



Verification Report for

Davis Landfill Gas Offset Project CAR473

Reporting Period:
January 1, 2019 to December 31, 2019

Climate Action Reserve
Landfill Project Protocol, Version 5.0

May 21, 2020

Report Prepared for

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Summary

The Element Markets Emissions, LLC (Element Markets) engaged NSF Certification, LLC (NSF) to verify its destruction of landfill gas (LFG) from the Davis Landfill Gas Offset Project (herein referred to as the “Project”) defined in accordance with the requirements of the Climate Action Reserve Landfill Project Protocol, Version 5.0 (April 24, 2019). The project is comprised of a landfill gas collection and combustion system comprised of three engines and two enclosed flares at the Davis County Landfill in Layton, Utah. This verification report submitted to the Reserve for the Project report period of January 1, 2019 to December 31, 2019.

The project reduced emissions into the atmosphere by 93,422 metric tons CO₂-e.

1. Introduction

1.1 Objective

The objective of this verification audit was to determine, with reasonable assurance, that Element Markets Emissions, LLC (Element Markets) had quantified, monitored, and fairly reported to the Climate Action Reserve its emission reductions from the destruction of landfill gas and to determine that the Project conformed to the requirements of the verification criteria set in Section 1.3 of this report, including its continuing eligibility. This project is listed as CAR473 with the Climate Action Reserve.

1.2 Scope

The scope of the engagement included verification of the quantification, monitoring and reporting of greenhouse gas emission reductions from the Project for the period January 1, 2019 to December 31, 2019. It also included verification of the calculated project emissions associated with combustion of fossil fuel in the two flares and engine/generator sets, and indirect emissions attributed to electricity consumption from project-related activities.

1.3 Criteria

NSF verified reported project emission reductions against the following criteria:

- Reserve Offset Program Manual (November 12, 2019),
- Landfill Project Protocol, Version 5.0 (April 24, 2019) (the Landfill Project Protocol),
- Climate Action Reserve Verification Program Manual (February 8, 2017) 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 Verification Program Manual, emission reduction reports are considered fairly stated if they vary by no more than 3% from a complete statement of the project’s emission reductions because the total annual emission reductions are greater than 25,000 tCO₂e and less than 100,000 tCO₂e .

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1.5 Level of Assurance

This verification engagement was performed at the reasonable level of assurance.

2. Verification Approach

2.1 Team Appointment and COI Review

This verification was performed by Tina Sentner, NSF Lead Verifier, and reviewed by Mike DeBusschere, NSF Internal Reviewer. Conflict of Interest inquiries were completed for NSF and for the verification team 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 Element Markets's project documentation submitted to the Climate Action Reserve, the basis for emission reduction calculations, project design documentation, procedures, regulatory information, and project reporting period raw data provided by Element Markets

2.3 Planning

NSF'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 project management personnel at Element Markets, a verification plan and a sampling plan were developed for this engagement.

2.4 Verification Activities

As a result of its planning process, NSF conducted site visit at the landfill site in Layton, Utah. The site visit was conducted on March 9, 2020. Verification activities included:

- Confirmation of the project continued eligibility, ownership of LFG reductions, and quantification of project emission reductions at the landfill site with Project personnel;
- Review of the control environment, information management systems and monitoring plans at offices and facilities operated by the Project;
- Review of compliance with relevant environmental regulatory requirements at the landfill facility. The primary focus of inquiry at the landfill facility was compliance with Clean Air Act requirements and solid waste handling and water discharge facility requirements;
- Review of the system for monitoring flow and methane concentration of collected LFG and monitoring equipment calibration and operating performance at the landfill;

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- Verification that the Project's monitoring program and data management system addressed and recorded the Landfill Project Protocol required monitoring parameters for the reporting period to produce accurate, reliable and reproducible data and information. Recalculation was conducted for samples of calculated variables as presented in the Reporter's calculation spreadsheet.
- Verification that the Project's records management system contains procedures for acquisition and retention of all Landfill Project Protocol required information, including data substitution periods, and that such procedures have been implemented.
- Determination of Project's conformity in all material respects with the requirements of the Landfill Project Protocol.

3. Verification Findings

3.1 Project Description

The Davis Landfill Gas Offset Project, located at the Davis County Landfill in Layton Utah, consists of a gas collection and control system (GCCS) comprised of an interconnected network of vertical extraction and horizontal wells connected via underground header piping to a blower station and redirected to a pipeline for off-site combustion in three separate generator engines or to one of two enclosed flares. The landfill is not considered a bioreactor as defined by US EPA.

The landfill facility is owned by Wasatch Integrated Waste Management District (WIWMD). A single dedicated pipeline delivers the compressed LFG to an electricity generation plant where the LFG is destroyed in a Jenbacher Engine Model #J320, Caterpillar (CAT) Engine Model #3516, and a CAT Engine Model #3512, all of which are owned and operated by Hill Air Force Base. The enclosed flares handle excess LFG and are located on the landfill. The account holder and project developer is Element Markets Emissions, LLC.

During this report period, the second enclosed flare was added to the system in June 2019.

3.2 Eligibility and Title

Project Location. The landfill is located in Layton, Utah within the United States. NSF confirmed the location through the site visit on March 9, 2020.

Project Start Date: The Project was originally listed on the Climate Action Reserve website on July 27, 2009. The Project start date was verified as January 18, 2002, when the flare began combusting landfill gas. Element Markets provided an initial start-up documentation from the third party company who installed the open flare that note the flare began burning methane on January 18, 2002. NSF concluded that the project remains eligible.

Crediting Period. The crediting period for landfill projects is 10 years from the project start date. This is the second ten-year crediting period for the Project. The second credit period

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started January 18, 2012 to January 17, 2022. NSF has concluded that the reporting period verified in this report is within the second crediting period for this Project.

Zero Crediting Periods. There were no zero-credit period reviewed during this verification.

3.3 Additionality

Project Proponents must indicate that reductions are above and beyond business as usual. In order to do so, the Project must pass a Performance Standard test and the Legal Requirement test.

Performance Standard Test

For the Performance Standard test, a project developer may meet eligibility under four possible performance threshold scenarios. The following scenario applied to the Davis Landfill Gas Offset Project:

Installation of a landfill gas collection system and a new qualifying destruction device at an eligible landfill where landfill gas has never been collected and destroyed prior to the project start date.

NSF verified the Project was not previously collecting and destroying any landfill gas in a qualifying destruction device prior to the project start date. Through observation during the site visit and interviews with the landfill manager, there was no evidence of a pre-existing destruction devices, nor were pre-existing destruction devices on historical project drawings identified. In addition, NSF reviewed the various permits and found no evidence of a pre-existing destruction device of the site. Therefore, NSF concluded the project proponent meets the performance standard.

Limits on Credit Stacking

Credit stacking is defined as receiving both offset credits and other types of mitigation credits for the same activity on spatially overlapping areas (i.e., in the same landfill). Per interviews with the landfill personnel and Element Markets, the Project has not received offset credits and other types of mitigation credits for the same activity.

Legal Requirement Test

There are no laws, statutes, regulations, court orders, environmental mitigation agreements, permitting conditions, or other legally binding mandates requiring the destruction of landfill gas. Element markets has also developed a procedure in the monitoring plan to ascertain and demonstrate that the project at all times passes the legal requirements test at all times. The verification team reviewed the Title V Air Permit and found no requirements to install a gas collection system.

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The Davis County landfill is subject to NSPS regulation requiring the facility to conduct Non-Methane Organic Compound (NMOC) emission rate testing. The landfill is also subject to New Source Performance Standards (NSPS) for MSW Landfills, codified in 40 CFR Part 60 Subpart XXX- which targets landfills that commenced construction, modification or reconstruction after July 17, 2014, to a lower NMOC of 34 mg/yr. The most recent Five year Tier 2 NMOC Emissions Rate Report for the landfill was conducted on April 1, 2019 by Kleinfelder. The five year estimate of NMOC for 2019 was estimated at 19.18 Mg/NMOC. This is below the 34 Mg/yr threshold and therefore the landfill is not required to install a gas collection and conveyance system during the reporting period. The landfill is not anticipated to reach or exceed the NMOC threshold limit by the end of the crediting period.

Lastly, NSF reviewed the Attestation of Voluntary Implementation, signed on April 14, 2020 by an eligible signatory to attest for the Project. Element Markets has affirmed that the Project was established and implemented voluntarily and continues to operate as such. Based on this evidence, NSF concludes the Project passes the legal requirements test.

3.4 Regulatory Compliance.

NSF reviewed the Attestation of Regulatory Compliance completed by Element Markets Emissions, LLC. In addition, NSF conducted a review of the regulatory compliance of the landfill activities operated by the Project. NSF reviewed annual inspection reports for the reporting period with no violations noted. NSF also reviewed the EPA Enforcement & Compliance History Online database (ECHO), the Title V Semi-annual Compliance Certifications along with various other environmental reports. There were no material compliance issues noted. Lastly, NSF noted the Project's monitoring plan contained procedures for maintaining and monitoring regulatory compliance and that the procedures are being properly followed. Through its review, NSF confirmed that the Project was in material compliance with all applicable laws during the reporting period.

3.5 Ownership

Wasatch Integrated Waste Management District is the owner and operator of the Davis County landfill. Ownership was confirmed through review of various regulatory permits issued from regulatory agencies. Element Markets is the project developer and is the sole agent for the registration, verification and administrative process of the project's emission reductions. NSF reviewed a purchase service agreement contract between the Landfill and Element Markets. The contract between the entities contained language that specified that the GHG emission reductions are assigned to Element Markets Emissions, LLC at issuance. Lastly, NSF reviewed the Attestation of Title signed by Element Markets dated April 14, 2020 concerning ownership of landfill gas emission reduction credits for the reporting period. Based on this review, NSF concludes that Element Markets Emissions, LLC holds the legal title and exclusive ownership rights of the emission reductions associated with the Project.

3.6 Project Boundaries and Emission Sources

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The Project included all emission sources from the operation of the landfill gas collection system to the ultimate destruction of the landfill gas. The sources of GHG emissions reviewed in the Davis Landfill Gas Offset Project were as follows.

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 was partially covered with a synthetic liner, the Climate Action Reserve Landfill Project Protocol Version 5.0 assumption that 10% of the methane produced would be naturally oxidized by soil bacteria has been applied.

The GHG sources, sinks, and reservoirs associated with the project:

- CH₄ from the incomplete combustion of CH₄ in the internal combustion engines and enclosed flares
- 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.

3.7 Performance Against Project Protocol/Methodology

The Project was implemented in conformity with the Climate Action Reserve Landfill Project Protocol Version 5.0.

Monitoring and Operations Plan

In accordance with the Landfill Project Protocol requirements, Element Markets provided a monitoring and operations plan for the Project. This document addressed frequency of data acquisition, flow and methane concentration monitoring, facility and data management systems, QA/QC provisions of monitoring instrumentation, roles of individuals responsible for monitoring activities, a project diagram, a record keeping plan and describes how relevant parameters required by the Landfill Project Protocol Table 6.1 are to be collected and reported.

Monitoring Equipment

The primary data gathered for the Project is landfill gas flow, pressure, temperature, and methane content of the landfill gas. Landfill gas flow was monitored continuously to three offsite engines via the compression skid and to the two enclosed flares. The position of all the flow meters were observed to be adequate in order to allow for laminar flow. Flow rates were recorded every at least every 10 minutes. NSF confirmed the flow meters were calibrated to a range of flow rates corresponding to the flow rates expected at the landfill. The Landfill also employed an EcoChem MC3 continuous gas analyzer. The EcoChem was also calibrated to a range of methane expected at the landfill.

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The following lists the monitoring equipment onsite.

Instrument	Type	STD	Operation parameter
#1 Enclosed Flare	S&S MFG Inc. 1495 ISO 5157 Orifice Plate Flow Meter Model #4150-P with a Rosemount 3095 Transmitter.	Corrected to 60 deg, 1 ATM	Thermocouple Reading >500 deg F
#2 Enclosed Flare	FCI -Thermal Mass Flow Meter, Model ST51	0-1500 scfm, Corrected to 70 deg and 1 atm	Thermocouple Reading >500 deg F
#3- Compression Skid (Single meter to 3 Engines)	Oripac Orifice Plate Flow Meter Model #4150-P with a Rosemount 3095 Transmitter	Corrected to 60 deg and 1ATM	Engine Total kwh output is used as proof of operation- see variance Meter changed out on 12/3/2019 with like kind.
#4- Methane Analyzer	EcoChem MC3- Continuous Gas Analyzer	N/A	N/A

The Manufacturer's specifications do not suggest a calibration or cleaning /inspection frequency for the flow meters or the methane Analyzer. The instruments were inspected and cleaned on a regular basis. The instruments were calibrated by the manufacturer at least annually within the reporting period with the as found/as left conditions of the flow meter documented. This exceeds protocol requirements of at least every 5 years calibration by the factory when the manufacturer does not specify a calibration frequency. Calibration results are shown below.. LFG flow readings were noted to be adjusted to 60 °F and 1 atmosphere as required by the Protocol in the emission reductions.

The QA/QC results for the flow meter were as follows.

Table 1. Meter QA/QC Check Results

Instrument	Cleaning& Inspection Dates	Calibration Dates	Status (meter read within a +/- 5% margin of error)
#1 Enclosed Flare (S&S)	3/11/2019-Wasatch 6/27/201- Wasatch 9/12/2019- Emerson	09/12/19- Emerson 2/28/2020- Emerson	Calibrations Within protocol tolerance

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	11/18/2019-Wastach		
#2 Enclosed Flare (FCI)	Installed June 2019 9/10/2019- Wasatch 11/8/2019- Wasatch	12/4/2018- FCI 4/18/2020-FCI (Instrument was pulled on 2/7/2020)	Calibrations within Protocol tolerance with one exception. 4/18/20 shows meter underreporting- values were not adjusted as required by protocol.
#3- Compression Skid (to Engines)	3/11/2019-Wasatch 6/27/2019- Wasatch 9/12/2019- Emerson 11/27/2019-Wasatch	SN: 120832 (Installed: 01/01/19 to 12/3/19): Cal: 09/12/2019- Emerson SN: 0009187 (Installed 12/3/19 to 2/7/20) Cal: 11/27/19- Emerson 2/28/2020- Emerson	Calibration within protocol tolerance. No “as found” for SN: 120832 when pulled on 12/3/19. No emission reductions taken back to last successful calibration on 09/12/19.
#4- Methane Analyzer	3/11/2019-Wasatch 6/27/2019- Wasatch 9/10/2019- Wasatch 11/18/2019- Wasatch	10/30/2019 - EcoChem	Calibration drift within protocol tolerance.

In order to ensure landfill gas destruction, operating hours and the kilowatt-hour output of the engine generator units were recorded every hour. For verification purposes, NSF reviewed the flow meter data to ensure that no credits were being accumulated for periods in which the destruction device was not operational. See Variance below..

The flow meter and methane analyzer readings are measured on the same basis by the facility PLC (Programmable Logic Controller) and stored on the SCADA system. Data from these devices is recorded every 10 minutes and then stored on a server at the facility.

The project has confirmed the project records are kept for a minimum of ten years when the information is first generated or seven years after the last verification as stated in the current version of the project’s monitoring plan. Lastly, NSF confirmed the Project was in conformance with the monitoring plan and the Landfill Protocol version 5.0.

3.8 Project Management System

NSF verified the Project’s management system during document review and during the on-site visit at the Project. NSF interviewed executive management in addition to the personnel with specific responsibility for implementing the emission reduction project during this reporting period. NSF found a sufficient control environment for the project, including information

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management, authorizations for key activities, management reviews, and recordkeeping. In particular, NSF reviewed for adequacy the following elements:

- Definition and maintenance of an appropriate control environment by landfill management and personnel;
- Training and competence of landfill project managers and operating personnel, including contractors;
- 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;
- Checking and corrective action mechanisms.

3.9 Calculation of GHG Emission Reductions

The Davis Landfill Gas Offset Project emission reductions were calculated per the formula defined in the Climate Action Reserve Landfill Gas Protocol Version 5.0. The basic formula was:

Landfill gas destroyed

- the portion of methane oxidized by soil bacteria (as the landfill is not covered with a synthetic liner, the Landfill Project Protocol assumption that 10% of the methane produced would be naturally oxidized by soil bacteria has been applied)
 - carbon dioxide emissions from fossil fuel consumption
 - indirect carbon dioxide emissions from the use of electricity from the grid
 - discount factor to account for uncertainties associated with the project monitoring equipment. (a 0% monitoring discount factor was applied)
- = Project Emission Reductions.

NSF verified the calculated project emission reductions on a sampling basis from information in the Project spreadsheets by checking the Excel spreadsheet formulas and retracing spreadsheet inputs back to the raw data flow from the engine skid and flares. Similarly, NSF checked the total claimed flow for each aggregated daily summary to verify the correct totals for each day were used in the project spreadsheet equations. NSF also checked the methane concentration equations in the project's spreadsheets for accuracy.

NSF verified gas flow was adjusted to 60 deg and 1 ATM as required by the Landfill Project Protocol. For data control and quality purposes, any measurements when the engines recorded below 50 kWhs, were excluded from emission reduction calculations. NSF also confirmed the project applied a 0.936 destruction efficiency for the engines and a .995 destruction efficiency for the enclosed flares.

NSF verified the correct calculation of project emissions based upon evidence of fossil fuel consumption (Propane), and indirect CO₂ emissions from the use of electricity from the grid.

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As a result of NSF's verification process, we conclude emission reductions are fairly quantified and without material error.

3.10 Corrective Action Requests/Recommendations

All requests for corrective action raised by NSF during this reporting period were addressed to NSF's satisfaction and closed. These findings are detailed in our List of Findings, a private document.

3.11 Missing data

There was no missing data during the reporting period.

3.12 Approved Variances or Deviations

A Project Variance request was applied for the following:

If there are any periods where one or more destruction devices measured under a single flow meter is not operational, it must be documented that the remaining operational devices have the capacity to destroy the maximum gas flow recorded during the period. For devices other than flares, it must be shown that the output corresponds to the flow of gas.

The Project requested a variance for Davis Landfill to use totalized power output (kWh) to determine the maximum flow for periods during which specific engine power output was not available. The Reserve granted this variance pursuant to the following conditions:

- The verifier confirms that the data and method noted in the variance request are used appropriately during times in which protocol data substitution would not be suitable for max flow for the engines.
- The verifier can confirm that any power output data with a value less than 50 kWh is not used in the calculation for average kWh for the engines

NSF was able to confirm the requirements of the variance by review of the engine raw data, kWh hourly data and the Emission reduction calculation workbooks. NSF found the Project correctly applied the methodology as noted in the variance request.

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4. Verification Results

4.1 Verification Team Recommendation

Based on the verification activities described above, the verification team has concluded that the Davis Landfill Gas Offset Project, has achieved the following emission reductions:

Reductions/Removals the Reporting Period		Metric tons CO ₂ -e
Project baseline		93,694
- Project emissions		272
= Net project emission reductions/removals		93,422

Final values Rounded for simplicity

4.2 Verification Audit Summary

Project Developer	Element Markets Emissions, LLC 3555 Timmons Lane. Houston, TX 77027 USA
Project Location	Davis County Landfill Layton, Utah, USA
Project Type	Destruction of Landfill gas
Project Period	January 1, 2019 – December 31, 2019
Protocol/Methodology	Climate Action Reserve, Landfill Project Protocol, v. 5.0
Emissions/Removals Verified	Vintage 2019: 93,422 metric tons CO ₂ -e
Verification Conclusion	Based upon the verification activities described above, NSF has concluded with reasonable assurance that the Davis Landfill Gas Offset Project 2019 vintage emission reductions of 93,422 metric tons CO ₂ -e reported to the Climate Action Reserve for the period January 1, 2019 to December 31, 2019, are, in all material respects, fairly stated.
Lead Verifier	 Tina Sentner, May 21, 2020

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Internal Reviewer	 Michael DeBusschere, May 23, 2020
<i>This verification statement is valid when signed and dated by an NSF internal reviewer.</i>	