

Verification Report for Oneida Herkimer Landfill Ava, New York

Climate Action Reserve—CAR674

January 2020

**Prepared for: Oneida Herkimer Solid Waste Authority
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1. Introduction

This report is provided to Oneida Herkimer Solid Waste Authority (OHSWA) as a deliverable of the Climate Action Reserve (CAR) project verification process. This report covers the verification of the Oneida Herkimer Landfill – CAR674 (the Project) for the period from October 1, 2018 through September 30, 2019.

During the verification process, Barton & Loguidice, D.P.C. acted as the project advisor for Oneida Herkimer Solid Waste Authority. First Environment communicated primarily with Barton & Loguidice during the course of verification activities.

2. Objectives

The purpose of this verification was, through review of appropriate evidence, to establish that:

- the Project conforms to the requirements of the verification criteria, including all eligibility requirements, discussed in Section 4 of this report; and
- the data reported are accurate, complete, consistent, transparent, and free of material error or omission.

3. Verification Scope

Specific scope metrics for the verification are outlined in the table below:

Geographic Boundaries	Oneida Herkimer Landfill - Ava, New York
Emission Reduction Sources, Project Emissions, and Greenhouse Gases	Emissions reductions (expressed in units of Carbon Dioxide equivalents (CO ₂ e)) resulting from methane destruction; Project emissions of CO ₂ from fossil fuel combustion and purchased electricity.
Reporting Period	October 1, 2018 through September 30, 2019
Data Sources	Metered Data and Emissions Reduction Calculations

4. Standards Used to Verify Emissions (Criteria)

The following table outlines the guidance and protocols used to conduct this verification:

Standard of Verification	• Climate Action Reserve U.S. Landfill Project Protocol, Version 3.0, December 2, 2009 (CAR Protocol) • Climate Action Reserve Landfill Project Protocol Version 3.0 Errata & Clarification, June 18, 2015 (Errata and Clarification) • Reserve Offset Program Manual, November 12, 2019 • Applicable CAR Policy Memos
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Verification Process	• Section 8 of the CAR Protocol • Errata and Clarification • Climate Action Reserve Verification Program Manual, February 8, 2017 • ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006
Level of Assurance	• Reasonable assurance
Materiality	• Misstatements greater than one percent of the Project's emission reductions assertion are considered material • Qualitative non-conformities with the CAR Protocol are also considered material

5. Overview of the Verification Process

The verification process was utilized to gain an understanding of the Project's emission sources and reductions, to evaluate and verify the collection and handling of data, the calculations that lead to the results, and the means for reporting the associated data and results.

The following verification process was used:

- conflict of interest review;
- selection of Verification Team;
- initial interaction and kickoff meeting with the OHSWA team;
- development of the verification and sampling plans;
- review of management and data collection system;
- site visit;
- assessment of raw data and calculations for period under review;
- follow-up interaction with the OHSWA team for corrective action, clarification, or supplemental data as needed; and
- final statement and report submittal.

5.1 Conflict of Interest Review

Prior to beginning any verification project, First Environment conducts an evaluation to identify any potential conflicts of interest associated with the Project. No potential conflicts were found for this Project. First Environment also received authorization to proceed with verification activities for the Project from CAR in a notification dated October 4, 2019.

5.2 Verification Team

First Environment's Verification Team consisted of the following individuals who were selected based on their verification experience, as well as familiarity with landfill operations:

Lead Verifier – Jeff Daley,

Verifier – Luca Nencetti,

Senior Internal Reviewer – Jay Wintergreen.

5.3 Verification Kick-off

The verification was initiated with a kick-off meeting on October 17, 2019 with the OHSWA team. The meeting focused on confirming the scope, schedule, and data required for verification.

5.4 Development of the Verification Plan

The Verification Team formally documented its verification plan as well as determined the data-sampling plan. The verification plan was developed based on the discussion of key elements of the project verification process during the kick-off meeting. OHSWA was afforded the opportunity to comment on the key elements of the plan for verification. Based on items discussed and agreed upon with OHSWA, the plan identified the First Environment project team members, project level of assurance, materiality threshold, and standards of evaluation and reporting for the verification. It also provided an outline of the verification process and established project deliverables. A separate data-sampling plan was designed to review all project elements in areas of potentially high risk of inaccuracy or non-conformance.

5.5 Site Visit

Mr. Luca Nencetti conducted a site visit on November 8, 2019 to assess the Project's data management systems and interview personnel relevant to the Project for the verification period.

5.6 Emissions Reduction Data and Calculation Assessment

This assessment used information and insights gained during the previous steps to evaluate the collected data and the reported emissions reduction quantities and identify if either contained material or immaterial misstatements.

5.7 Corrective Actions and Supplemental Information

The team issued corrective action and clarification requests during the verification process. OHSWA provided sufficient responses to all corrective action and clarification requests issued.

5.8 Verification Reporting

Verification reporting, represented by this report, documents the verification process and identifies its findings and results. Verification reporting consists of this report for OHSWA, a verification statement, and a list of findings, all to be submitted to the Climate Action Reserve.

6. Site's Conformance with Verification Criteria

6.1 Project Description

The Oneida-Herkimer Landfill, located in Ava, New York, is owned and operated by the Oneida Herkimer Solid Waste Authority. The landfill opened in 2006 and currently receives municipal solid waste.

The Project consists of the voluntary collection and destruction of landfill gas in two open flares (Flare 25 and Flare 26) and two Caterpillar 3520 engine generator sets. OHSWA began installing a landfill gas (LFG) well field and active gas collection and control system in early 2010. Prior to this system, LFG was collected and destroyed in five passive solar flares for odor

mitigation. The Project destroys landfill gas in excess of the baseline destruction that otherwise would be vented to the atmosphere, resulting in a net reduction of CO₂-equivalents. The baseline scenario is defined as the installation of a new qualifying destruction device at an eligible landfill where landfill gas was collected and destroyed prior to the Project start date using non-qualifying destruction devices.

6.2 Eligibility

OHSWA meets the eligibility requirements set forth in the CAR Protocol, as described below.

6.2.1 Ownership and Title

Oneida Herkimer Solid Waste Authority is identified as the owner and operator of the landfill in the solid waste permit and therefore is the original owner of emission reductions generated by the Project. OHSWA sells landfill gas to WM Renewable Energy, LLC (owner of the engines, and energy plant) via a landfill gas sales agreement. The landfill gas sales agreement explicitly identifies that Oneida Herkimer Solid Waste Authority retains ownership of any carbon credits associated with the voluntary destruction of methane that is a component of the landfill gas.

Additionally, First Environment relied on the Attestation of Title completed by the Project Developer for the current reporting period to establish ownership of GHG emission reductions. The Attestation is on file with CAR and was reviewed to confirm that it was completed correctly.

6.2.2 Project Start Date

First Environment confirmed that the Project meets CAR's start date requirements. The Project start date is July 15, 2010, which was confirmed through review of flare start-up notification documentation.

6.2.3 Additionality

The Project passes both the Performance Standard Test and the Legal Requirements Test, as described below.

6.2.3.1 Performance Standard Test

The Project consists of the installation of a landfill gas collection and control system and therefore exceeds the performance standard defined by the CAR protocol, specifically Scenario 3a from the list provided in Section 3.4.1 of the CAR Protocol, because non-qualifying destruction devices were used prior to the Project start date. It was also confirmed at the site visit that the landfill is not a bioreactor.

6.2.3.2 Legal Requirements Test

The landfill has a permitted capacity above the 2.5 million cubic meter threshold that triggers New Source Performance Standard (NSPS) requirements. As such, the landfill is required to conduct Tier II testing to determine non-methane organic compound (NMOC) emissions. The most recent Tier II testing event occurred on April 3, 2019. The associated emissions rate report, dated May 2019, identifies NMOC emission rates of 11.98 Mg/year for 2018 and 12.84 Mg/year for 2019. The New York Department of Environmental Conservation has adopted the new lower NMOC emissions threshold of 34Mg per year for landfills that have a design capacity above the 2.5 million megagram threshold. Because landfill exceeds the 2.5 million megagram threshold, the Subpart Cf NMOC threshold of 34Mg per year applies. However, the landfills

NMOC results are below the 34 Mg/yr. threshold that would require the installation and operation of a gas collection and control system. First Environment also confirmed, through interviews with project personnel, that no additional state or local requirements mandate the active LFG collection and control system. This cursory review of permits, laws, and regulations indicated the voluntary nature of the Project.

Additionally, First Environment relied on the Attestation of Voluntary Implementation completed by the Project Developer for the current reporting period. The Attestation is on file with CAR and was reviewed to confirm that it was completed correctly.

6.2.4 Regulatory Compliance

First Environment reviewed the landfill's Title V Permits, Solid Waste Permit, State Pollutant Discharge Elimination System Permit, interviewed site personnel, and generated a compliance report on October 21, 2019 using the Environmental Protection Agency's (EPA) Enforcement and Compliance History Online (ECHO) database. The EPA ECHO database report indicated that the site had iron limit discharge exceedances during the current reporting period. The exceedances listed in the U.S. EPA ECHO report are related to exceedances of permit stormwater effluent limitations. First Environment reviewed the Discharge Monitoring Reports that were submitted to the state to confirm that the stormwater discharge exceedances were not related to the Project activity or any of the Project equipment. The facility did not receive any formal violations as a result. It was therefore determined that this issue does not impact the Project's eligibility under the CAR Landfill Protocol. First Environment also reviewed routine site inspection reports from the New York State Department of Environmental Conservation and Title V Compliance Certification reports. The cursory review of permits, compliance reports, state inspection reports, and interviews conducted at the site visit indicated that aside from the iron limit exceedances, there was no other evidence of non-compliance during the reporting period.

Additionally, First Environment relied on the Attestation of Regulatory Compliance completed by OHSWA for the current reporting period. The Attestation is on file with CAR and was reviewed to confirm that it was completed correctly.

6.3 *Project Performance Against CAR Protocol and Project Management System*

The Project was implemented in conformity with the CAR Protocol. OHSWA developed and implemented a Monitoring Plan to track relevant project parameters and data sources. The Monitoring Plan, including the Project Diagram, was reviewed to determine compliance with the protocol requirements. Based on observations made during the site visit and review of relevant project documentation, First Environment found the Monitoring Plan and Project Diagram to meet the requirements set forth by the CAR Protocol and the Project to be implemented in accordance with the Monitoring Plan.

6.3.1 Project Monitoring

Each flare is equipped with a Thermal Instruments flow meter to continuously measure landfill gas flow. A spare Thermal Instruments flow meter is maintained to facilitate manufacturer calibrations. All three of the Thermal Instruments flow meters standardize flow readings to a temperature of 60°F and pressure of one atmosphere.

A Siemens Ultramat 23 Continuous Gas Analyzer measures gas composition of landfill gas sent to the flares. Methane concentration for gas sent to the flares and engines was also measured using a portable Elkins Envision 100 analyzer during limited instances throughout the reporting period.

A single ABB Flow Meter continuously measures landfill gas flow to both engines. The ABB flow meter standardizes flow readings to a pressure of one atmosphere and a temperature of 60°F.

An ABB Gas Chromatograph measures gas composition of landfill gas sent to the engines.

Gas flow rates to each destruction device and the respective methane concentration is measured on the same relative moisture basis.

Each flare incorporates a thermocouple that continuously monitors flare temperature to confirm destruction device operation. The kilowatt production from each engine is measured continuously and recorded every five minutes to demonstrate engine operability.

A PLC system for the flare skid continuously records gas flow, continuous methane concentration, and flare temperature data on a Yokogawa digital chart recorder. A separate PLC system for the engine facility continuously records gas flow, continuous methane concentration, and engine kilowatt production data on an ABB data logger.

Table 1 summarizes the Project monitoring system parameters and monitoring equipment employed by the Project.

TABLE 1: Monitoring Equipment

Parameter	Monitoring Equipment	Frequency of Measurement	Frequency of Recording	Recording Device
Landfill gas flow to flares	Thermal Instruments flow meters	Continuous	Every minute	Yokogawa digital chart recorder
Landfill gas flow to engines	ABB Flow Meter	Continuous	Every five minutes	ABB data logger
Methane concentration to flares	Siemens Ultramat 23 Continuous Gas Analyzer	Continuous	Every minute	Yokogawa digital chart recorder
	Elkins Envision 100 portable analyzer	At least weekly	As measured	Unit memory
Methane concentration to engines	ABB Gas Chromatograph	Continuous	Every five minutes	ABB data logger
Hourly Operation of flares	Thermocouple	Continuous	Every minute	Yokogawa digital chart recorder
Hourly Operation of engines	Electricity meter	Continuous	Every five minutes	ABB data logger

6.3.2 Instrument Quality Assurance/Quality Control

OHSWA's instrument quality assurance/quality control (QA/QC) plan for the Project's monitoring equipment complies with CAR's requirements.

All flow meters are cleaned and inspected with as-found/as-left conditions documented and field checked for calibration accuracy by a third party (Barton & Loguidice for the flare meters, and RKA Integrated Systems for the engine meter) on a quarterly basis, including once within the last two months of the end of the reporting period. All quarterly field checks performed during the current reporting period indicated that all flow meters were operating within the five percent accuracy range required by the CAR Protocol. The manufacturer of the Thermal Instruments flow meters recommends calibration every 18 months. The Thermal Instruments meters are calibrated in accordance with manufacturer recommendations. The manufacturer of the ABB flow meter does not recommend a specific interval to perform calibrations on an ongoing basis. However, the ABB flow meter is calibrated in-situ on a quarterly basis by a third party, which is more frequently than the Protocol default of once every five years.

Both the Siemens Ultramat 23 and ABB Gas Chromatograph gas analyzers are cleaned and inspected with as-found/as-left conditions documented, field checked for calibration accuracy, and field calibrated by a third party (RL Stone Company, Inc. for the flare meter, and RKA Integrated Systems for the engine meter) on a quarterly basis, including once within the last two months of the end of the reporting period. All quarterly field checks performed during the current reporting period indicated that both analyzers were operating within the five percent accuracy range required by the CAR Protocol. The manufacturer of the Siemens Ultramat does not recommend a frequency for calibrations, only a recommendation of an annual field check. The Siemens analyzer is field checked more frequently than manufacturer recommendations and calibrated more frequently than the Protocol default of once every five years. The manufacturer of the ABB Gas Chromatograph does not recommend a specific interval to perform calibrations on an ongoing basis. The ABB Gas Chromatograph is calibrated more frequently than the Protocol default of once every five years.

During the reporting period, a portable Elkins Environ 100 analyzer was used to take methane concentration readings at the flare skid and engine skid. The manufacturer requires the portable analyzer be calibrated on an annual basis. The analyzer used during the reporting period was within the manufacturer's recommended calibration service interval.

Each of the pre-project solar flares was monitored for methane concentration with Landtec GEM-2000 portable gas analyzers and in conjunction with a Dwyer DS-300 Pitot tube to measure flow rate. First Environment reviewed calibration records for the Landtec GEM-2000 units to confirm that analyzers were calibrated and maintained per the manufacturer's requirements.

Additionally, First Environment confirmed that the Elkins Envision portable gas analyzer and Fluke multi-meters used to perform the third-party field calibration accuracy check of the Project flow meters and continuous methane analyzer was calibrated and maintained per the manufacturer's requirements.

Table 2 shows the dates relevant to the current reporting period when instrument QA/QC was performed.

TABLE 2: Instrument QA/QC

Monitoring Equipment	Dates of Service (Location)	Calibration	Field Checked for Accuracy	Inspected/Cleaned
Thermal Instruments flow meter. s/n: 2011156	4/30/2018 – 11/7/2018 (Flare 25) 12/10/2018 – 6/28/2019 (Flare 25) 6/28/2019 – 9/23/2019 (Flare 26)	12/5/2017 11/26/2018	12/14/2018; 2/27/2019; 6/28/2019; 9/20/2019	12/14/2018; 2/27/2019; 6/28/2019; 9/20/2019
Thermal Instruments flow meter. s/n: 2014201	11/7/2018 - 12/10/2018 (Flare 25) 6/28/2019 – 9/30/2019 (Flare 25)	7/12/2018 1/8/2019	9/20/2019	9/20/2019
Thermal Instruments flow meter. s/n: 2010175	6/24/2018 - 6/28/2019 (Flare 26) 9/23/2019 – 9/30/2019 (Flare 26)	5/9/2018 7/10/2019	12/14/2018; 2/27/2019; 6/28/2019	12/14/2018; 2/27/2019; 6/28/2019
ABB Flow Meter. s/n: XRC6413	10/1/2018 – 9/30/2019 (Engines)	10/9/2018; 2/12/2019; 5/29/2019; 8/14/2019	10/9/2018; 2/12/2019; 5/29/2019; 8/14/2019	10/9/2018; 2/12/2019; 5/29/2019; 8/14/2019
Siemens Ultramat 23 gas analyzer. s/n: F-NR-N1-A5-961	10/1/2018 – 9/30/2019 (Flare Skid)	12/20/2018; 3/12/2019; 6/13/2019; 9/20/2019	12/20/2018; 3/12/2019; 6/13/2019; 9/20/2019	12/20/2018; 3/12/2019; 6/13/2019; 9/20/2019
ABB Gas Chromatograph	10/1/2018 – 9/30/2019 (Engines)	10/9/2018; 2/12/2019; 5/29/2019; 8/14/2019	10/9/2018; 2/12/2019; 5/29/2019; 8/14/2019	10/9/2018; 2/12/2019; 5/29/2019; 8/14/2019
Elkins Envision Portable Gas Analyzer (s/n: 1503201)	Periodically between: 10/1/2018 – 1/5/2019	1/29/2018	Prior to use	Prior to use

6.3.3 Project Emissions

Project emissions sources and the associated monitoring methodology are summarized in Table 3.

TABLE 3: Project Emissions

Project Emissions Source	Monitoring
Consumption of Purchased Electricity	Monthly utility invoices
Propane consumption	Fuel purchase records

6.4 Emissions Reduction Calculation Assessment

The emission reduction calculations were reviewed to ensure accuracy in the formulas applied and the raw data used as inputs. The formulas were tested to ensure consistency with the calculation methodologies described in the CAR Protocol.

Total landfill gas flow is computed by multiplying the average landfill gas flow rate in a given interval by the length of the interval. Metered gas flow volumes were automatically corrected to standard conditions of one atmosphere of pressure and a temperature of 60°F by the Thermal Instruments and ABB flow meters. The total volume of methane destroyed by the Project was computed in daily intervals by multiplying the daily LFG flow to the flares and engines by the daily or weekly methane concentration for each respective destruction device type which is converted to a mass flow using the density of methane at 60°F and one atmosphere of pressure. The total quantity of methane destroyed by the Project is aggregated daily and summed over the reporting period to obtain the total baseline emissions. Project emissions were calculated by multiplying activity data by an appropriate emission factor. Pre-project emissions were monitored and calculated consistent with the requirements of Appendix D of the Protocol. Because one flow meter is monitoring flow to both engines, it was confirmed through review of the raw flow data that during any intervals when one engine was not operational, the remaining engine had the capacity to destroy the available landfill gas. Additionally, it was confirmed during the site visit that the engines are designed in such a manner that it is physically impossible for gas to pass through while the engine(s) are non-operational and that each engine is equipped with an automatic safety shut-off valve. The total emission reductions were determined by subtracting the project emissions and pre-project discount from the baseline emissions. One instance of methane data substitution was applied for a gap lasting greater than one day, but less than seven days. First Environment confirmed that data substitution was applied in accordance with Appendix E of the Protocol.

Table 4 summarizes the input parameters used in the emission reduction calculations.

TABLE 4: Input parameters

Input Parameter	Name	Description/ Value
$LFG_{i,t}$	Total quantity of LFG	Summed daily from metered data, internally corrected to 60°F and one atmosphere of pressure.
$PR_{CH_4,t}$	Methane content	Averaged daily from continuously recorded data, or obtained at least weekly from portable methane concentration measurements.
DE_i	Default destruction efficiency	96% - Open flare 93.6 – Lean burn engine
OX	Oxidation Factor	10%
DF	Discount Factor	0% -or- 10% - When non continuous methane readings are applied

Input Parameter	Name	Description/ Value
Flare Temperature Cut-off	Metered data below corresponding temperature cut-off are excluded from calculations	500°F
EF _{FF}	Propane emission factor	5.74 kg CO ₂ /gal
EF _{EL}	Purchased electricity emission factor	294.661 lb. CO ₂ /MWh (NYUP Region)
GWP _{CH₄}	Global Warming Potential of Methane	25 (IPCC 4 th Assessment Report)

Copies of the raw data used in the calculations, including flow data, methane content data, and utility and other fossil fuel invoices, were compared with the data used in the final calculations and tested for transcription or mathematical errors. A representative sample of raw data sources and calculations over the verification period were reviewed. First Environment performed recalculations of emission reductions for the entire reporting period to assess whether they were free of material misstatement. First Environment found the emission reduction calculations to be free of material misstatement.

6.5 Approved Variance or Deviations

No variances were requested for the Project in this reporting period.

7. Verification Conclusion

Based on the evidence collected and the assessments performed, First Environment concludes that the Project's GHG emissions reductions achieved through the collection and combustion of landfill gas for the period October 1, 2018 through September 30, 2019 can be considered with a reasonable level of assurance:

- in conformance with the verification criteria, and
- without material discrepancy.

Verified results show:

October 1 to December 31, 2018	Total
Baseline Emissions (tCO ₂ e)	39,357
Pre-Project Discount (tCO ₂ e)	1,587
Project Emissions (tCO ₂ e)	35
Emissions Reductions (tCO ₂ e)	37,735

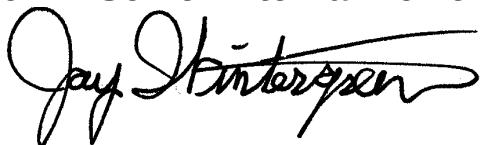
January 1 to September 30, 2019	Total
Baseline Emissions (tCO ₂ e)	122,631
Pre-Project Discount (tCO ₂ e)	4,710
Project Emissions (tCO ₂ e)	104
Emissions Reductions (tCO ₂ e)	117,817

8. Lead Verifier Signature



Jeff Daley
Environmental Specialist

9. Senior Internal Reviewer Signature



Jay Wintergreen
Senior Associate