



Verification Report for

New River Landfill Gas Methane
Destruction Project,
Dublin, Virginia
USA

Climate Action Reserve
CAR Project 560

Landfill Project Protocol, Version 2.1

5 May 2011

Report Prepared for

New River Resource Authority
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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 periods:

- 14 January 2008 – 31 December 2008,
- 1 January 2009 – 31 December 2009, and
- 1 January 2010 – 30 June 2010.

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 three vintages listed above are detailed in Section IV 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 Verification Protocol version 2.1.

1.2 Scope

The scope of the engagement included quantification, monitoring and reporting of greenhouse gas project emissions reductions associated with the operation of a flare at the New River Resource Authority landfill during three reporting periods in 2008, 2009 and 2010.

1.3 Criteria

New River Resource Authority implemented its methane emission reduction project in accordance with the requirements of the Climate Action Reserve's Landfill Project Protocol version 2.1, the Landfill Project Protocol 2.1 Errata and Clarifications (January 4, 2011), and the Climate Action Reserve Program Manual (March 16, 2010). NSF-ISR conducted its verification of the reported emission reductions in accordance with the Climate Action Reserve Landfill Project Verification Protocol 2.0, the Climate Action Reserve Project Verification Manual (June 17, 2009), and ISO 14064:2006 Part 3, *Greenhouse gases – Specification with guidance for the validation and verification of greenhouse gas assertions*.

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1.4 Materiality

In accordance with the Climate Action Reserve Project Verification Manual, emission reduction reports were considered fairly stated if they varied by no more than 5% from a complete statement of the project's methane emission reductions. Thresholds of materiality defined by Climate Action Reserve Project Verification Manual allowed verifiers of emission reduction reports to consider as immaterial discrepancies of 5% or less.

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 John Shideler, NSF-ISR Lead Verifier, and reviewed by Michael DeBusschere. Conflict of Interest inquiries were completed for NSF-ISR, for the verification team, and for the internal reviewer, and a finding of low COI risk was confirmed by the Climate Action Reserve.

2.2 Document Review

The verification team conducted a document review to inform the planning process in advance of performing on-site 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 "Initial Landfill Methane Collection and Destruction Records Report, Vintage Years January 2008 through June 2010", and "Monitoring, Recordkeeping, and Quality Assurance Plan for Greenhouse Gas Credit Quantification;" 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 New River Resource Authority personnel in Dublin, Virginia, a verification plan and a sampling plan were developed for this engagement.

2.4 Verification Activities

As a result of its planning process, on 12-13 April 2010 NSF-ISR conducted a site visit of the New River Resource Authority's methane gas collection and destruction project operation in Dublin, Virginia. Verification activities continued off-site in September and October 2010 and in March 2011. The nature of verification activities conducted included:

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- Verification of the eligibility of the New River Resource Authority's landfill gas project to report emission reductions in accordance with the Climate Action Reserve Landfill Project Protocol 2.1;
- Verification of title to the emission reduction credits asserted by the New River Resource Authority;
- Verification of the project's additionality as established through the Legal Requirement Test and the Performance Standard Test;
- Verification of the ongoing compliance of the New River Resource Authority to regulatory requirements;
- Verification of applicable methane and carbon dioxide emission sources within the project boundary and their quantification as defined by the Climate Action Reserve Landfill Project Protocol 2.1;
- Verification of New River Resource Authority's monitoring of key operational parameters of its landfill gas collection and destruction project;
- Assessment of the capability of New River Resource Authority's management system and procedures to produce accurate, reliable, and reproducible data and information;
- Determination of New River Resource Authority's conformity in all material respects with the requirements of the Climate Action Reserve Landfill Project Protocol 2.1;
- Reviewing the basis for and results achieved from the calculated methane emission reductions from its landfill gas collection and destruction project;
- Selecting locations and processes within the scope of New River Resource Authority's landfill gas project to visit based upon an assessment of risks to fair reporting; and
- Visiting the selected work locations and interviewing personnel, observing operations, and reviewing relevant documents and records.

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, two 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

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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.

3.2 Eligibility

NSF-ISR considered evidence to establish the eligibility of the New River Landfill Gas Destruction Project (the Project) under the Landfill Project Protocol (LPP) version 2.1.

Location. The Project is located within the United States of America in Dublin, Virginia. NSF-ISR confirmed the location through a site visit in April 2010.

Project Start Date. The Project was listed with the Climate Action Reserve (the Reserve) on 17 November 2009, which was within 12 months after the publication of version 2.0 of the Landfill Project Reporting Protocol. The project start date occurred after 1 January 2001, on 14 January 2008, the day the open flare became operational on a continuous basis. NSF-ISR confirmed the project start date through the review of records. From these facts NSF-ISR has concluded that the Project is eligible.

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 are within the first crediting period of the Project.

3.3 Additionality

Legal Requirement Test. NSF-ISR reviewed an attestation of voluntary implementation signed by the New River Resource Authority on 1 March 2011 for the project reporting period from 14 January 2008 through June 30, 2010. 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. NSF-ISR also interviewed the executive director of the New River Resource Authority concerning his knowledge of any changes to regulation that would affect the voluntary nature of the project's implementation. From this review NSF-ISR has concluded that the project implementation continued to be voluntary.

Performance Standard. 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 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. NSF-ISR examined records from a contracted driller to confirm that

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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. 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. NSF-ISR reviewed two records of Non-Methane Organic Compound (NMOC) emission rates, one conducted in 2008 where an NMOC emission rate of 39.15 was established and another one in 2010 where the rate was found to be 46.73 tons per year. In a subsequent communication to NSF-ISR, using data from the 2008 Tier II testing, the consulting engineering firm employed by the landfill estimated that the earliest date the landfill would exceed an NMOC generation emission rate of 50 Mg/yr would be 1 January 2011. NSF-ISR also reviewed NRRA's Title V air permit, and found no regulatory requirements in the permit that required control of NMOC emissions that remained below 50 tons per year. In August 2007 NRRA applied to the Virginia Department of Environmental Quality (VADEQ) for a modification to its air permit to install the landfill gas flare. VADEQ replied in a letter that a permit modification was not required because the amount of increased emissions was not sufficient to trigger the Prevention of Significant Deterioration provisions of the Clean Air Act and the proposed propane emissions for the flare ignition were *de minimis*. 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 during the past five years under the CAA, National Pollution Discharge Elimination System, or Resources Recovery and Reclamation Act. The results of NSF-ISR's regulatory review indicated the landfill was in compliance with Federal, State and Local regulations at the time of its construction in November 2007 and had remained so during the reporting period 14 January 2008 through 30 June 2010. On this basis NSF-ISR has concluded that NRRA operated in accordance with applicable regulatory requirements.

3.4 Ownership

NSF-ISR reviewed the Attestation of Title dated 26 July 2010 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 also considered 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 NRRA to assist it with the monetization of emission credits. From this evidence, NSF-ISR has concluded that the project developer, New River Resource Authority, is 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

The Project included all emission sources from the operation of the landfill gas collection system to the ultimate destruction of the landfill gas at an open flare. The sources of GHG emissions reviewed in the New River Landfill Gas Methane Destruction Project are as follows.

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GHG sources, sinks, and reservoirs associated with the baseline scenario:

- CH₄ vented to the atmosphere.
- CO₂ from the oxidation of CH₄ by soil bacteria. As the landfill is not entirely covered with a synthetic liner, the Landfill Project Protocol v. 2.1 assumption that 10 percent of the methane produced would be naturally oxidized by soil bacteria has been applied.
- CO₂ from landfill gas destroyed in nonqualifying devices prior to the Project's implementation.

The 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.

All gases have been converted to CO₂ equivalents.

3.6 Performance Against Project Protocol/Methodology

The New River Landfill Gas Destruction Project was implemented in conformity with the Climate Action Reserve Landfill Project Protocol version 2.1. In this section of the report, NSF-ISR reviews the evidence it has considered in reaching conclusions about the performance of the landfill with respect to operations and maintenance activities required by the applicable protocol.

Monitoring Flow of Landfill Gas. The Project measured the flow of landfill gas using a Veris Verabar flow sensor connected to a Rosemount differential pressure transmitter and LFG temperature sensor. During the project period landfill gas flow data was logged using a Yokogawa FX106 data recorder. NSF-ISR reviewed a sampling of Excel spreadsheet files to which the Yokogawa data had been exported. At the time of the initial NSF-ISR site visit in April 2010, NSF-ISR was not able to confirm from evidence that the flowmeter's maintenance from the equipment's factory calibration on October 9, 2007 to May 13, 2010 had met the requirements of the LPP for inspection, cleaning and calibration. Subsequently the Project submitted a Variance Request to the Climate Action Reserve requesting dispensation from certain requirements, specifically for records providing evidence of quarterly inspection, cleaning, and field checking of calibration. The Climate Action Reserve granted the variance request on July 22, 2010. The Reserve in February 2011 clarified its Variance in a way that provided the Project further relief from some recordkeeping requirements associated with landfill monitoring. The Reserve allowed this because subsequent records demonstrated that installed monitoring and measurement devices had drifted less than the maximum allowable $\pm 5\%$ from the manufacturer's factory calibration since installation at the landfill in fall 2007.

NSF-ISR reviewed a letter dated 12/14/2009 from Veris, Inc. concerning the manufacturer's recommended interval for inspection and cleaning. The letter stated that calibration of the Veris Verabar was not required and that "the only thing that can affect the initial accuracy is damage to the sensors or clogging (which is rare if ever)." Veris recommended "that the primary element be

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visually inspected bi-annually to ensure that the unit was physically intact and that all ports are open and clean.” NSF-ISR has concluded that the element remained in good operable condition during the interval from the project start date to its first recorded inspection and cleaning, and that the Rosemount transducer had remained in calibration from its initial field installation to the date of its recalibration in May 2010. From these findings, NSF-ISR has concluded that the project continuously monitored landfill gas flow, temperature and pressure in conformity with project protocol requirements as modified by the Reserve’s Variance.

Monitoring Fraction of Methane in the Landfill Gas. The Project monitored methane concentration using Landtec portable methane analyzers. With some exceptions, the Project had met the minimum monthly monitoring requirement that applied in 2008, and the minimum weekly monitoring requirement that applied in 2009 and 2010. NSF-ISR verified that no landfill gas flow was counted in the calculation of emission reduction credits for those time periods when required monthly or weekly monitoring of methane concentration was not performed. The Project correctly accounted for the uncertainty associated with measurements taken using a portable gas analyzer. A 20% deduction of landfill gas flow was applied for those periods when monthly methane concentrations were obtained and a 10% deduction was applied when weekly methane concentrations were obtained. The Project also did not count landfill gas flow during periods when portable gas analyzers had exceeded the annual limit for recalibration. From this information NSF-ISR concluded that the Project had correctly applied discount factors to its monitoring of methane concentration of the landfill gas.

Synthetic Liner. The New River Landfill Gas Destruction Project did not uniformly incorporate a synthetic liner over its cover system; therefore a 10% methane soil oxidation factor was applied to the baseline scenario.

Pre-Project Adjustment for Destruction in the Baseline Scenario. 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 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 $PRE_{discount}$. No monitoring was performed to determine flowrate to the device so instead of using Appendix D of the LPP to calculate $NQ_{discount}$, the Project instead substituted the maximum rated flow capacity provided by the manufacturer (90 cfm). NSF-ISR concluded from an examination of the evidence provided that the pre-project adjustment for destruction in the baseline scenario had been correctly calculated.

Combustion Device Destruction Efficiency. The project applied the default destruction efficiency of 96% to its single open flare.

3.7 Project Management System

The verification team reviewed elements of the New River Landfill Gas Destruction Project management system during its on-site visit conducted 12-13 April 2010. In particular, it reviewed for adequacy the following elements:

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- Definition and maintenance of an appropriate control environment by New River Resource Authority's management and personnel;
- Training and competence of landfill project managers and operating/data management personnel;
- Identification and management of legal requirements related to landfill operations;
- Identification and maintenance of records required by the landfill project;
- Landfill site and gas collection and combustion equipment specifications;
- Quantification methods and calculations of project emissions; and
- Checking and corrective action mechanisms.

NSF-ISR identified some deficiencies in project accounting and recordkeeping and reported these to the Project, which subsequently sought a Variance from the Reserve. The Variance issued in July 2010 was subsequently modified in February 2011 at the Project's request. Apart from these identified deficiencies, for which the Reserve granted relief to the Project through its issued Variance, NSF-ISR has concluded that the management system in place during the project reporting period met minimum requirements.

3.8 Calculation of GHG Emission Reductions

NSF-ISR verified that the New River Landfill Gas Destruction Project had calculated emission reductions correctly, that appropriate discount factors were used and adjustments made, and that project emissions were quantified from records. Project emissions included fossil fuel consumption (consisting of very small amounts of propane used as supplemental fuel for the flare) and indirect CO₂ emissions from the use of grid electricity. In addition, emission reductions were further reduced by a deduction for emissions that would have occurred from a pre-project destruction device (a solar flare) had that device not been removed during the project construction.

3.9 Corrective Action Requests/Recommendations

NSF-ISR issued a number of corrective action requests and made recommendations to project management during the verification process. All material issues were resolved. Details on the corrective actions and clarifications requested are provided to the project developer and to the Reserve in a List of Findings, a private document.

3.10 Approved Variances or Deviations

One variance was requested by the Project and issued in July 2010 by the Reserve. The Reserve subsequently revised its variance in February 2011.

4. Verification Results

4.1 Verification Team Recommendation

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Emission Reductions from Project Reporting Period 2008		Metric tons CO ₂ -e
Project baseline		21,061
- Project emissions		14
- Project adjustments: Deduction for prior destruction of CH ₄		10,400
= Net project emission reductions/removals		10,647

Emission Reductions from Project Reporting Period 2009		Metric tons CO ₂ -e
Project baseline		29,953
- Project emissions		14
- Project adjustments: Deduction for prior destruction of CH ₄		10,400
= Net project emission reductions/removals		19,539

Emission Reductions from Project Reporting Period 2010		Metric tons CO ₂ -e
Project baseline		18,686
- Project emissions		7
- Project adjustments: Deduction for prior destruction of CH ₄		5,158
= Net project emission reductions/removals		13,521

4.2 Verification Audit Summary

Project Developer	New River Resource Authority
Project Location	Dublin, Virginia, USA
Project Type	Landfill gas destruction
Project Period	January 14, 2008 through June 30, 2010
Protocol/Methodology	Climate Action Reserve Landfill Project Protocol, version 2.1
Emissions/Removals Verified	Vintage 2008: 10,647 Vintage 2009: 19,539 Vintage 2010: 13,521
Verification Conclusion	
Lead Verifier	 John C. Shideler, 5 May 2011
Internal Reviewer	 Michael T. DeBusschere, 9 May 2011
<i>This verification statement is valid when signed and dated by an NSF-ISR internal reviewer.</i>	