

Verification Report for Moccasin Mike Landfill Gas Project-CAR 406 Superior, Wisconsin

Climate Action Reserve

March 2011

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1. Introduction

This report is provided to the City of Superior, Wisconsin as a deliverable of the Climate Action Reserve (CAR) project verification process. This report covers the verification of the Moccasin Mike Landfill Gas Project (the Project) for the period of July 1, 2010 through December 31, 2010. First Environment, Inc. (First Environment) conducted the verification from December 2010 through March 2011.

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, including all eligibility requirements, 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	Moccasin Mike Landfill, Superior, Wisconsin
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	July 1, 2010 through December 31, 2010
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 Protocol, Version 3.0, December 2009 (CAR Protocol); Errata and Clarification to Landfill Project Protocol, Version 3.0, January 4, 2011; Climate Action Reserve Program Manual, March 2010
Verification Process	Climate Action Reserve Verification Program Manual, June 2009; Section 8 of the CAR Protocol; ISO 14064-3:Specification with guidance for the validation and verification of greenhouse gas assertions, 2006
Level of Assurance	Reasonable assurance
Materiality	Misstatements greater than five percent of the Project's emission reductions assertion are considered material; Qualitative non-conformities with the CAR Protocol are also 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;
- initial interaction and kick-off meeting;
- development of the verification plan;
- site visit;
- review and evaluation of raw data and calculations for period under review;
- follow-up interaction with the City of Superior 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 15, 2010.

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 – Iris Caldwell
Verifier – Jeff Daley
Senior Internal Reviewer – Michael Carim

5.3 Audit Kick-off

The verification audit was initiated with a kick-off meeting on December 21, 2010 with the primary City of Superior contact, Jeff Goetzman, and the project consultants, Colin Reichhoff and Brian Kent from Short Elliott Hendrickson, Inc. (SEH). The meeting focused on confirming the scope, schedule, and data required for verification.

5.4 Development of the Verification Plan

The Audit 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. The City of Superior was afforded the

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

First Environment conducted a site visit on September 16, 2010 as part of the previous verification activities for the Project. During the site visit, First Environment assessed the Project's data management systems and interviewed personnel relevant to the Project. First Environment was able to confirm during the kick-off meeting that no changes to the Project's operation or data management systems had occurred since the initial site visit in September 2010. Therefore, a site visit was deemed unnecessary for the current reporting period.

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 reported emissions reduction quantities, and identify if either contained material or immaterial misstatements.

5.7 *Corrective Actions and Supplemental Information*

The Audit Team did not issue any corrective actions during the verification process; however, several requests for clarification and supplemental information were issued. The City of Superior provided sufficient responses to all clarification and information requests.

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 the City of Superior, 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 Moccasin Mike Landfill is located in Superior, Wisconsin and is owned and operated by the City of Superior. The landfill has actively received municipal solid waste since 1976 and consists of Cells 1 through 4 and a newly proposed Cell 5. In 2004, the City of Superior installed five passive vents to help prevent the migration of landfill gas. These passive vents were converted to active gas collection wells in 2008 and seven additional wells and an open flare were installed.

The Project consists of the voluntary collection and destruction of landfill gas in the open flare. The Project destroys landfill gas that otherwise would be vented to the atmosphere, resulting in a net reduction of CO₂-equivalents. The baseline scenario, defined as the total release of landfill gas to the atmosphere, was confirmed through review of start date documentation and interviews with project personnel during the site visit in September 2010.

6.2 Eligibility

The Project meets the eligibility requirements set forth in the CAR Protocol. The Project is located within the United States and has a project start date after January 1, 2001. The project start date was April 28, 2009. First Environment previously verified the project start date through review of a notification letter from the City of Superior to the Wisconsin Department of Natural Resources (DNR) and to local emergency managers stating that the flare became operational on this date.

The City of Superior owns the landfill and the gas collection and control system that constitutes the Project, and therefore has title to emission reduction credits associated with the Project. First Environment verified ownership through review of several permits held by the City of Superior, including the air pollution control construction permit authorizing the City of Superior to install the flare. The City of Superior also completed the Attestation of Title for the current reporting period. First Environment confirmed that the form is on file with CAR and was completed correctly.

First Environment reviewed the most recent air pollution control operating permit, issued to the facility on December 15, 2010, as well as emissions testing results to inform the assessment of regulatory compliance. Additionally, First Environment reviewed the Environmental Protection Agency's Enforcement and Compliance History Online (ECHO) database profile for the Moccasin Mike Landfill. These cursory reviews indicated that the Project was in compliance and no violations occurred during the reporting period. First Environment also relied in part on the Attestation of Regulatory Compliance, completed by the City of Superior for the current reporting period, in order to confirm the Project's regulatory status. First Environment confirmed that the form is on file with CAR and was completed correctly.

6.3 Additionality

The Project consists of a voluntarily installed landfill gas collection system and a new qualifying destruction device at a landfill where landfill gas has never been collected and destroyed prior to the project start date, and therefore passes the first performance standard defined by the CAR Protocol in Section 3.4.1. In order to establish regulatory additionality and the Project's eligibility under the CAR Protocol, First Environment relied in part on the Attestation of Voluntary Implementation completed by the City of Superior for the current reporting period. First Environment confirmed that the form is on file with CAR and was completed correctly.

During the current reporting period, the landfill's permitted design capacity was expanded to greater than 2.5 million megagrams (Mg) due to the construction of Cell 5. As such, the City of Superior conducted non-methane organic carbon (NMOC) emissions rate testing on October 14, 2010. The results of this test indicated that the NMOC emission rate is anticipated to remain well below the 50 Mg per year threshold established by the New Source Performance Standard (NSPS) regulation for the next five years. Therefore, the landfill is not required to operate an active collection and control system under NSPS requirements. First Environment reviewed the preliminary determination document issued by the Wisconsin DNR, the current air pollution control operating permit, and the NMOC emission rate report in order to confirm that the Project is not required under federal NSPS regulations.

Additionally, the landfill is required to comply with Wisconsin Administrative Code NR 445, which regulates hazardous air contaminants. In order to demonstrate compliance with NR 445, the landfill was required to install an active gas collection system and monitor hazardous air contaminants. In their preliminary determination document, the Wisconsin DNR confirmed that, based on estimated maximum theoretical emission rates, the landfill does not have to operate the open flare as a means of meeting the NR 445 limits. First Environment reviewed the preliminary determination document issued by the Wisconsin DNR, current and past air pollution control operating permits, hazardous air modeling results, and copies of correspondence with the Wisconsin DNR in order to confirm the voluntary nature of the landfill gas collection and control system under state regulations. Similarly, based on a cursory review of the landfill's permits and compliance history, First Environment is reasonably assured that there are no additional local requirements for the installation of the landfill gas collection and control system, as stated in the Project's monitoring plan. Based on First Environment's review described above, the Project passes the Legal Requirements Test defined by the CAR Protocol.

6.4 Project Performance Against Protocol/Methodology and Project Management System

The Project was implemented in conformity with the CAR Protocol.

The Project's monitoring system consists of a flow meter, gas analyzer, and thermocouple, which feed data to a Yokogawa datalogger. The flow of landfill gas is continuously measured using a Rosemount 3095MV mass flow meter. The total flow is recorded every eight minutes by the Yokogawa datalogger. The data are exported to Microsoft Excel for review and quantification. The flow meter standardizes flow data from ambient conditions to 60°F and one atmosphere of pressure.

The flow meter is cleaned and inspected on a monthly basis, as documented on the Gas Extraction and Well Head Monitoring Logs. The Monitoring Plan indicates that the flow meter is field calibrated at least annually and factory calibrated every three years, consistent with manufacturer's recommendations. During the reporting period, Aspect Electrical Engineering & Service, LLC performed field calibrations on November 24, 2010 and December 23, 2010. Both of these calibrations were performed within two months of the end of the reporting period as required by the CAR Protocol. First Environment reviewed evidence of the monthly inspections and cleanings as well as the field calibrations of the flow meter, which indicated that the flow meter was operating accurately within the five percent threshold specified by the CAR Protocol.

The methane concentration of the landfill gas is continuously measured using a Siemens Ultramat 23 gas analyzer. The methane concentration is recorded every eight minutes by the Yokogawa datalogger. The data is exported to Microsoft Excel for review and quantification.

The gas analyzer is cleaned and inspected on a monthly basis, as documented on the Gas Extraction and Well Head Monitoring Logs. The Monitoring Plan indicates that the gas analyzer is field calibrated annually and factory calibrated every five years. The field calibrations are performed by Aspect Electrical Engineering & Service, LLC per manufacturer's recommended procedures and using a gas of known concentration. During the reporting period, the field calibrations were performed on November 24, 2010 and December 23, 2010. Both of these calibrations were performed within two months of the end of the reporting period as required by the CAR Protocol. First Environment reviewed evidence of the monthly inspections and

cleanings and the field calibrations of the gas analyzer, which indicated that the gas analyzer was operating accurately within the five percent threshold specified by the CAR Protocol.

Flare temperature is continuously monitored by dual thermocouples and recorded by the Yokogawa datalogger. The data are exported to Microsoft Excel for review and quantification. The blowers turn on when the flare temperature reaches 200°F and the pilot gas turns off when the flare temperature reaches 400°F. If the flare temperature drops below 400°F and the flare cannot be re-ignited after three attempts, the valve on the main landfill gas header will automatically close, shutting off flow to the flare.

Project emissions consist of indirect emissions of CO₂ from purchased electricity used to power project equipment and direct emissions from the combustion of propane for the flare pilot. Activity data for electricity consumption are obtained from monthly leachate report logs, which document readings from the Project's electricity sub-meter. Activity data for propane consumption are obtained from propane purchase records and field logs, which document tank level readings.

The City of Superior developed and implemented a monitoring plan to track relevant parameters and data sources for the Project. First Environment reviewed the monitoring plan and determined that it met the requirements of the CAR Protocol and accurately reflected the monitoring practices in place.

6.5 Emissions Reduction Calculation Assessment

The 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. Since the landfill is only partially covered with a synthetic liner, a ten percent oxidation factor was applied to account for methane oxidation in the cover soil. A 96 percent destruction efficiency was assigned to the Project's open flare, consistent with the CAR Protocol, and was applied accordingly in the emission reduction calculations.

The amount of methane destroyed was calculated from metered data for landfill gas collected. The flow rate was obtained at eight-minute intervals from the Yokogawa datalogger. Total flow over a given interval was computed by multiplying the flow rate by the length of the interval. No temperature or pressure correction was required in the emission reduction calculations since the flow meter automatically corrects to one atmosphere of pressure and a temperature of 60°F. For quality control purposes, flow measurements recorded when the flare temperature was below 1000°F were excluded from the emission reduction calculations. The fraction of methane in the landfill gas was determined from data obtained in the same eight-minute intervals and averaged over a given day. The total quantity of methane destroyed by the Project was determined on a daily basis and converted to a mass flow using the density of methane at 60°F and one atmosphere of pressure.

Project emissions of CO₂ from purchased electricity and stationary combustion of propane were subtracted from the total quantity of methane destroyed. Project emissions were calculated by multiplying activity data by an appropriate emission factor.

Copies of the raw data used in the calculations including flow data, methane content data, electricity meter readings, and propane tank level readings, were compared with the data used in the final calculations and tested for transcription or mathematical errors. All of the raw methane data, flow data, and supporting documentation of project emission sources were reviewed by First Environment. Calculations over the entire verification period were reviewed for accuracy. Additionally, First Environment performed an independent recalculation of the emission reductions for the entire reporting period. Minor transcription errors were noted, but they had an immaterial impact on the overall emission reductions. In general, First Environment found the emission reduction calculations to be free of material misstatement.

6.6 *Approved Variance or Deviations*

The City of Superior did not request any variances or deviations from the CAR Protocol for the current reporting period.

6.7 *Changes Due to Errata and Clarifications Issued by CAR*

The issuance of the Errata and Clarification to the Landfill Project Protocol, Version 3.0 document on June 25, 2010 resulted in a change to the attestation forms that the project developer submitted to the Reserve. First Environment reviewed the Attestation of Voluntary Implementation and the Attestation of Regulatory Compliance forms and confirmed that these forms were completed correctly and are on file with the Reserve.

7. *Audit Results*

The City of Superior 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 clarification and supplemental information from the City of Superior. The responses given by the City of Superior were sufficient to resolve the issues raised by the Audit Team.

Verified results show 11,210 metric tonnes of CO₂e from Vintage 2010 from the reporting period of July 1, 2010 through December 31, 2010 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's GHG emissions reductions, due to the capture and combustion of methane gas for the period July 1, 2010 through December 31, 2010, 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: July 1, 2010 to December 31, 2010	Total
2010 Baseline Emissions (tCO ₂ e)	11,225
2010 Project Emissions (tCO ₂ e)	15
2010 Emissions Reductions (tCO ₂ e)	11,210

9. Lead Verifier Signature



Iris Caldwell
Engineer II

10. Senior Internal Reviewer Signature



Michael Carim
Associate