



Verification Report for

New River Landfill Gas Methane Destruction Project Dublin, Virginia USA

Climate Action Reserve Project ID CAR 560

Landfill Project Protocol, Version 2.1

22 March 2012

Report Prepared for:

New River Resource Authority
7100 Cloyd's Mountain Road
Dublin, VA 24084

Report Prepared by:

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Summary

New River Resource Authority engaged NSF-ISR to verify its methane emission reductions from a landfill gas project reported to the Climate Action Reserve for the following reporting period:

- 1 July 2011 – 31 December 2011

New River Resource Authority, the project developer, is a Municipal Landfill as described by NAICS code 562212.

New River Resource Authority's methane emission reductions during the cited project reporting periods resulted from the collection and destruction of landfill gas in a single flare at the New River Solid Waste Facility located at 7100 Cloyd's Mountain Road, Dublin, Virginia.

Verified emission reductions for the vintage listed above are detailed in Section 4 of this report.

1. Introduction

1.1 Objective

The objective of this verification audit was to determine, with reasonable assurance, that New River Resource Authority had met eligibility requirements and had quantified, monitored, and fairly reported to the Climate Action Reserve its landfill gas emission reductions at the New River Resource Authority landfill in accordance with all applicable requirements of the Climate Action Reserve Landfill Project Protocol version 2.1.

1.2 Scope

The scope of the engagement included verification of the quantification, monitoring and reporting of greenhouse gas emission reductions from the project at the New River Resource Authority Landfill for the reporting period of 1 July 2011 through 31 December 2011. The scope included verification of the calculated project emissions associated with combustion of fossil fuel in a single flare and indirect emissions attributed to electricity consumption and propane consumption at the flare skid from project-related activities. And finally, the scope of this verification covered a review of all eligibility rules for this project per the requirements in the Landfill Project Protocol.

1.3 Criteria

New River Resource Authority implemented its methane reduction in accordance with the requirements of the Climate Action Reserve's Landfill Project Protocol, Version 2.1; Errata and Clarifications, Version 2.1, October 26, 2011 and the Climate Action Reserve Program Manual, October 26, 2011. NSF-ISR conducted its verification of the reported emission reductions in accordance with the requirements of the Climate Action Reserve's Landfill Project Verification Protocol Version 2.0, November 18, 2008, Verification Program Manual, June 17, 2009 and ISO 14064:2006, Part 3, Greenhouse gases – Specification with guidance for the validation and verification of greenhouse gas assertions.

1.4 Materiality

In accordance with the guidelines in the Verification Program Manual, emission reduction assertions were considered fairly stated if they varied by no more than 3% for this reporting period. These percentages are based on annual pro-rated emissions for the whole year based on sub-annual registered emissions for 2011 for this project per the criteria in the Climate Action Reserve's Verification Program Manual, December 20, 2010. Thresholds of materiality allowed verifiers of emission reduction reports to consider as immaterial discrepancies less than 3% for the last half of 2011 (the reporting period for this verification). In addition, deviations from the protocol are considered material.

1.5 Level of Assurance

This engagement was performed at the reasonable level of assurance.

2. Verification Approach

2.1 Team appointment and COI Review

This verification was performed by Mark Lutz, NSF-ISR Lead Verifier and reviewed by Michael DeBusschere, NSF-ISR Senior Internal Reviewer. Conflict of Interest inquiries were completed for NSF-ISR, the Lead Verifier and the Senior Internal Reviewer. A finding of low COI risk was confirmed by the Climate Action Reserve on 24 February 2012.

2.2 Document Review

The Lead Verifier conducted a document review to inform the planning process in advance of performing onsite verification activities. Documents reviewed included New River Resource Authority project documentation submitted to the Climate Action Reserve; documentation prepared for New River Resource Authority by SCS Engineers, including "Landfill Methane Collection and Destruction Records Report, Vintage: July 2011 through December 2011; "Monitoring, Recordkeeping, and Quality Assurance Plan for Greenhouse Gas Credit Quantification" Excel calculation spreadsheets and other project records and data.

2.3 Planning

NSF-ISR's verification approach is risk-based. It draws upon our understanding of risks to fair statement of reported emissions and the operation of controls to reduce such risks. As a result of the document review and preliminary conversations with SCS Engineering personnel (SCS Engineering is the company contracted by New River Resource Authority to assist them in this project), a verification plan and a sampling plan were developed for this engagement.

2.4 Verification Activities

As a result of its planning process, on 27 February 2012, NSF-ISR conducted a site visit of the New River Resource Authority's methane gas collection and destruction project operation in Dublin, Virginia.

The nature of verification activities conducted included:

Project Verification Report

- Confirmation of continuing eligibility, ownership of the project, and quantification of project emission reductions;
- Review of the project's continuing eligibility details under NSPS Emission Guidelines for MSW Landfills;
- Confirmation of the continued control environment, information management systems and monitoring plans of this project;
- Review, on a sampling basis, of compliance with relevant environmental regulatory requirements at the New River Landfill for the July 1, 2011, through December 31, 2011, reporting periods;
- Selecting locations and processes within the scope of New River Resource Authority's gas project to visit based on an assessment of risks to fair reporting;
- Reviewing the basis for and results achieved from the calculated methane emission reductions from its landfill gas collection and destruction project;
- Verification that New River Landfill's monitoring program and data management system addressed and recorded Protocol monitoring parameters during each project period; and
- Verification that New River Landfill's records of its management system contains procedures for acquisition and retention of all Protocol required information, and that such procedures have been implemented.

3. Verification Findings

3.1 Project Description

The New River Resource Authority operates a municipal solid waste facility in Dublin, Virginia. During the project reporting periods covered by this report, landfill gas was collected and routed for combustion at a single open flare located at the landfill. The collection and control system consisted of 16 vertical extraction wells, three horizontal collectors, three leachate cleanout connections, a single 1,250 cfm VFD-controlled blower, and a 1,250 cfm utility flare. Landfill gas flow was measured with a Veris Verabar flow measurement device, Wika gas temperature sensors and meters and a thermocouple at the flare tip. A programmable logic controller monitored flow and flame temperature and controlled the variable frequency drive at the blower, the shut-off valve, and the ignition start sequence which was supplemented with propane gas. Data were recorded in a Yokogawa data logger. During the most recent reporting period covered by this report, our site visit confirmed that landfill gas continued to be collected and routed for combustion at a single open flare located at the landfill and all of the equipment and details mentioned above are still in place.

3.2 Eligibility and Title

Project Location: The project is located in Dublin Virginia – located entirely within the U.S. and was eligible as a landfill project under the Climate Action Reserve Protocol.

Project Start Date: The project start date of January 14, 2008 was confirmed by the original verification of this landfill, conducted by NSF-ISR, 12-13 April, 2010.

Crediting Period: The crediting period for landfill projects is 10 years from the project start date. The crediting period for the New River Landfill Gas Methane Destruction Project extends to 13

January 2018. NSF-ISR has concluded that the reporting periods verified in this report is still within crediting period of the Project.

3.3 Additionality

Legal Requirement Test: NSF-ISR reviewed an attestation of voluntary implementation signed by the Executive Director of New River Resource Authority on 18 February 2012 for the project reporting period from 1 July 2011, through 31 December 2011. NSF-ISR verified the implementation of the project developer's monitoring plan with respect to changes in regulations that could affect the continued eligibility of the landfill gas destruction project. We also took a sample of current permits and interviewed the Executive Director for this project concerning his knowledge of any changes to regulations that would affect the voluntary nature of the projects implementation. From this review NSF-ISR has concluded that there were no significant changes that have affected this project for reporting period of this report and that the project implementation continued to be voluntary.

NSF-ISR, in its original verification of this landfill, concluded that the New River Resource Authority landfill was subject to NSPS regulation because it had a solid waste design capacity greater than 2.5 million megagrams or 2.5 million cubic meters. For this reporting period, NSF-ISR reviewed the latest Tier 2 NMOC Emissions Rate Report submitted by SCS Engineers to the Virginia Department of Environmental Quality, April 14, 2011. The 2011 NMOC emissions from this report is 4.21 Mg/year.

Performance Standard Test: The New River Resource Authority (NRRA) landfill met the performance standard by installing a new qualifying destruction device at an eligible landfill where landfill gas had previously been destroyed using a nonqualifying destruction device (in this case two passive flares installed for odor control; only one of which became operational) prior to the project start date. A visit to the site and interviews with site and project development personnel on 12-13 April 2010 confirmed that two passive flares installed on leachate cleanout riser pipes had been decommissioned in November 2007 after the construction of the new active landfill gas collection system. In the first reporting period for this project, NSF-ISR examined records from a contracted driller to confirm that construction activities had commenced on 30 August 2007. NSF-ISR concluded from this evidence that the Project has met the performance standard test.

Regulatory Compliance:

NSF examined on-going Regulatory Compliance by an interview with NRRA executive management and internal monitoring of Regulatory Compliance of by a review of NRRA's Form I-1 ("Annual Checklist Regulatory Test Determination.") This review is done once per year and was verified on the prior site visit August 29 and 30, 2011. NSF-ISR looked at a sample of current permits and found them all to be current.

As a cross-check, NSF-ISR reviewed the EPA's publicly available Office of Enforcement and Compliance History database, and found records of state inspection for compliance with the Clean Air Act (CAA). No Notices of Violation had been recorded in the database in this reporting period under the CAA, National Pollution Discharge Elimination System, or Resources Recovery and Reclamation Act.

NSF-ISR examined the "Attestation of Regulatory Compliance" signed by the Executive Director of New River Resource Authority on 18 February 2012 and found the document free of apparent defect.

Based on the above, NSF-ISR's regulatory review indicated the landfill was in compliance with Federal, State and Local regulations during the reporting period from 1 July 2011, through 31 December 2011. On this basis, NSF-ISR has concluded that NRRRA operated per applicable regulatory requirements.

3.4 Ownership

NSF-ISR reviewed the Attestation of Title dated 18 February 2012 concerning ownership of landfill gas emission reduction credits. This document asserts that the project applicant had legal rights to any emission reduction credits to be issued by the Climate Action Reserve.

NSF-ISR had previously considered in the first verification as evidence the contractual scope of work statement that the New River Resource Authority executed with SCS Engineers. This agreement was executed on 20 October 2008 and provided for SCS Engineers to provide consulting services to NRRRA to assist it with the monetization of emission credits. Both the Executive Director of NRRRA and a representative from SCS Engineers verbally confirmed that this agreement is still in effect.

From this evidence, NSF-ISR has concluded that the project developer, New River Resource Authority, continues to be entitled to receive the emission reduction credits that may be issued by the Climate Action Reserve for methane destroyed during this project period.

3.5 Project Boundaries and Emission Sources

NSF-ISR reviewed the project boundaries per the requirements of the protocol and found that the assessment boundaries have not changed from the original verification and continue to correctly begin with the project landfill gas collection system (gas wells and lateral collectors) in the well field leading to a blower/flare skid and associated valves and instrumentation and ending with the flare itself. NSF-ISR verified in the latest site visit (February 27, 2012) that there were no additions of engines, turbines, boilers or other devices and that the flare continued to be the sole destruction device.

Sources, Sinks and Reservoirs. The Project accounted for the following sources, sinks and reservoirs identified in the Landfill Project Protocol: Waste Breakdown; Gas Collection; Supplemental Fuel and CH₄ emissions from both Project LFG Flare Destruction and CH₄ emissions from pre-Project LFG Flare Destruction. Landfill Project Protocol default destruction efficiencies were correctly applied to account for incomplete combustion of methane by the flare. Specific sources included the following:

- CO₂ from the oxidation of CH₄ by soil bacteria. As the landfill is only partially covered by a synthetic liner, the Landfill Project v. 2.1 Reporting Protocol assumption that 10 percent of the methane produced would be naturally oxidized by soil bacteria has been applied.
- Uncontrolled GHG released from the landfill.

GHG sources, sinks and reservoirs associated with the project:

- CH₄ from the incomplete combustion of CH₄ in the 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.
- The gases reviewed include CO₂ and CH₄. All gases have been converted to CO₂ equivalents.

3.6 Performance Against Project Protocol/Methodology

During the site visit, a review of the project greenhouse gas management system was conducted with the project developer. This review included a look at the project data handling and processing procedures, recordkeeping and data storage and the quality control and assurance procedures. The following is the result of this review.

The Project continued to measure the flow of landfill gas using a VerisVerabar flow sensor model V100-10-H-M connected to a Rosemount differential pressure transmitter and LFG temperature sensor during this reporting period to report pressure and temperature-compensated flowrates and calculated by the system's PLC. Landfill gas flow data was logged using a Yokogawa FX106 paperless data recorder mounted in the flare station control panel. This data was then corrected on Excel spreadsheets to 60 deg F and 14.7 psia per protocol requirements. NSF-ISR reviewed a sampling of Excel spreadsheet files to verify that this correction had taken place during the reporting period.

NSF-ISR also reviewed flow meter records that indicated that the flow measurement equipment was cleaned and inspected on a quarterly basis with documented "as found / as left" condition. In addition, NSF-ISR verified that the differential pressure instrumentation of the flowmeter was calibrated per manufacturer's guidance by an independent third-party qualified calibration service (last calibrated on November 2, 2011, well within two months of the end of the reporting period.) The % drift was documented and well within 5% across all target ranges. The frequency of this calibration is more often than yearly and well exceeds the manufacturer's recommendations.

Also, NSF-ISR confirmed through a sample of records that temperatures were maintained above 200 degrees F. for all flows reported and that the operation of the flare was continuously monitored using a thermocouple located within the flare shroud connected to a logging device.

From these findings, NSF-ISR has concluded that the project continuously monitored landfill gas flow, temperature and pressure in conformity with project protocol requirements

NSF reviewed records for the methane gas analyzer and found that it was cleaned and inspected on a quarterly basis, with the activities performed and as found/as left condition of the equipment documented and field checked for calibration accuracy with the percent drift documented within the two months prior to the end date of the reporting period.

Methane concentration was monitored weekly using a calibrated portable gas analyzer (an Elkins Envision 1104). Per protocol requirements, a 10% discount must be applied to account for uncertainty associated with these readings. We reviewed the data to verify weekly methane concentration measurements and also found that the required 10% discount was used throughout the reporting period calculations for the total quantity of methane collected and destroyed.

The New River Landfill Gas Destruction Project adjusted its calculation of emission reductions to account for the prior operation of a nonqualifying destruction device. One of the two passive flares installed on leachate cleanouts for odor control had operated. NSF-ISR had previously confirmed this from affirmations provided by landfill personnel. For the one passive flare that had operated, the project had correctly used Equation 5.3 to determine the value of *PREdiscount*. The pre-project discount factor for soil oxidation without a liner was correctly used per "Errata and Clarifications to Landfill Project Protocol", Version 2.1, October 26, 2011. No monitoring was performed to determine flow rate to the device, so instead of using Appendix D of the LPP to calculate *NQdiscount*, the Project substituted the

maximum rated flow capacity provided by the manufacturer (90 cfm). NSF-ISR concluded from an examination of the evidence provided (including a review of the flare manufacturer's specifications) that the pre-project adjustment for destruction in the baseline scenario had been correctly calculated.

NSF-ISR verified that the required documents for the Project's reporting period had been completed and submitted to the Reserve. These included the signed Attestation of Title, the signed Attestation of Voluntary Implementation and the signed Attestation of Regulatory Compliance and found them to be free of apparent defect.

3.7 Project Management System

The project management system was described in "Monitoring, Recordkeeping, and Quality Assurance Plan for Greenhouse Gas Credit Quantification", March 31, 2010 written by SCS Engineers. This plan included a description of the project, calculation methodologies and a monitoring plan to track emission reductions. In addition, the plan included monitoring details of landfill gas delivered to the flare, the monitoring of the percent of methane content and the monitoring of flare temperatures to ensure complete destruction of methane. This document was verified to address the requirements of Version 2.1 of the Landfill Project Reporting Protocol.

The plan outlined procedures that described what records would be kept, by whom and for how long. In general, records are stored for a period of 10 years after the information was generated or 7 years after the last verification.

The Project Monitoring Document also outlined how applicable local, state and national regulations and permit requirements were monitored on an ongoing basis. This was verified by an interview with NRRRA management and by examination of Form I-1 ("Annual Checklist Regulatory Test Determination.")

NSF-ISR found an adequate control environment per the documented project management system for the Project for the reporting period, including a record-keeping plan, monitoring of landfill regulations, the role of individuals performing specific monitoring activities and QA/QC provisions to ensure that data acquisition and meter calibrations were carried out consistently and with precision.

3.8 Calculation of GHG Emission Reductions

Monitoring Plan data calculation procedures were reviewed for consistency with the Landfill Project Reporting Protocol v. 2.1 requirements as part of this verification. After corrective actions were taken for the non-conformances found during the verification, we calculated less than a .01% discrepancy between our total emission reduction calculations for 2011, far below the materiality thresholds for NSF-ISR independently verified calculated project emission reductions for 2011 from information on data calculation spreadsheets. Landfill Gas Destruction Project emission reductions were calculated per the formulas defined in the Climate Action Reserve Landfill Gas Reporting Protocol version 2.1. The basic formula for determining GHG emission reductions of the project activity during the reporting period was:

- Baseline emissions (in tonnes CO₂e) – Project emissions (in tonnes CO₂e)

The formula for determining Baseline emissions was:

- The total Methane destroyed
- Methane destroyed (above) converted to CO₂e
- Less the oxidation factor

Project Verification Report

- Less the discount factor for weekly methane monitoring
- Less the adjustment to account for the one qualifying pre-project destruction device
- Less the default destruction efficiency for an open flare (.96)

The formula for determining Project emissions was:

- The fossil fuel emissions used for the project, converted to CO₂ (in this case, the propane used for flare start ups.)
- The total annual electricity consumed by the project landfill gas project (with conversion factors to convert from MWh to CO₂, and then conversion of lb/CO₂ to tonnes of CO₂.)

= Project Emission Reductions.

Note: For this project, there was no supplemental natural gas utilized, so there was no need to calculate this factor. NSF-ISR further verified the data for accuracy, based on its sampling plan, the trail of data beginning from the raw data outputs to the spreadsheets capturing this data to the final calculations. NSF-ISR independently calculated the data based on the calculations in the protocol and found New River Landfill's claimed emission reductions were fairly stated.

No flow rates were substituted during the reporting period. Where multiple methane readings were obtained during a monitoring period, we confirmed that the lower concentration of the multiple readings collected were used.

3.9 Corrective Action Requests/Recommendations

NSF-ISR issued nonconformances to the requirements of the Climate Action Reserve during this audit and no recommendations.

All material and immaterial issues were resolved. Details on the corrective actions and clarifications requested were provided to the Project Developer and to the Reserve in a List of Findings, a private document.

3.10 Approved Variances or Deviations

There were no requested variances or approved deviations for this project during this reporting period.

4. Verification Results

4.1 Verification Team Recommendation:

Based on the verification activities described above, the verification team has concluded that the New River Landfill Gas Methane Destruction Project has achieved the following emission reductions:

Vintage Year :	Baseline Emissions	- Project Emissions	- Adjustments	= Metric tons CO ₂ -e Removals (net)*
2011 (from July 1 to December 31)	32,158.43	18.67	4,718.36	27,421

Project Verification Report

* Rounded Down

4.2 Verification Audit Summary:

Project Developer	New River Resource Authority
Project Location	Dublin, Virginia, USA
Project Type	Collecting and Destroying Methane from Landfills
Reporting Period	Vintage 2011: 1 July 2011 through 31 December 2011
Protocol Methodology	Climate Action Reserve, Landfill Project Protocol, Version 2.1
Emission Removals Verified	Vintage 2011: 27,421 metric tons of CO ₂ -e
Verification Conclusion	Based upon the above, NSF-ISR has concluded that the New River Landfill Gas Methane Destruction Project 2011 vintage methane emission reductions of 27, 421 metric tons (CO ₂ -e) reported to the Climate Action Reserve are, in all material respects, fairly stated.
Lead Verifier	 Mark Lutz, 2012-03-22
Internal Reviewer	 Michael DeBusschere 2012-04-24
<i>This verification statement is valid when signed and dated by an NSF-ISR internal reviewer.</i>	