



Verification Report for CAR435 Northeast Mississippi
Landfill

May 1, 2011 - April 30, 2012 Reporting Period

Prepared for:
NEML1, LLC

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1.0 Introduction

Ruby Canyon Engineering (RCE) was contracted by Element Markets, LLC (Element Markets) to perform the repeat verification of the Northeast Mississippi Landfill (CAR435) project (Project) for the reporting period May 1, 2011 through April 30, 2012 to the Climate Action Reserve (CAR) Landfill Project Reporting Protocol Version 2.0 (Protocol). The Project involves GHG emission reductions from the capture and destruction of methane from the municipal solid waste landfill located in Tippah County, Mississippi.

1.1 Project Background & Site Description

The Northeast Mississippi Regional Landfill (NEML) is owned by the Northeast Mississippi Solid Waste Management Authority (NMSWMA). The landfill is operated by Waste Connections, Inc., through its fully owned subsidiary Waste Services NE Mississippi. NEML is an active solid waste municipal sanitary landfill located in Tippah County, Mississippi approximately two miles west of Walnut, Mississippi on 288 acres with a permitted disposal area of 82 acres. NEML began receiving waste in 2001 and is not expected to close until 2029.

The Project is owned and operated by NEML1, LLC a wholly owned subsidiary of Element Markets. The Project was voluntarily implemented and began operating on November 5, 2008 and consists of one landfill gas collection system and one open candlestick flare that combusts the collected gas. RCE confirmed that the Project is not a bioreactor and does not add any liquid other than leachate in a controlled manner. The Project maintenance and data gathering is conducted by Waste Connections and the greenhouse gas (GHG) calculations are performed by Element Markets.

1.2 Responsible Party

NEML1, LLC
3555 Timmons Lane, Suite 900
Houston, TX 77027

1.3 Verification Team

The RCE verification team consisted of the following individuals who were selected based upon verification experience and knowledge of the landfill methane sector.

Lead Verifier: Michael Coté
Team Member: Phillip Cunningham
Senior Internal Reviewer: Nina Pinette

1.4 Objectives

The goal of the verification activities was to ensure that the claimed GHG emission reductions were complete, consistent, accurate, transparent and permanent and that the Project was in compliance with CAR project additionality, monitoring and reporting requirements. Furthermore, the verification activities ensure that the data provided to RCE are well documented and free of any material errors or omissions.

1.5 Scope

The scope of the periodic verification consists of the following independent and objective activities:

- Review the Project Monitoring Plan
- Conduct a site visit to the Project
- Review the Project data acquisition and quality control procedures
- Review the Project's baseline emissions and Project boundaries
- Review the Project's emission reduction calculations
- Review requests for variances and variance determinations issued by CAR
- Review of the Project documents and data against the verification criteria in Table 1
- Issue requests for additional documentation, clarifications, and corrective actions as necessary
- Issue a verification report, verification statement, and list of findings to Element Markets and CAR

1.6 Verification Criteria

Table 1 - Verification Criteria

Criteria	
Standard of Verification	• Landfill Project Reporting Protocol Version 2.0 • Landfill Project Verification Protocol Version 2.0 • Errata & Clarifications to Landfill Project Protocol, Version 2.0 (October 26, 2011) • Verification Program Manual (December 20, 2010) • Program Manual (October 26, 2011)
Verification Process	• CAR and ISO 14064-3 Specification with guidance for the validation and verification of greenhouse gas assertions
Level of Assurance	• Reasonable assurance
Materiality	• A +97% accuracy level (less than 3% error) because total annual ERs are greater than 25,000 tCO₂e but less than or equal to 100,000 tCO₂e.

2.0 Verification Activities Summary

The Project was previously listed with CAR, and RCE verified the first two reporting periods. The verification of the May 1, 2011 through April 30, 2012 Project reporting period began with Element Markets selecting RCE as the verification body. Element Markets provided the Project data and verification support on behalf of the wholly owned project developer NEML1, LLC. Prior to starting the verification, RCE developed a verification plan that was followed throughout the verification. The verification plan consisted of the following activities:

- RCE completed the Project NOVA/COI form to identify any potential conflicts of interest with the Project or Project developer. The NOVA/COI form was submitted to the Reserve's website, and the COI assessment revealed no conflicts of interest and was approved by CAR on May 1, 2012.

- RCE held a verification kickoff meeting with Element Markets on May 2, 2012. During the kickoff meeting RCE reviewed the verification objectives, verification process and the verification schedule.
- RCE began receiving the background verification documents by email from Element Markets on June 6, 2012.
- RCE performed a strategic review and risk assessment of the received data and support documents in order to understand the scope and areas of potential risk in the GHG emissions reductions.
- RCE developed a risk-based sampling plan based upon the strategic review and risk assessment. The verification plan and sampling plan were used throughout the verification and were revised as needed based upon additional risk assessments.
- RCE conducted a site visit on June 12, 2012. During the site visit RCE performed key personnel interviews, inspected the Project equipment, and observed the onsite GHG management systems, and data gathering, monitoring, and handling practices.
- RCE performed a risk-based desktop review of the submitted verification documents including an assessment of the GHG calculation methods and inputs, source data completeness, GHG management and monitoring systems, evidence of regulatory compliance, continued additionality, and record retention practices.
- RCE submitted requests for additional documentation, clarifications, and corrective actions to Element Markets throughout the verification.
- RCE's senior internal reviewer conducted a review of the verification sampling, verification report, and verification statement.
- RCE developed a final verification report, verification statement, and list of findings.
- RCE held an exit meeting with Element Markets on July 17, 2012.

3.0 Verification Findings

3.1 *Assessment of the GHG Reduction Project Operations*

The Project currently collects landfill gas (LFG) and destroys it via combustion in an open utility flare. Prior to combustion, the LFG passes through a condensate knockout tank and is measured for flow, temperature, pressure and methane content. The LFG is pulled through a LFG collection system by an electrically-driven centrifugal blower located at the flare skid.

The LFG collection system was installed within Cells 1 through 3 that vented passively until November 2006. Following that, Waste Connections installed four passive solar flares to test the gas flow rate and quality. In anticipation of the Project (blower/flare skid) installation, additional landfill gas wells were drilled in August 2008. The gas collection system was expanded between November 17 and 18, 2009 with the addition of 8 vertical wells and the expansion was brought online on February 19, 2010.

3.2 *GHG Project Boundary (sources, sinks and/or reservoirs)*

According to the Protocol only CO₂ and CH₄ GHG are included from the baseline and Project activities. The GHG emissions resulting from the Project activity must be deducted from the Project baseline emissions in order to calculate total GHG emission reductions. The Project emissions include carbon dioxide resulting from both the consumption of electricity from the grid and from the on-site destruction of fossil fuel related to Project activities. The calculation of

baseline emissions takes into account the total methane destroyed based on the destruction efficiency of the Project flare, the oxidation of methane by soil bacteria and an adjustment to account for the pre-Project LFG destruction device. The sources of GHG emissions reviewed during the verification of the Project are listed in **Table 2**.

Table 2 – Summary of the Project GHG Sources, Sinks and Reservoirs

Activity	GHG Sources, Sinks & Reservoirs
Baseline	• CH₄ from the combustion of LFG in the passive solar flare. • CH₄ vented to the atmosphere. • Percent methane oxidized by soil bacteria. As the landfill is not covered with a synthetic liner, a 10 percent oxidation factor resulting from natural oxidation by soil bacteria was applied to the baseline emissions.
Project	• CH₄ from the combustion of LFG in the utility flare. • CO₂ from the combustion of fossil fuels used during operation and maintenance activities for the Project activity. • CO₂ resulting from the consumption of imported electricity.

3.3 Project Eligibility Criteria

The Protocol specifies three eligibility rules that a GHG Project developer must meet in order to register reductions with the CAR: location, Project operation start date and additionality requirements that consist of meeting the performance standard and exceeding any legal requirements. During the previous verification cycle RCE verified the Project's location, start date and that the Project passed the Performance Standard Test.

RCE performed a complete additionality assessment to ensure that the Project met the Legal Requirements Test and that the Project was in regulatory compliance with all applicable local, state and Federal requirements. In addition, the Project developer provided evidence of exclusive ownership rights to the GHG reductions.

Below is a summary of the CAR eligibility requirements and the Project's compliance to each requirement.

- **Eligibility Rule 1: Location:**
The Project is a US-based landfill located in Tippah County, Mississippi approximately 2 miles west of Walnut, Mississippi USA. The Project therefore meets this eligibility requirement.
- **Eligibility Rule 2: Project Start Date:**
The Protocol states that pre-existing projects must have a start date on or after January 1, 2001 and must be listed with the Reserve twelve months from the effective date of the protocol which is November 18, 2008. The start date is defined as the date on which a qualifying destruction device becomes operational. According to the Project Design Description and Monitoring Plan the Project became operational on November 5, 2008.

To confirm the Project start date RCE examined the SHAW LFG Specialties Commissioning Report with a commissioning date of November 5, 2009 and the SHAW LFG Specialties Equipment Acceptance and Warranty Acknowledgement provided by

Element Markets. The reviewed evidence in combination with interviews with the landfill personnel concerning the Project start date was sufficient evidence to affirm that the Project began flaring gas on November 5, 2008 and therefore meets the Project start date requirements.

- **Eligibility 3: Additionality**

According to the CAR additionality requirements Project developers must pass a Performance Standard Test and a Legal Requirement Test in order to show that the Project reductions are above and beyond business as usual.

Performance Standard Test

Prior to the Project implementation, NEML collected and flared the landfill gas via a non-qualifying destruction device. In November 2006 one passive solar flare was voluntarily installed between two leachate cleanout collectors to control odors and for safety purposes. In August of 2008 the passive solar flare was shut down and kept onsite for emergency purposes. During November 2006 four solar flares were also installed to test the quality and flow of the landfill gas but were removed within one week.

The Project only considered as additional the landfill gas that was destroyed beyond that resulting from the pre-Project passive collection and destruction system. Therefore, the Project proponent meets the performance standard threshold under option 2 of the performance standard test. Option 2 states “If the landfill was previously collecting and destroying landfill gas using a destruction device which would not qualify under this protocol (e.g. passive flares), the project is additional under the following condition:

- a. Only the landfill gas destroyed beyond that resulting from the pre-project collection and destruction system is considered additional (i.e. those reductions resulting from the implementation of the new GHG reduction project).”

Legal Requirement Test

For the Legal Requirement Test, Project proponents must ensure that emission reductions achieved by the Project would not have occurred in the baseline case due to federal, state, or local regulations. During the site visit RCE interviewed the Landfill Manager and Landfill Technician about the environmental compliance and legal requirements procedures. The Waste Connections personnel regularly review federal, state and local regulations and permitting requirements to ensure NEML is not mandated to collect and combust its landfill gas. In particular, the Waste Connections personnel closely monitor the NEML NSPS Tier II report testing requirements.

NEML has a design capacity above 2.5 million megagrams (Mg) and 2.5 million cubic meters of municipal solid waste. Consequently, the facility is required by the New Source Performance Standard (NSPS) regulation to conduct Non-Methane Organic Compound (NMOC) emission rate testing. During 2007, NEML hired a third-party consultant, SCS Engineers to conduct a Tier 2 NMOC test. The test results from the Tier 2 NMOC emission rate for 2011 was 13.2 Mg/year and in 2012 was 14.5 Mg/year. RCE

reviewed the results from the NMOC test that indicated that NEML is below the 50 Mg/year regulatory threshold and should not have to recalculate its NMOC until 2012.

RCE reviewed the Legal Requirements procedures detailed in the Project Description/Monitoring Plan and the Waste Connections Environmental Policies and Procedures and confirmed that the Monitoring Plan contains a clear and rigorous method to ensure the Project passes the CAR Legal Requirements Test. An Attestation of Voluntary Implementation was signed by the Senior Vice President of NEML1, LLC on June 25, 2012 and is on file with CAR.

Based upon the personnel interviews and the documentation reviewed RCE did not find any indication that NEML was mandated to collect and combust its LFG. Additionally, there are no local, Mississippi or Federal requirements mandating the installation of a landfill gas collection and combustion system at NEML. Therefore the results of the regulatory review indicated that the Project developer is following its Project Description/Monitoring Plan procedures to assure they pass the legal requirements test and the Project is in compliance with all Federal, State and local regulations.

- Regulatory Compliance

RCE reviewed the environmental compliance procedures described in the Project Description/Monitoring Plan, the Waste Connections Environmental Policies and Procedures, the Attestation of Regulatory Compliance signed by the Senior Vice President of NEML1, LLC on June 25, 2012, Title V application, the Solid Waste Management permit and Water Pollution Control permit for evidence that the Project was in compliance with all environmental and regulatory requirements. During RCE's review there was no evidence of non-compliance found, and the procedures for ensuring regulatory compliance in the Project Description/Monitoring Plan were being properly followed.

3.4 Ownership of Emission Reductions

RCE reviewed multiple contract agreements submitted by Element Markets and the completed and signed Attestation of Title signed by the Senior Vice President of NEML1, LLC on June 25, 2012 for evidence of ownership of the generated emission reductions.

The contract agreements reviewed included an agreement signed in June 2008 regarding the purchase and ownership of Emission Reduction Credits between NEML1, LLC (a wholly owned company of Element Markets, LLC) and Waste Connections, Inc, the Certificate of Formation of the NEML1, LLC and the Limited Liability Company Agreement of NEML1, LLC. The presented evidence clearly demonstrated NEML1, LLC as the sole purchaser and owner of the emission reductions associated with the Project.

3.5 Assessment of Information System Controls

The GHG management systems were reviewed during both the site visit and the desktop review. During the site visit the majority of the GHG management systems review took place and was achieved through observing the onsite procedures and interviewing the Landfill Manager, the Landfill Gas Technician with NEML and the Element Markets Project Manager. The onsite

review included an assessment of the Project data collection, processing and handling procedures, recordkeeping and data storage, the quality control and assurance procedures, Project maintenance procedures, and a field tour of the Project.

The primary Project data included the landfill gas flow, methane content, pressure and temperature of the landfill gas. Two Rosemount-Emerson Flow Meters are periodically switched out. Both flow meters automatically adjust the temperature and pressure to 60 degrees F and one atmosphere and continuously monitor the landfill gas flow. The Rosemount-Emerson flow meter is located after the blower and a condensate knockout tank and the position of the flow meter is adequate to ensure laminar flow. The landfill gas flow is measured continuously and is recorded every 2 minutes via a Yokogawa digital chart recorder.

RCE reviewed the submitted field calibration certificates for each flow meter and confirmed that each quarter a successful field calibration was conducted. The last successful field calibration of the Rosemount SN 33517 was performed by Emerson Process Management on April 1, 2012. In addition, the Landfill Manager or Field Technician inspect the flare skid daily and perform regularly scheduled field inspections, maintenance and cleaning. The Field Technician also records the total landfill gas flow, temperature, pressure, electricity consumption and site inspection notes and maintenance activities onto the daily field log.

On May 17, 2010 a Siemens Ultramat 23 continuous gas analyzer was installed. RCE was provided the factory calibration certificate and the quarterly field calibrations, and RCE determined that the gas analyzer was cleaned, inspected and calibrated according to the Protocol requirements.

The LFG Carbon Management Report spreadsheets are maintained by the Landfill Manager and once a month the spreadsheet is transmitted electronically to Element Markets.

The flare operation is monitored continuously by a thermocouple located in the utility flare shroud and the temperature and operating hours are recorded every 2 minutes by the Yokogawa digital chart recorder. The flare operations are monitored by an electronic system called Guard It. In the event of a pilot flame failure, main flame failure, automatic block valve failure or flame arrester high or low temperature, the Guard It System will automatically alert three separate individuals via phone. The Guard It will attempt to automatically restart the flare three times and if the flare cannot be restarted the system will automatically shut down and eliminate flow to flare.

The Yokogawa instrument continuously collects and records the flow meter, gas analysis and thermocouple raw data every 2 minutes onsite to a compact 512 MB flash drive. The Yokogawa is directly connected via a phone line to the Element Markets Houston office. The Houston office will export daily DDS files directly from the Yokogawa using a software system called the DAQ Explorer. The DDS files are converted into text files that are stored in the Element Markets database system. The raw data from the text files are then put into an Excel file NEML Emission Reductions, which adjusts flow totals to net out low temperature readings below 500 degrees Fahrenheit and is also used to generate the emission reductions.

The Project Design Document/Monitoring Plan was reviewed, and RCE determined that Project Design Document/Monitoring Plan clearly and thoroughly described the Project activities and

included all requirements of the Landfill Project Reporting Protocol 2.0. RCE also confirmed that the Project was implemented according to the Project Design Document/Monitoring Plan. All Project records kept by NEML and Element Markets are kept a minimum of ten years from when the information is first generated or seven years after the last verification.

3.6 Assessment of GHG Emissions Reductions Calculations

The emission reduction calculation assessment included the review of Project assumptions, raw data inputs, and accuracy of calculations. RCE assessed the completeness of the raw data and how the data are transferred to the calculation spreadsheet. The formulas and raw data inputs were reviewed for accuracy and compliance with the Protocol. RCE recalculated the GHG emissions and reductions and compared the results to Project calculations to determine if the GHG emissions were materially correct.

During the desktop review raw Project flow data from the Yokogawa DDS files were compared to the gas flow volumes and temperature readings recorded in the NEML Emission Reductions Spreadsheet. RCE selected weekly risk-based samples from each month to recalculate the monthly CH₄ destroyed by the Project. Since the Rosemount flow meter's standard conditions are 60 degrees F and one atmosphere, the flow readings did not need to be adjusted to a standard temperature and pressure of 60 degrees F and one atmosphere per the Protocol's requirement.

RCE reviewed source documentation for Project emissions from purchased electricity and propane, confirmed that appropriate emission and conversion factors were used, and reviewed the use of Protocol equations for Project emissions in the GHG assertion.

Since the Project destroyed landfill gas prior to the Project implementation the pre-Project emission reductions were deducted. As the passive flare was down prior to the Project installation, no monitoring of the flow data occurred. To estimate the non-qualifying device pre-Project emission reductions Element Markets used the pre-Project passive flare's maximum flow rate of 25 scf/m in accordance to the manufacturer's specifications. The estimation method is conservative and is in accordance with table 6.1 of the Protocol. Element Markets provided as evidence a SHAW LFG Specialties technical data sheet for the passive vent flare that supported the flare's maximum flow rate of 25 scf/m.

RCE confirmed that the 96 percent destruction efficiency was assigned to the Project's combustion device and applied accordingly in emission reduction calculations. Because the landfill does not have a synthetic liner, a 10 percent discount is applied to the baseline scenario for bacterial oxidation of methane under the cap. RCE examined the Project calculation methods and compared them to the protocol.

As there were no missing data and all calibration tests were verified to be within a five percent margin of error no discount factor was applied to account for uncertainties.

The total Project GHG reductions in CO₂e were calculated by subtracting the Project emissions from the net amount of methane destroyed by the Project in CO₂e. RCE found no material misstatements in the final Project GHG reductions calculations and results.

4.0 Verification Results

Element Markets provided sufficient evidence and documentation of its emission estimates, data collection procedures and monitoring and quality control procedures. The verification process focused on verifying the emissions estimates and the source data used by Element Markets to quantify the emissions reductions in accordance with the CAR Landfill Project Reporting Protocol 2.0. The following is a summary of the verification results.

The Project proponents reported emission reductions of 54,209 metric tons CO₂e in 2011 and 42,250 metric tons of CO₂e in 2012 as per the information provided in the final NEML Emission Reductions Spreadsheet. During final review, RCE identified no material misstatements in the data or emissions calculations. Table 3 defines the emission reductions verified for this reporting period.

During the verification process, RCE made requests for clarifications, corrective actions and supplemental documentation to complete the verification. Element Markets sufficiently addressed all corrective actions. The details of these requests are documented in RCE's List of Findings provided to CAR and Element Markets.

5.0 Verification Statement

RCE conducted a risk-based analysis of the Northeast Mississippi Landfill (CAR435) project GHG assertion including a strategic review of the Project data and evidence. Based upon the processes and procedures and the evidence collected, RCE concludes that the GHG assertion is a fair representation of the Project emission reductions resulting from the capture and destruction of landfill gas during the reporting period May 1, 2011 through April 30, 2012 and can be considered:

- in conformance with the CAR Landfill Project Reporting Protocol 2.0 standards
- without material discrepancy, and
- verified to the reasonable level of assurance.

The verified emission reduction CRTs are listed in Table 3.

Table 3 Emission Reductions Verified for May 1, 2011 through April 30, 2012

Emissions Verified	Baseline Emissions	Project Emissions	Emission Reductions CO₂e (metric tons)
2011 Emission Reductions	55,960	1,751	54,209
2012 Emission Reductions	43,149	899	42,250
Total	99,109	2,650	96,459

Lead Verifier Signature



Michael Coté

Senior Internal Reviewer Signature



Nina Pinette