

Verification Report for CommonWealth New Bedford Energy, LLC Greater New Bedford LFG Utilization Project Dartmouth, Massachusetts

Voluntary Carbon Standard 2007.1

Verification Period: July 1, 2009 to December 31, 2009

March 2010

**Prepared by: First Environment, Inc.
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Name of Verification Company:	Date of the issue:
First Environment, Inc.	March 1, 2010
Report Title:	Approved by:
Verification Report for the Greater New Bedford LFG Utilization Project	Jay Wintergreen
Client:	Project Title:
CommonWealth Resource Management Corporation	Greater New Bedford LFG Utilization Project
Summary:	
The Project voluntarily captures and destroys methane from the Crapo Hill landfill, a landfill owned and operated by the Greater New Bedford Regional Refuse Management District in Dartmouth, Massachusetts. The Project voluntarily captures LFG through an active collection system and destroys methane either via four (4) Caterpillar 3516 engine-generator sets or an open flare. The Project claims emission reductions of 59,245 metric tons CO₂e for the verification period of July 1, 2009 through December 31, 2009.	
Work carried out by:	Number of pages:
Iris Caldwell Heather Moore	11

TABLE OF CONTENTS

1.	Introduction	1
1.1	Objective	1
1.2	Scope and Criteria.....	1
1.3	VCS project Description	1
1.4	Level of Assurance.....	2
2.	Methodology.....	2
3.	Verification Findings.....	4
3.1	Remaining issues, including any material discrepancy, from previous validation ...	4
3.2	Project Implementation.....	4
3.3	Completeness of Monitoring.....	5
3.4	Accuracy of Emission Reduction Calculations	6
3.5	Quality of Evidence to Determine Emission Reductions	6
3.6	Management and Operational System.....	6
4.	Verification conclusion	7
5.	Verifier Signatures.....	8

1. Introduction

This report is provided to CommonWealth New Bedford Energy LLC (CNBE), a wholly owned subsidiary of CommonWealth Resource Management Corporation (CRMC), as a deliverable of the Voluntary Carbon Standard 2007.1 (VCS) project verification process. This report covers the verification of emission reductions from the destruction of landfill gas (LFG) in four Caterpillar engine generators and a flare for the period from July 1, 2009 through December 31, 2009 at the Greater New Bedford LFG Utilization Project in Dartmouth, Massachusetts. First Environment, Inc. (First Environment) completed the verification in March 2010.

1.1 Objective

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 1.2; and
- the data reported are accurate, complete, consistent, transparent, and free of material error or omission.

1.2 Scope and Criteria

The project activity verified for the Greater New Bedford Landfill Gas (LFG) Utilization Project (the Project) occurred at the Crapo Hill Landfill (the Site) in Dartmouth, Massachusetts. Emission offsets, expressed in metric tonnes of carbon dioxide equivalents (CO₂e), result from the destruction of LFG methane. The data sources reviewed during verification include metered data and emissions offset calculations.

The emissions reductions verified for this facility will be submitted as part of the Voluntary Carbon Standard (VCS) 2007.1 project verification process. The project emissions reductions have been quantified in accordance with the CDM methodology ACM0001 (Version 9.1). First Environment conducted the validation of the Project's approach, as outlined in the final Project Design Documentation (PDD) dated December 2005 with additional supplements dated December 2007 and December 23, 2008, and approved it in a validation report submitted to CommonWealth Resource Management Corporation (CRMC) in December 2008. First Environment used the VCS 2007.1, validated PDD, and the CDM methodology ACM0001 (Version 9.1) as the basis for this verification.

The verification covers the time period of July 1, 2009 through December 31, 2009.

A material misstatement is defined as a difference of five percent of the total reported emissions reductions.

1.3 VCS Project Description

The landfill site is located west of Samuel Barnet Boulevard in the northeast portion of the Town of Dartmouth, Massachusetts on 69.8 acres of a 152-acre parcel of land. The Project voluntarily captures LFG through an active collection system and destroys methane either via four Caterpillar 3516 engine-generator sets or an open flare. The landfill is not subject to the New Source Performance Standards (NSPS) rules or other local, state, or federal regulations requiring the active collection of LFG.

The Massachusetts Department of Environmental Protection (MDEP) permit governing the Site requires passive venting of LFG to the atmosphere. The Greater New Bedford Regional Refuse Management District (the District) voluntarily installed an active LFG collection system (the District Initial System) in order to prevent odor issues and to provide a means for productive use of the LFG in the future. This initial system became operational in early 2000 and was expanded aggressively in 2002 in anticipation of the development of an electric generating facility, which became operational in October 2005. LFG collected and destroyed under the District Initial System is not included within the scope of the project activity. Emission reductions are only claimed for LFG collected by the system from January 1, 2002 onwards and destructed in the electric generating facility and flare.

The PDD provides additional details regarding the Site and gas collection system.

1.4 Level of Assurance

First Environment and CRMC have agreed that a reasonable level of assurance be applied for the Project.

2. Methodology

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

- conflict of interest review;
- selection of Audit Team;
- kick-off meeting with CRMC contacts;
- review of the PDD;
- development of the verification plan;
- review and evaluation of raw data and calculations for period under review;
- follow-up interaction with CRMC 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 (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.

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:

Iris Caldwell – Lead Auditor
Heather Moore - Auditor
Jay Wintergreen – Internal Reviewer

Audit Kick-off

The verification audit was initiated with a kick-off conference call on January 29, 2010 between First Environment and the primary CRMC contacts, Thomas Yeransian and Anton Finelli. The communication focused on confirming the verification scope, objectives, criteria, schedule, and the data required for the verification.

CRMC confirmed during the kick-off meeting that no changes in operation or data management had occurred since the previous site visit in August 2009. Therefore, a repeat site visit for this verification period was deemed unnecessary.

Project Design Document Review

The Audit Team reviewed the PDD as a basis for developing the Verification Plan.

Development of the Verification Plan

The Audit Team formally documented its verification plan as well as determined the data-sampling plan.

Emissions Reduction Data and Calculation Assessment

This assessment used information and insights gained during the previous steps to evaluate the collected data and reported emissions reduction quantities and identify if either contained material or immaterial misstatements.

Corrective Actions and Supplemental Information

No corrective action requests were issued for this verification period. The Audit Team made several clarifications and supplemental information requests. The clarification requests and the responses provided are summarized in the table below:

Clarification Request	Response	Verification Conclusion
Please confirm whether fossil fuels are combusted during project operations.	No fossil fuels are combusted during project operations. We are allowed to combust landfill gas under our permit and have no capability of providing any other fuel other than landfill gas to the Project.	Response to CR is acceptable.
Please explain how the methane content was measured when the California Analytical Analyzer was out of service, as shown in the August 2009 calibration results in Exhibit 6.	The California Analytical Analyzer was measuring methane content continuously during all of August 2009. We were out of standard gas for methane for two weeks and could not perform an internal calibration to the instrument during the times noted. Note that the first calibration performed after the missed internal calibrations showed a post-calibration that was 0.5% difference than the pre-calibration. Further note that the preceding calibration showed a post-calibration that was 0.8% difference than the pre-calibration. Also, a weekly independent reading using a handheld GEM instrument was performed and compared to the	Response to CR is acceptable.

Clarification Request	Response	Verification Conclusion
	California Analytical Instrument and showed the two instrument readings. This check indicated no need to recalibrate during the two-week period. As an additional check, the heat rates before and after the two-week period are consistent with the two-week period, which further verifies the accuracy of the instrument.	

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 CRMC.

3. Verification Findings

3.1 Remaining issues, including any material discrepancy, from previous validation

There are no remaining issues or material misstatements.

3.2 Project Implementation

In early 2000, the District voluntarily installed an active LFG collection system consisting of lateral and vertical LFG extraction wells, header pipes connecting the wells, and a flare. Two vacuum blowers were installed to pull the LFG to the flare. The Audit Team previously reviewed evidence confirming the start date of this District Initial System. The Project consists of the expansion of the active collection system after January 1, 2002 and installation of the electricity generating facility during 2005 with commencement of operations in October 2005. The open flare continued to serve as backup. However, emission reductions are only claimed for LFG collected from the expanded active collection system.

The Crapo Hill Landfill is owned and operated by the District. CNBE wholly owns all environmental attributes associated with LFG destruction for the Project per an agreement with the landfill in December 2003. First Environment previously verified evidence of this agreement.

First Environment previously verified emission reduction credits from this Site for both CCX® and Environmental Resources Trust for crediting periods January 1, 2003 through December 31, 2008; for GE-AES for crediting periods January 1, 2007 through December 31, 2008; and for VCS for crediting period January 1, 2009 to June 30, 2009. GHG emission reduction credits that have not been verified under VCS have been registered with the American Carbon Registry (formerly ERT); and all transactions involving the sale, retirement, or transfer of these GHG credits from CRMC to another party (e.g., to the CCX) are recorded there. GHG emission reduction credits from January 1, 2009 through June 30, 2009 have been registered with VCS. Similarly, on behalf of CNBE, CRMC provided First Environment with an attestation that emission reduction credits over the current verification period will only be registered with a VCS registry.

3.3 Completeness of Monitoring

The Audit Team discussed the following topics with CRMC during the previous site visit on August 12, 2009 and during this verification:

- the data collection process to generate reports, and
- internal documents and protocols that set guidelines for the data collection process.

The 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 flow conveyed to the four engines and the open flare is monitored continuously using two separate orifice plate flow meters, one upstream of the four engines and the second upstream of the flare. The meters continuously measure the accumulating volumetric flows on a wet basis and record the cumulative actual cubic feet of landfill gas. For the engines, total flow is measured each minute and totalized and recorded hourly and daily. The totalized intervals for flow to the engines are automatically converted to standard cubic feet (scf) at 68°F and one atmosphere and are sent to a supervisory control and data acquisition (SCADA) system. For the flare, the landfill operator reads the totalized flow on a weekly basis. Flow data is archived daily and stored off site to provide assurance that the records will be available for the lifetime of the project.

The performance of the meters in the field are assured by the manufacturer on the basis of bench scale testing in accordance with applicable design and methodologies prescribed by the International Standards Organization (ISO) and the American Society of Mechanical Engineers (ASME). A periodic flow check is performed on the engine flow meter using a pitot tube and a Dwyer Mark II manometer. First Environment reviewed evidence that flow checks were performed on July 15, 2009, August 4, 2009, September 18, 2009, October 6, 2009, October 22, 2009, November 2, 2009, and November 19, 2009. All flow checks performing during the current verification period are within approximately one percent of the flow meter reading.

For the flare, a pitot tube and a Dwyer Mark II manometer is also used to confirm the accuracy of the flare's orifice plate flow meter. First Environment reviewed evidence that the flare flow meter was checked using a pitot tube on September 18, 2009. This flow check indicated that the pitot tube flow measurement was within less than one percent of the actual flow meter reading.

Methane concentration of the landfill gas flow is measured on a wet basis using a California Analytical Instrument 602P Digital non-dispersive infrared (NDIR) analyzer and recorded by the SCADA system. The continuous methane concentration analyzer was calibrated each week, or more frequently as necessary. In addition, engine operations limit the variance of methane to no more than six percent because 1) the engine will shut down within an hour if above six percent, and 2) engine alarms notify the operator to recalibrate the instrument when a measurement is either higher than or lower than the actual value by four percent. These controls provide an additional level of confidence. This continuous methane concentration analyzer is also used to measure the methane concentration of the landfill gas conveyed to the flare as a result of a corrective action from the first half of 2009 verification.

The data collection and record keeping procedures utilized were consistent with those outlined in the PDD and meet the requirements of the Project Methodology.

3.4 Accuracy of Emission Reduction Calculations

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 destruction of methane in the pre-existing flare system, as per the validated PDD. The quantity of methane destroyed by the District Initial System was subtracted from the total methane destroyed during this verification period, as outlined in the PDD.

The SCADA system is programmed to calculate the methane gas flow in units of MMBtu using standardized gas flow, methane concentration, the gross heat content (higher heating value) of methane, and the current temperature and pressure. CRMC converts the MMBtus to total scf of methane gas flow for the purposes of calculating emission reductions using the gross heat content (higher heating value) of methane.

For the flare, methane concentration from the continuous gas analyzer is used instead of GEM readings taken directly upstream of the flare as a result of a corrective action from the first half of 2009 verification. It was discovered that the GEM meter was not calibrated before each use and thus could not be relied upon for the methane concentration. The use of the continuous gas analyzer for the flare calculations was found adequate. It is also noted that the emission reductions claimed from methane destruction at the flare are less than one percent of the total emission reductions during this verification period.

The Project does not import electricity nor consume fossil fuels; therefore, there are no associated project emissions. Per the PDD, the destruction efficiencies of the flare and electric generating units are 50 percent and 100 percent, respectively.

The emission reduction calculations, provided as Attachment A, were reviewed to ensure accuracy in the formulas used and the raw data and default factors used as inputs. First Environment used the daily raw data (landfill gas flow and methane content) from SCADA to recalculate the emission reductions for the entire verification period to ensure consistency with the calculations described in the CDM methodology and the validated PDD. In addition, copies of the hourly raw data were compared to the daily reports to ensure accuracy and consistency.

3.5 Quality of Evidence to Determine Emission Reductions

First Environment compared raw flow data and methane fraction readings to the data used in the final calculations and tested them for transcription or mathematical errors. CRMC provided adequate documentation for the emissions estimates as well as its programs around the data collection process. Evidence included flow check records, contractual agreements, and electronic data associated with gas flow and methane content monitoring. The verification process focused on verifying the data and methodology used by CRMC to calculate emissions reductions. The calculations on the spreadsheet were consistent with the PDD.

3.6 Management and Operational System

CRMC has adequate management and operational systems in place with respect to their management system for monitoring and reporting, as determined through interviews and supporting documentation. Records of the raw data and calibrations are recorded in an on-site SCADA system. The monitoring system is designed to trigger alarms when parameters fall outside a specified range. The records are sent to CRMC for analysis, quality control, and emission reduction calculations.

In the verification for the first half of 2009, an opportunity for improvement was identified during the verification surrounding the retention of records of calibrations for the flare flow meter. During the current verification, First Environment requested records of the flare flow meter calibrations and confirmed that the records had been retained.

4. 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 Voluntary Carbon Standard 2007.1 and UNFCCC's ACM0001 (Version 9.1);
- *Verification criteria:* Voluntary Carbon Standard 2007.1, CDM Methodology ACM0001 (Version 9.1), and validated PDD;
- *Definition of materiality:* Misstatements of more than 5 percent of the GHG reduction assertion are considered material;
- *Scope, including:*
 - o *Boundaries of the assertion:* Crapo Hill landfill operations;
 - o *The physical infrastructure, facilities, and activities within the assertion:* Landfill gas collection and destruction operations;
 - o *GHG sources, sinks, and reservoirs included within the assertion:* Methane emission reductions expressed as carbon dioxide-equivalents; and
 - o *The time period for the assertion:* July 1, 2009 through December 31, 2009.

The verification of the Project is based on the information made available to us and the engagement conditions detailed in this report. First Environment cannot guarantee the accuracy or correctness of this information. Hence, First Environment cannot be held liable by any party for decisions made or not made based on this report or opinion.

Based on the assessments performed and the historical evidence collected, First Environment concludes with a reasonable level of assurance that the emissions reductions of the Project resulting from the capture and combustion of methane gas for the period of July 1, 2009 through December 31, 2009 are:

- consistent with the VCS PDD of December 2005 (with supplements);
- in conformance with the Voluntary Carbon Standard 2007.1 and the CDM methodology ACM0001 (Version 9.1);
- without material discrepancy; and
- meeting the minimum level of accuracy of at least 95 percent.

Verified results show:

Reporting Period: July 1, 2009 through December 31, 2009	
Baseline Emissions (tCO ₂ -e)	59,245
Project Emissions (tCO ₂ -e)	0
Emissions Reductions (tCO ₂ -e)	59,245

5. Verifier Signature



Iris Caldwell
Engineer II

ATTACHMENT A

EXHIBIT 2														
CommonWealth New Bedford Energy LLC														
Emission Reductions from methane oxidation during energy generation														
Physical constants:														
Methane, molecular weight (lb per lb-mole)				16					Calculation of Verified Emission Reduction in CO2 equivalent tons per the following:					
Pounds to metric ton				2,205					Verification Process: UNFCCC's CDM methodology ACM0001 (Version 9.1)					
Gas constant, scf per lb-mole				385					Standard of Verification: Voluntary Carbon Standard 2007.1					
Begin period - date	End period - date	Totalizer reading end period	Totalizer reading start period	Total in period	Methane delivered to engines	Methane delivered cumulative	Methane delivered in the period	Methane delivered in the period	Methane oxidation efficiency	MD electricity, Mass methane destroyed in the period	MD electricity, Mass methane destroyed cumulative	Global warming potential methane	Emission reduction	Emission reduction cumulative
mm/dd/yy	mm/dd/yy	MMBtu HHV	MMBtu HHV	MMBtu HHV	scf	scf	metric tons	metric tons	%	metric tons	metric tons	tons CO2 equivalent per ton methane	CO2 equivalent metric tons	CO2 equivalent metric tons
1-Jul-09														
1-Jul-09	31-Jul-09	29,052	-	29,052	28,707,510	28,707,510	541	541	100.0%	541	541	21	11,362	11,362
31-Jul-09	31-Aug-09	57,672	29,052	28,620	28,280,632	56,988,142	533	1,074	100.0%	533	1,074	21	11,193	22,556
31-Aug-09	30-Sep-09	85,320	57,672	27,648	27,320,158	84,308,300	515	1,589	100.0%	515	1,589	21	10,813	33,369
30-Sep-09	31-Oct-09	114,085	85,320	28,765	28,423,913	112,732,213	536	2,125	100.0%	536	2,125	21	11,250	44,619
31-Oct-09	30-Nov-09	141,106	114,085	27,021	26,700,906	139,433,119	503	2,628	100.0%	503	2,628	21	10,568	55,187
30-Nov-09	31-Dec-09	167,367	141,106	26,260	25,949,015	165,382,134	489	3,117	100.0%	489	3,117	21	10,270	65,457

EXHIBIT 3																
CommonWealth New Bedford Energy LLC																
Calculation of Verified Emission Reduction in CO2 equivalent tons per the Project Methodology																
Emission Reductions from methane oxidation from LFG flaring																
Physical constants:																
Methane, molecular weight (lb per lb-mole)				16												
Pounds to metric ton				2,205												
Gas constant, scf per lb-mole				385												
Calculation of Verified Emission Reduction in CO2 equivalent tons per the following:																
Verification Process: UNFCCC's CDM methodology ACM0001 (Version 9.1)																
Standard of Verification: Voluntary Carbon Standard 2007.1																
Begin period - date	End period - date	Totalizer reading end period	Totalizer reading start period	Total in period	Methane delivered to flare	Methane delivered cumulative	Methane delivered in the period	Methane delivered cumulative	Methane oxidation efficiency	MD flare, Mass methane destroyed in the period	MD flare, Mass methane destroyed cumulative	Global warming potential methane	Emission reduction	Emission reduction cumulative	PE flare, Project emissions (uncontrolled emissions to atmosphere from flare)	PE flare, Project emissions cumulative (uncontrolled emissions to atmosphere from flare)
mm/dd/yy	mm/dd/yy	MMBtu HHV	MMBtu HHV	MMBtu HHV	scf	scf	metric tons	metric tons	%	metric tons	metric tons	tons CO2 equivalent per ton methane	CO2 equivalent metric tons	CO2 equivalent metric tons	CO2 equivalent metric tons	CO2 equivalent metric tons
1-Jul-09																
1-Jul-09	31-Jul-09	558	-	558	550,922	10,288,706	10	10	50%	5	5	21	109	109	109	109
31-Jul-09	31-Aug-09	558	558		-	10,288,706	0	10	50%	-	5	21	-	109	-	109
31-Aug-09	30-Sep-09	558	558		-	10,288,706	0	10	50%	-	5	21	-	109	-	109
30-Sep-09	31-Oct-09	558	558		-	10,288,706	0	10	50%	-	5	21	-	109	-	109
31-Oct-09	30-Nov-09	558	558		-	10,288,706	0	10	50%	-	5	21	-	109	-	109
30-Nov-09	31-Dec-09	958	558	400	395,425	10,684,130	7	18	50%	4	9	21	78	187	78	187

EXHIBIT 4

Emission Reductions from the Greater New Bedford LFG Utilization Project using ACM0001 (Version 9.1) under the VCS Program

Key factors to determine baseline and emission reductions (1):								
Methane oxidation efficiency for electric generation:								100%
Methane oxidation efficiency for flare:								50%
GWP methane, Global warming potential for methane:								21
Quantity methane collected and controlled to make electricity								100%
Quantity methane collected and controlled by flare								0%
EL lfg	Indirect electricity required by baseline activity							0
ET lfg	Indirect thermal energy required by baseline activity							0
PE	Project emissions, which are indirect emissions from Project Activity							0
MD project	Methane destroyed by Project Activity							See below
MD bl	Methane destroyed in the District Initial System.							See below
MD flared	Methane destroyed by flaring = methane delivered to flare - methane emitted to atmosphere							See below
MD electricity	Methane destroyed by generation of electricity							See below
BE	Baseline emissions = (MD project-MD bl) * GWP methane + indirect emissions of baseline activity							See below
ER	Emission reductions, which is equal to BE - PE							See below

	Methane collected and delivered to engines and flare, methane metric tons	MD electricity, methane metric tons	MD flared, methane metric tons	MD project, methane metric tons	MD bl (2), methane metric tons	(MD project MD bl) methane metric tons	BE, CO2e metric tons	ER, CO2e metric tons
Year								
2nd Half 2009	3,135	3,117	9	3,126	305	2,821	59,245	59,245

(1) Key factors and equations are from UNFCCC CDM document ACM0001/Version 09.1.

(2) Calculation of MD bl in accordance with validation report shown below.

Year	Methane delivered to flare from District Initial System, metric tons	MD bl, Methane destroyed in the District Initial System, metric tons						
2001	3,548	1,774						
2002	3,104	1,552						
2003	2,716	1,358						
2004	2,377	1,188						
2005	2,080	1,040						
2006	1,820	910						
2007	1,592	796						
2008	1,393	697						
2009	1,219	610						
2010	1,067	533						
2011	933	467						
2012	817	408						
2013	715	357						
2014	625	313						
2015	547	274						
2016	479	239						
Annual rate of decline =	0.125							