ☒

Static Pressure Test: ☒

Side To Side: ☐

Memory Comms.

Store Readings: ☒

Reading View: ☒

Down Load: ☒

Memory Clear: ☒

MK II Batt. & Charger

MKII Charging: ☐

MKII Off Current: ☐

MKII On Current: ☐

MKII Display: ☐

Battery Voltage Correct: ☐

Completed? ☒

N/A ☐

Physical Condition

Case: ☒

Membrane: ☒

Case Fittings: ☒

Case Back Fitting: ☒

Lemo Plug: ☒

Carrying Strap: ☐

Inlet Filter: ☒

Housings Secure: ☒

Labels

Unit Label: ☒

Serial Number: ☒

Battery Warning: ☒

GI (UK): ☐

Void Labels: ☒

'CE' Label: ☐

Case Screen Printing: ☐

Flow

Vacuum: ☒

Flow > 300cc: ☒

200cc Check: ☐

Flow fail Occurs: ☒

Affect on Baro. Press: ☐

Calibration Certificate: ☒

Western Region/Corporate Offices
850 South Via Lata, Suite 112, Colton, California 92324
Telephone: (909) 783-3636 Fax: (909) 825-0591
WWW.CES-LANDTEC.COM

APPENDIX F



Variance Approval

Project Name: Sioux Falls Regional Sanitary Landfill
Project Developer: TerraPass Inc.
Protocol: Landfill Project Protocol Version 2.0

The Climate Action Reserve (Reserve) received a Request for Project Variance from TerraPass Inc. on October 19, 2009 in regards to CAR462, the Sioux Falls Regional Sanitary Landfill (SFRSL). SFRSL has been submitted to the Reserve under version 2.0 of the Landfill Project Protocol and is subject to all requirements of the protocol.

The Protocol requires that the methane fraction of the landfill gas is to be measured on a wet/dry basis and must be measured on same basis as flow, temperature, and pressure.

As requested by TerraPass Inc., the Reserve hereby grants a variance for the SFRSL project to measure methane concentration on a "wet" basis and landfill gas flow on a "dry" basis for the reporting period March 1, 2008, to February 26, 2009, provided that the project verifier confirms that the monitoring system arrangement has resulted in inherent conservativeness. Having taken into account the language of the Landfill Protocol version 1.0 on which the project was designed and several other considerations particular to this project, the Reserve is confident that this variance will result in a sufficient degree of conservativeness.

This variance is expressly limited to SFRSL as specified above. TerraPass Inc. must comply with all other requirements of the Protocol. Further, this variance is limited to the SFRSL project, and does not set precedent for future projects or Reserve decisions.

Signed:

Tim Kidman
Policy Manager
Climate Action Reserve

Date: 11/19/2009

APPENDIX G

ER_{weekly_total}	$FFCO_2$	$ELCO_2$	$PRE_{discount}$	ER_{2008}
75,049	0.29	449	0	74,600

Comments:

1 ER_{weekly_total} is calculated beginning Week

Equation 5.1. Project GHG emission reductions.

$$ER_y = [(CH_4 Dest_{PR}) * 21 * (1 - OX) * (1 - DF)] - FFCO_2 - ELCO_2 - PRE_{discount}$$

Where,

	Units
ER_y = total annual project GHG emission reductions	tCO ₂ e/yr
$CH_4 Dest_{PR}$ = total annual methane emissions destroyed by the project landfill gas collection and destruction system – see Equation 5.2	tCH ₄ /yr
21 = Global Warming Potential factor of methane to carbon dioxide equivalent ¹⁶	
OX = factor for the oxidation of methane by soil bacteria. Equal to 0.10 for all landfills except those that are covered with a synthetic liner as part of the final cover systems where OX = 0.	
$PRE_{discount}$ = adjustment to account for pre-project LFG destruction device (see Equation 5.3). Equal to zero if no pre-project LFG destruction system is in place prior to project implementation.	tCO ₂ e/yr
DF = discount factor to account for uncertainties associated with the project monitoring equipment. Either 0, 0.05, 0.10, 0.15, 0.20, or 0.25 (see Section 8, Project Monitoring). Equal to zero if using continuous methane monitor with no missing data and all calibration tests are within a 5% margin of error.	

$$FFCO_2 = \frac{\sum_i (FF_{PR,i} * EF_{FF,i})}{1000}$$

Where,

	Units
$FFCO_2$ = total annual carbon dioxide emissions from the destruction of fossil fuel	tCO ₂ /yr
$FF_{PR,i}$ = total annual fossil fuel consumed by the project landfill gas collection and destruction system, by fuel type i	volume fossil fuel/yr
$EF_{FF,i}$ = fuel specific emission factor, California Registry General Reporting Protocol Appendix C.3 and C.5 ¹⁷	kg CO ₂ /volume fossil fuel
1000 = kgCO ₂ /tCO ₂	

$$ELCO_2 = \frac{(EL_{PR} * EF_{EL})}{2204.62}$$

Where,

	Units
$ELCO_2$ = total annual indirect carbon dioxide emissions from the consumption of electricity from the grid	tCO ₂ /yr
EL_{PR} = total annual electricity consumed by the project landfill gas collection and destruction system	MWh
EF_{EL} = carbon emission factor for electricity used ¹⁸	lb CO ₂ /MWh
2204.62 = lbCO ₂ /tCO ₂	

¹⁶ IPCC Second Assessment Report: Climate Change 1996.

¹⁷ California Climate Action Registry General Reporting Protocol V. 3.0, Appendix C, tables C.4 and C.6.

LCFL = carbon emission factor for electricity used
2204.62 = lbCO₂/tCO₂

lb CO₂/MWh

¹⁶ IPCC Second Assessment Report: Climate Change 1996.

¹⁷ California Climate Action Registry General Reporting Protocol V. 3.0, Appendix C, tables C.4 and C.6.

APPENDIX H

Project Transfer Attestation Form

The undersigned, on behalf of TerraPass Inc.,
(the "Project Developer"), represents and warrants to the California Climate Action Registry
("California Registry"), as of the date set forth below and throughout the Term of the Terms of
Use, that it is the developer of:

Project Name: Sioux Falls Regional Sanitary Landfill

Project Location: 26727 464th Ave, Hartford, SD 57033

Project Type: Landfill Gas

Project Start Date: 7 April 2006

Project Developer: TerraPass Inc. (collectively referred to as
the "Project").

The Project Developer further represents, attests and warrants to the California Registry that:

1. The Project is intended to be listed on the Climate Action Reserve (the "Reserve").
2. The Project Developer has completed and signed the California Registry's Attestation of Title document.
3. The Project previously registered emissions reductions or removals with the following registry(s) or similar system(s) (the "Previous Registries"). List all Previous Registries below, including the vintage year the emissions reductions or removals took place and the volume of emissions reductions or removals generated.

Chicago Climate Exchange	2006	7,700 mT
Previous Registry	Vintage	Volume
Chicago Climate Exchange	2007	34,700 mT
Previous Registry	Vintage	Volume
Chicago Climate Exchange	2008	13,400 mT
Previous Registry	Vintage	Volume
Previous Registry	Vintage	Volume
Previous Registry	Vintage	Volume

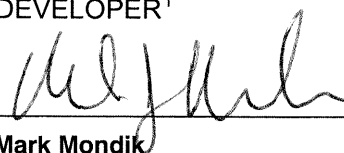
4. The Project will not transfer to the Reserve emission reductions or removals that were previously registered with Previous Registries. Therefore, none of the emission reductions or removals listed above will be posted to the Reserve.

5. The Project Developer will provide the California Registry, upon provisional approval of the verification report and opinion, with a copy of a signed Project Transfer Letter informing the Previous Registry where the Project was most recently registered that no additional emission reductions or removals will be registered for the Project on that Previous Registry as of the date that emission reductions or removals from the Project will first be registered with the Reserve. No CRTs will be issued until this letter is received and reviewed by the Reserve.
6. The emission reductions or removals related to the Project, that are submitted for registration on the Reserve will not be registered on any other registry or similar system during the period that they are registered with the Reserve. Nothing in this Attestation precludes future reductions from being registered with other Registries or similar programs, provided that they are not also submitted for registration on the Reserve, and that explicit notice is given to the Reserve prior to such registration.
7. The emission reductions or removals related to the Project, that are submitted for registration on the Reserve will be quantified and judged for additionality using the appropriate California Registry protocol.
8. The Project Developer acknowledges that the Project must undergo a full verification to ensure its compatibility with all California Registry eligibility requirements.
9. The emission reductions or removals related to the Project, that are submitted for registration on the Reserve will be verified by a California Registry accredited verifier.

I declare that all statements contained herein are true and correct, to the best of my knowledge, and are made with full knowledge that the California Registry and all users of the Reserve rely upon the truth of the statements contained in this attestation. I am authorized to make this declaration on behalf of Project Developer.

PROJECT DEVELOPER¹

Signature: _____



Name: _____

Mark Mondik

Title: _____

Chief Financial Officer

Address: _____

568 Howard St, 5th Fl., S.F., CA 94105

Date: _____

21 May 2009

¹ If Project Developer is a corporation, partnership or other legal entity, this Consent must be executed by a company officer of the Project Developer. If Project Developer is an individual, this Consent must be executed by the individual.