



Verification Report for

South Jordan Landfill Gas Destruction
Project
CAR400

Reporting Period:
January 1, 2018 to December 31, 2018

Climate Action Reserve
Landfill Project Protocol, Version 5.0

April 28, 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 South Jordan Landfill Gas Destruction 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 one flare at the South Jordan Landfill Gas Destruction Project in South Jordan, Utah. This verification report submitted to the Reserve for the Project report period of January 1, 2018 to December 31, 2018.

The project reduced emissions into the atmosphere by 199,888 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 CAR400 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, 2018 to December 31, 2018. It also included verification of the calculated project emissions associated with combustion of fossil fuel in the flare and engine/generator, vehicle fuel use 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 1% from a complete statement of the project’s emission reductions because the total annual emission reductions are greater 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, Mark Lutz, 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 South Jordan, Utah. The site visit was conducted on December 17, 2019. 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 South Jordan Landfill Gas Destruction Project, located at the Trans-Jordan Landfill in South Jordan 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 three separate Caterpillar 3520 C (1.6 MW) generator engines. The Landfill also has an open flare on site that was utilized before the engines were installed and was the original Project destruction device. No emission reductions are claimed for the current reporting period for destruction of LFG in the open flare, as the device was not operating during the reporting period. The landfill is not considered a bioreactor as defined by US EPA.

The landfill facility is owned by Trans-Jordan Cities and Energy Developments Limited (EDL) owns the energy facility. The account holder and project developer is Element Markets Emissions, LLC.

This verification included confirmation and review of a zero-credit reporting period and verification of the first reporting period of the second crediting period.. As such, the Project was originally developed under Landfill Project Protocol, Version 2.0, and later updated to Landfill Project Protocol, Version 3.0. With this second credit period, the landfill has updated to the Landfill Project Protocol, Version 5.0.

3.2 Eligibility and Title

Project Location. The landfill is located in South Jordan, Utah within the United States. NSF confirmed the location through the site visit on December 17, 2019.

Project Start Date: The Project was listed on the Climate Action Reserve website on June 25, 2009. The Project start date was verified as June 29, 2005, when the flare began combusting landfill gas. Element Markets provided various documents to support the evidence of construction of the landfill gas project such as initial start-up documentation from the third party company who installed the open flare and the startup logbooks from landfill personnel that note

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the flare began burning methane on June 29, 2005. These documents confirmed the project start date of June 29, 2005. 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 started June 29, 2015 and extends to June 28, 2025. NSF has concluded that the reporting period verified in this report is within the second crediting period for this Project.

Zero Crediting Periods. There was one zero credit period covering multiple years which was not part of the current reporting period. The zero credit period was from June 29, 2015 to December 31, 2017 of the first 10 year credit period and does not affect the length of the current reporting period.

NSF confirmed the project developer signed a Zero-Credit Reporting Period Acknowledgment and Election form (Acknowledgment and Election form) acknowledging that CRTs will not be issued for any GHG emission reductions or removals achieved by the project during the zero-credit period. The project developer also submitted a monitoring report to the Reserve that covers data for the zero-credit period. Lastly, the Project developer provided project documentation and calculations for the zero-credit reporting period emissions to the verifiers. NSF was able to confirm with reasonable assurance that project emissions were less than baseline emissions during the zero-credit period.

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 South Jordan Landfill Gas Destruction Project:

Scenario 2: Installation of a new qualifying destruction device at an eligible landfill where landfill gas is currently collected and vented, but has never been destroyed in any manner 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 compliance 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

The project startup documentation and Title V permit confirmed that no other destruction devices were permanently located at the Landfill until the candlestick flare was installed in 2005.

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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 regulatory compliance personnel and Element Markets, the Project has not received offset credits and other types of mitigation credits for the same activity.

Legal Requirement Test

A regulatory review of the Project and the landfill were conducted by the verification team. The results of the regulatory review indicated the landfill is in compliance with Federal, State, and Local regulations. 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 Plan, the Title V Air Permits for both the landfill and the engine facility and found no requirements to install a gas collection system.

The Trans-Jordan landfill is subject to NSPS regulation requiring the facility to conduct Non-Methane Organic Compound (NMOC) emission rate testing. The most recent Five year Tier 2 NMOC Emissions Rate Report for the landfill was conducted on November 9, 2015 by Kleinfelder. The five year estimate of NMOC did not exceed 38.9 Mg/NMOC through 2020. This is below the 50 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. NSF also confirmed that landfill had not undergone or permitted for any landfill expansions, modification or reconstruction, which would subject the landfill to a lower NMOC of 34 mg/yr.

Lastly, NSF reviewed the Attestation of Voluntary Implementation, signed on 28 April 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 facilities 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

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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

Trans-Jordan Cities is the owner of the Trans Jordan landfill. Ownership was confirmed through review of various regulatory permits issued from regulatory agencies. EDL operates the electric generation facility. NSF reviewed contracts between the Landfill, EDL and Element Markets. The contracts between all three entities contained language that specified that all rights, title, and benefits of the GHG emission reductions would be transferred to Element Markets Emissions, LLC. Lastly, NSF reviewed the Attestation of Title signed by Element Markets dated 28 April 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

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 South Jordan Landfill Gas Destruction 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 open flare (not operating this period).
- 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

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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 Caterpillar 3520 generator engines. The LFG flow to the engines was measured via a Yokogawa Vortex flow meter, and the transmitter automatically corrects LFG flow readings to 60 °F and 1 atmosphere as required by the Protocol. The position of the flow meter was also observed to be adequate in order to allow for laminar flow. Flow rates were recorded every at least every 5 minutes.. The Manufacturer's specifications do not suggest a calibration or cleaning /inspection frequency for the flow meter.

The flow meter was inspected, cleaned and calibrated by a certified third party calibration service provider per the manufacturer's guidance on an at least quarterly basis 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. All calibrations show that the flow meter read within a +/- 5% margin of error and the last check was within two months of the end of the reporting period by a certified third party. NSF confirmed the flow meter was calibrated to a range of flow rates corresponding to the flow rates expected at the landfill. The calibration results for the flow meter were as follows.

Table 1. Flow Meter Field Calibration Check Results

Quarter	Calibration, Cleaning & Inspection	Service Provider
Q1	3/06/2018,	PEP (Third party)
Q2	6/13/2018	PEP (Third party)
Q3	9/5/2018	PEP (Third party)
Q4	12/11/2018	PEP (Third party)

The Landfill also employed a Siemens Ultramat 23 continuous gas analyzer. The analyzer was cleaned and inspected on a monthly basis by Project personnel. The manufacturer recommends that the analyzer be calibrated with test gases on an annual basis. The analyzer was calibrated quarterly with the last calibration conducted on 12/11/2018 by a certified third party calibration service provider per the manufacturer's guidance with the as left/as found conditions documented within two months of the end of the reporting period. During all field check events, the meter was observed to be operating within +/- 5% tolerances. NSF confirmed the methane analyzer meter was calibrated to a range of conditions corresponding to the methane rates expected at the landfill. The calibration results for the methane analyzer meter were as follows.

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Table 2. Gas Analyzer Field Calibration Check Results

Quarter	Quarterly Inspection and field check Date	Service Provider
Q1	3/06/2018	PEP (Third party)
Q2	6/13/2018	PEP (Third party)
Q3	9/5/2018	PEP (Third party)
Q4	12/11/2018	PEP (Third party)

In order to ensure landfill gas destruction, operating hours and the kilowatt-hour output of the engine generator units are recorded every 5 minutes. 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.

The flow meter and methane analyzer readings are measured on the same basis and connected to the facility PLC (Programmable Logic Controller). Data from these devices is recorded every 5 minutes and then stored on a server at the energy facility.

NSF 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 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;

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- Quantification methods and calculations of project emissions;
- Checking and corrective action mechanisms.

3.9 Calculation of GHG Emission Reductions

The South Jordan Landfill Gas Destruction 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. 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 recorded at 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 zero kWhs were not recorded by the SCADA system and were excluded from emission reduction calculations. NSF also confirmed the project applied a 0.936 destruction efficiency for the engines.

NSF verified the correct calculation of project emissions based upon evidence of fossil fuel consumption (natural gas for heating,, and diesel for vehicles), and indirect CO₂ emissions from the use of electricity from the grid.

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

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There was no missing data during the reporting period.

3.12 Approved Variances or Deviations

There were no variances requested the report period, however CAR did provide an extension for the verification deadline to April 30, 2020.

4. Verification Results

4.1 Verification Team Recommendation

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

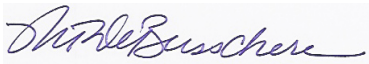
Reductions/Removals the Reporting Period		Metric tons CO ₂ -e
Project baseline		199,894
- Project emissions		6.0
= Net project emission reductions/removals		199,888

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	Trans- Jordan Landfill South Jordan, Utah, USA
Project Type	Destruction of Landfill gas
Project Period	January 1, 2018 – December 31, 2018
Protocol/Methodology	Climate Action Reserve, Landfill Project Protocol, v. 5.0
Emissions/Removals Verified	Vintage 2018: 199,888 metric tons CO ₂ -e
Verification Conclusion	Based upon the verification activities described above, NSF has concluded with reasonable assurance that the South Jordan Landfill Gas Destruction Project 2018 vintage emission reductions of 199,888 metric tons CO ₂ -e reported to the Climate Action Reserve for the period January 1, 2018 to December 31, 2018, are, in all material respects, fairly stated.

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Lead Verifier	 Tina Sentner, May 6, 2020
Internal Reviewer	 Michael DeBusschere, May 7, 2020
<i>This verification statement is valid when signed and dated by an NSF internal reviewer.</i>	