# VALIDATION & VERIFICATION REPORT FOR TW GHANA

RUBY CANYON ENGINEERING

Document Prepared by Ruby Canyon Engineering, Inc.

Grand Junction, Colorado, USA

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| **Prepared By** | Ruby Canyon Engineering, Inc. |
| **Contact** | Address: 743 Horizon Court, Suite 385, Grand Junction, CO, 81506<br>Telephone: +1-970-241-9298<br>Email: mcote@rubycanyoneng.com<br>Website: www.rubycanyoneng.com |
| **Approved By** | Zach Eyler (Independent Technical Reviewer) |
| **Work Carried Out By** | Michael Coté (Lead Validator and Verifier)<br>Phillip Cunningham (Validation and Verification Team Member)<br>Samantha Phillips (Validation and Verification Team Member) |

**Summary:**

Tradewater, LLC (Tradewater), the project proponent, contracted Ruby Canyon Engineering, Inc. (RCE) to perform the validation of the proposed "TW Ghana" ODS project (Project) and the verification of the initial monitoring period. The Project is grouped, and the project activity instance consists of collection of recovered and stockpiled ozone depleting substances (ODS) from Ghana and destruction of the ODS at a facility permitted under U.S. Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA) as a Hazardous Waste Combustion Facility. ODS is a potent greenhouse gas and the destruction of ODS that would have been released to the atmosphere generates VCUs.

The Project is conducted under the approved VCS methodology VM0016 Recovery and Destruction of Ozone-Depleting Substances, Version 1.1 (30 November 2017). Additionality is assessed using the module VMD0048 Activity Method for the Determination of Additionality for Recovered and Stockpiled ODS Refrigerant Projects, Version 1.0 (30 November 2017).

As part of the validation activities, RCE reviewed the completeness, conservativeness, and accuracy of the underlying evidence for the Project's assumptions and data sources and documents. RCE conducted a site visit to the destruction facility in September 2018. The verification activities ensured that the project activity was implemented according to the monitoring plan, that the emission reduction assertion submitted by Tradewater was materially correct and free of errors and omissions, and that the Project meets all criteria requirements. RCE assessed the Project's Monitoring Report—which also includes the Project's monitoring plan, based on the above criteria as well as relevant criteria and VCS guidance documents. RCE completed a desk review of associated documents to confirm that the project activity was implemented as stated in the VCS Project Description including a review of data and information control systems.

During the validation and verification process, RCE issued a total of 22 findings – 16 for the validation and 6 for the verification. The findings include:

- 15 Corrective Action Requests (CARs)
- 2 Requests for additional documentation (ADRs)
- 5 Clarification Requests (CLs)
- 0 Forward Action Requests (FARs)

Based on documentation and explanations provided by the Project Proponent, RCE closed out all findings in a clear and transparent manner. RCE is reasonably assured that the Project meets all relevant VCS requirements and correctly applies the VCS Methodology and Module.

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# 1 INTRODUCTION

## 1.1 Objective

The purpose of validation and verification (val/ver) is to have an independent third party assess the Project's eligibility, baseline scenario, additionality, project description (PD), and monitoring plan to ensure conformance with VCS requirements. Validation objectives also include an assessment of the expected emission reduction claims made by the Project. The validation process also provides assurance to stakeholders of the quality of the Project and achieving real, permanent, measurable, and additional emission reductions. The objective of the verification is to ensure that the GHG emission reduction assertion made by Tradewater is materially correct and that the data provided are accurate, complete, and transparent. Additionally, RCE ensured that the Project is in conformance with the criteria as stated in Section 1.2.

## 1.2 Scope and Criteria

The sectoral scope of the project is fugitive emissions from industrial gases and includes ODS sourced from Ghana and destroyed at a destruction facility located in the United States. The project boundary includes $CO_2$, $CH_4$, $N_2O$, and CFC GHG emissions from transportation and destruction of ODS and the fugitive emissions of CFCs in the baseline scenario.

Validation scope is defined as an independent and objective review of the Project PD v1.4 dated 17 December, 2018.The objective of the project validation is to ensure that: 1) the Project plans and GHG assertions are materially correct and meet the protocol requirements, 2) the Project meets the eligibility requirements of the GHG program, and 3) the planned Project could reasonably be expected to achieve the claimed emission reductions.

The objective of the verification is to ensure that the GHG emission reduction assertion made by Tradewater is materially correct and the project instance for this reporting period is in conformance with all VCS program requirements.

RCE conducted the val/ver based upon the following criteria:

- Verified Carbon Standard Version 3.7 (21 June 2017);
- VCS Program Guide Version 3.7 (21 June 2017);
- Validation and Verification Manual Version 3.2 (October 19, 2016);
- ISO 14064-3 "Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions"
- Approved VCS methodology VM0016 Recovery and Destruction of Ozone-Depleting Substances (ODS) from Products, v1.1;
- VMD0048 Activity Method for the Determination of Additionality for Recovered and Stockpiled ODS Refrigerant Projects, v1.0

Additionally, RCE reviewed the Project's monitoring period-specific TW Ghana Monitoring Report v1.2 dated 29 November, 2018, including the monitoring plan, during verification activities.

## 1.3 Level of Assurance

RCE conducted the val/ver to a reasonable level of assurance. The VCS Standard defines materiality as errors, omissions, or discrepancies resulting in misstatement of greater than five percent of the Project's GHG assertion. Additionally, RCE considered qualitative non-conformances with criteria requirements as material during the val/ver process.

### 1.4 Summary Description of the Project

The initial project activity instance consists of collecting recovered and stockpiled ozone depleting substances (ODS) in the country of Ghana. ODS is recovered from small refrigerator appliances as well as larger chillers. Aggregated ODS is sent to the United States for destruction at a permitted facility. ODS is a potent greenhouse gas and the destruction of ODS that would have been released to the atmosphere generates VCUs.

The Project is considered a grouped project, thus allowing the adding of the project activity instances subsequent to the validation. The VCS PD names the country of Ghana as the geographic area for which new project activity instances are included.

## 2 VALIDATION AND VERIFICATION PROCESS

### 2.1 Method and Criteria

RCE employed a risk-based approach throughout the val/ver process when reviewing the completeness, conservativeness, and accuracy of the data and evidence provided by the Project Proponent. The results of the validation activities provided the necessary input for the validation/verification opinion, which was completed according to the VCS Program Guide v3.7, VCS Standard v3.7, and ISO 14064-3:2006. The risk-based approach was used to develop the sampling plan as part of the val/ver activities. The sampling plan assessed the following:

- Conformation of the VCS PD to the applicable methodology
- Project boundary
- Baseline scenario
- Demonstration of additionality
- Project ownership and other programs
- Accuracy of the emission reduction calculations
- Data management
- Monitoring plan
- Conformance of the Monitoring Report to the VCS PD
- Eligibility of the destruction facility

Elements contained in the VCS PD were the primary focus of the validation activities. RCE reviewed the PD for completeness and accuracy and used it to determine other relevant documents to review and personnel to interview. Based on the requirements of VCS PD and methodology, RCE developed a sampling plan checklist. RCE found the largest validation risk items to be associated with the baseline scenario and emission reduction calculations.

RCE developed a verification checklist based on the methodology, VCS PD, and monitoring plan requirements. RCE found the largest verification risk items to be associated with data management of the point of origin documentation and emission reduction calculations.

Following its initial review of all Project documents for validation, RCE delivered a List of Findings to the Project Proponent that included corrective actions, additional document requests, and clarifications. In addition to verification document review, RCE recalculated emission reductions and found no errors or misstatements.

The Project Proponent provided responses to RCE for all identified issues, which led to several rounds of findings and responses until all items were closed out. As part of the response resolutions, RCE interviewed Project Proponent stakeholders.

Following the close-out of all open items in the list of findings, RCE completed a val/ver report and representations, and submitted the val/ver for independent review.

## 2.2 Document Review

The validation activities relied heavily on document review. RCE reviewed several versions of the VCS PD as well as copies of underlying evidence and supporting documents to justify the assumptions made in the PD. The final version of the TW Ghana PD v1.4 is dated 17 December 2018. Supporting information included the following documents:

- Applicability Condition Exhibits
- Additionality Condition Statement
- Ghana EPA letter from Emmanuel Osae-Quansah
- Ghana EPA Regulations – Management of ODS and Products, 2005
- UNDP Pilot Demonstration Project Description of ODS Waste Management and Disposal
- Nana Kwame Abbam Affidavit, 5 November, 2018

During the verification RCE confirmed that the monitoring report followed the TW Ghana PD and accurately documented the project activity for the monitoring period. RCE reviewed records of project activity documentation meeting the requires of the TW Ghana PD and monitoring plan. The documentation that RCE reviewed included:

- Ownership documents
- Point of origin records
- Transportation records
- Chain of custody documentation
- Evidence of the destruction facility eligibility
- ODS lab analysis reports
- Destruction facility permits
- Destruction facility operational and monitoring records
- Certificates of destruction
- Records of the weights of the half-ton cylinders before and after destruction
- Scale calibrations
- ODS Training & Certifications
- Emission reductions calculations

## 2.3 Interviews

RCE held discussions with the following personnel during the verification:

- July, August, and October, 2018: Gabe Plotkin and Tim Brown, Tradewater: Mr. Plotkin and Mr. Brown are responsible for development and operations, project description, maintenance of the Project Monitoring Report, and emissions reductions calculations. They were the primary contact during the verification and addressed all corrective action requests (CARs), additional documentation requests (ADRs), and clarification requests (CRs).
- September and October, 2018: Rachel Kanan, Tradewater: Rachel is responsible for the technical support of the Project. She attended the verification site visit, provided responses to findings, and completed the GHG assertion spreadsheet.
- September 12, 2018: Stacy Ward, Steve Lorah, and John Higgins, Heritage Thermal Services: The group provided a description and tour of the destruction facility and provided operational and monitoring data from the Project.

## 2.4 Site Inspections

RCE conducted a site visit to the Heritage Thermal Services (destruction facility) located in East Liverpool, Ohio, USA on 12 September 2018. The site visit activities included a physical inspection of the Project operations and a review of the Project's ODS destruction processes and technologies, information control systems, and QA/QC activities. RCE reviewed the weighing and sampling procedures of Project ODS and inspected the scales used. RCE interviewed personnel and discussed the standard operational procedures for ODS destruction and monitoring. RCE has visited the ODS destruction facility several times in the past for other ODS destruction projects. RCE confirmed during the site visit that the facility does not follow all the required Code of Good Housekeeping monitoring parameters for HF, $HBr/Br_2$, or CO. However, the facility is a RCRA-permitted facility as a hazardous waste combustion facility, which has been approved for ODS destruction by the California Air Resources Board. Please see section 3.4.7 of this report. RCE also confirmed that the monitoring was carried out to the Monitoring Plan requirements in the TW Ghana PD.

## *2.5* Resolution of Findings

Using a list of findings, RCE requested corrective actions, clarifications and additional documentation during the val/ver process. The Project Proponent responded to all requests, which were subsequently closed out. During the val/ver process, RCE issued a total of 22 findings which include:

- 15 Corrective Action Requests (CARs)
- 2 Requests for additional documentation (ADRs)
- 5 Clarification Requests (CLs)
- 0 Forward Action Requests (FARs)

The resolution of findings is summarized in the table found in Appendix A.

### Forward Action Requests

No forward action requests.

# 3 VALIDATION FINDINGS

## 3.1 Project Details

RCE confirmed the project activity instances consist of collecting recovered and stockpiled ODS in Ghana. ODS is recovered from small refrigerator appliances and larger chillers, aggregated and stockpiled, and sent to the United States for destruction at a permitted facility.

RCE confirmed that Tradewater, LLC is the project proponent and City Waste Recycling, Ltd, is the other entity involved in the Project.

Project Start Date is September 11, 2018.

Project Crediting Period is ten years from 11 September 2018 to 10 September 2028. The Project is expected to generate 970,000 $tCO_2e$ emission reduction over the ten-year crediting period. RCE confirms the planned Project can reasonably be expected to achieve the ex-ante estimate of claimed emission reductions.

RCE confirmed that Ghana has no law, rule, or regulation requiring the destruction of ODS, and that no market exists for the reuse of recovered and stockpiled ODS in Ghana.

RCE confirmed the Project is in compliance with applicable laws, statutes, and regulatory frameworks. During the site visit, RCE reviewed destruction facility permits applicable to the Project.

RCE confirmed that Tradewater, LLC holds title to all ODS collected and aggregated for the Project and retain any emission reduction claims.

The Project has not sought or received any other form of environmental credit, and GHG emission reductions have not been included in other emissions trading programs.

RCE concludes the description of the project activities in the TW Ghana PD is accurate, complete, and provides an understanding of the Project, and that the Project has been implemented as described in the PD.

## 3.2 Participation under Other GHG Programs

The Project does not participate in or have been rejected by any other GHG programs.

## 3.3 Grouped Projects

During the validation activities, RCE assessed the pre-established criteria contained in the TW Ghana PD to be applied to project activity instances, and confirmed that the initial project activity instance is collecting, stockpiling, and destroying ODS material. The eligibility criteria include:

- Meet the applicability conditions set out in VM0016 and VMD0048
- Use and apply the technologies specified in the TW Ghana PD
- Apply the technologies or measures in the same manner as specified in the TW Ghana PD
- Subject to geographic area and baseline scenario determined in the TW Ghana PD
- Additionality is consistent with the initial project activity instances

The Project meets the eligibility criteria and is considered a grouped project under VCS Standard 3.7 and VDM0048, thus allowing the addition of the project activity instances during the crediting period.

## 3.4 Application of Methodology

### 3.4.1 Title and Reference

The Project was conducted under the approved VCS methodology VM0016 Recovery and Destruction of Ozone-Depleting Substances, v1.1 (30 November 2017) and utilizes the module VMD0048 Activity Method for the Determination of Additionality for Recovered and Stockpiled ODS Refrigerant Projects, v1.0 (30 November 2017).

### 3.4.2 Applicability

Under VM0016, v1.1. there are applicability conditions presented as follows:

- This methodology applies to project activities that recover and destroy ODS where the baseline scenario is the partial or total atmospheric release of ODS. RCE confirmed that the baseline scenario of partial or total atmospheric release of ODS is representative of the current activities in Ghana.

- The ODS cannot be manufactured for the sole purpose of destruction. RCE confirmed that the ODS was not sourced from a manufacturing company.

- Only ODS listed in Appendix 1 of VM0016, v1.1 of the methodology are eligible for emission reductions. Due to the nature of this grouped project, the type of ODS destroyed will need to be assessed during each subsequent verification. RCE confirmed for this monitoring period that the recovered and stockpiled ODS destroyed was eligible.

- If applying the methodology to ODS blowing agents, ODS can only be recovered and destroyed from insulated foam of end-of-life refrigerator appliances. The ODS blowing agent must be extracted from the foam under negative pressure to a concentrated form prior to destruction. Due to the nature of this grouped project, ODS blowing agents may be destroyed in subsequent project activities and the process for recovery will be to be assessed during the verification. RCE confirmed that ODS blowing agents were not destroyed during this monitoring period.

- All ODS must be collected, stored and transported in cylinders or other hermetically sealed containers. Due to the nature of this grouped project, the type of cylinders used to collect, store and transport ODS will need to be assessed during each verification. RCE confirmed for this monitoring period that the containers used during each process of the project were certified cylinders.

Under VMD048, v1.0. there are applicability conditions presented as follows:

- The project activity consists of the collection and destruction of recovered CFC refrigerant in any quantity or consumer quantity CFC refrigerant. Due to the nature of this grouped project, the type and quantity of ODS collected or recovered for destruction will need to be assessed during each verification. RCE reviewed documentation to confirmed that the project activity consisted of recovered refrigerant and consumer quantity CFC stored in containers in quantities less than 250 pounds.

- The project activity cannot consist of the destruction of CFC refrigerant collected from, or as part of, a product stewardship scheme or other program that creates incentives or mechanisms that result in CFC destruction as an industry common practice. RCE confirmed that there are no schemes or programs designed to incentivize ODS destruction in Ghana.

### 3.4.3 Project Boundary

The GHG project boundary is delineated in VM0016 Section 5.0 and TW Ghana PD Section 2.3, which includes the ODS recovery facility, transport, and ODS destruction facility. The identified project boundary encompasses the ODS recovery facility (City Waste Recycling, Ltd) located in Ghana, transport from the recovery facility to the qualifying destruction facility, and the destruction facility location (located in the United States for the initial project instance). RCE reviewed the recovery facility website information and permits to confirm the recovery facility identified in the PD is included in the project boundary. RCE reviewed recovery facility documents to confirm the ODS was sourced in Ghana. RCE reviewed transfer of ownership and custody documentation, bills of lading and transport documentation to confirm the ODS was shipped from Ghana to the destruction facility and the transportation of the ODS is appropriately included in the boundary. RCE observed operations of the destruction facility during the site visit and confirmed that the destruction facility is appropriately included in the boundary.

The Project Proponent clearly accurately depicts the project boundary in the TW Ghana PD, Section 1.9.

### 3.4.4 Baseline Scenario

The project proponent identified all realistic and credible baseline scenarios and concluded that alternative baseline scenario R4 was most applicable and plausible based on the economic and technical circumstances in Ghana. The baseline emissions source is the atmospheric release of ODS refrigerant from continued storage in stockpiles or from end of life equipment. RCE confirmed that Ghana has no mandates for the destruction of ODS and it remains lawful to sell and use ODS. RCE confirmed that Ghana has no market for the sale of stockpiled ODS, thus it remains in long-term storage in tanks and cylinders. VM0016 methodology is applicable for ODS refrigerants if either R3 or R4 alternatives are the most plausible scenarios. The Project Proponent provided documentation from Ghana Environmental Protection Agency, United Nations Environment Programme, City Waste Recycling, and Ghana ODS wholesalers to support the R4 baseline scenario.

The RCE concludes the baseline scenario represents the scenario most likely to occur in the absence of the project and considers it justified.

### 3.4.5 Additionality

Demonstration of project additionality was conducted using VM0016, Section 7.1 for the destruction of CFC refrigerant.

Step 1: Regulatory surplus

The project proponent must demonstrate regulatory surplus in accordance with the rules and requirements regarding regulatory surplus set out in the latest version of the VCS Standard.

Step 2: Positive list

The applicability conditions of VCS activity method module Activity method for the determination of additionality for recovered and stockpiled ODS refrigerant projects represent the positive list. The positive list was established using the revenue streams option (Option C in the VCS Standard). Projects that meet all of the applicability conditions of this methodology and the VCS activity method module for the determination of additionality for recovered and stockpiled ODS refrigerant projects are deemed additional (VMD0048).

RCE reviewed information from Ghana EPA to confirm the Project meets the regulatory surplus requirement. In addition, RCE concludes the Project meets the applicability conditions of VMD0048 and additionality is justified.

### 3.4.6 Quantification of GHG Emission Reductions and Removals

RCE assessed the quantification of baseline, project and leakage emissions against the equations contained in VM0016 Sections 8.1 – 8.4. RCE confirms the quantification of GHG emission reductions contained in the TW Ghana PD Sections 3.1 – 3.4 accurately follow the equations in VM0016. RCE confirms all data and parameters used in the TW Ghana PD are reasonable in the context of the Project.

RCE reviewed the Project Proponent's GHG Project Assertion Spreadsheet and found it to be free from errors and omissions. All data values, emission factors, and emission reduction calculations are accurate and can be replicated. The data activity contains a low degree of uncertainty as all ODS is weighed on certified scales and the composition of ODS material is determined through certified-laboratory analysis.

RCE concludes the Project Proponent has correctly applied the methodology to calculate baseline, project, and leakage emissions, and net emission reductions during the monitoring period.

### 3.4.7 Methodology Deviations

The Project includes one deviation to VM0016, Section 9.3 Destruction Facility Requirements. The Project Proponent intends to use facilities in the U.S. that are permitted for ODS destruction and meet the screening criteria for destruction technologies, but do not possess a TEAP certification and all operating parameters described in the Code of Good Housekeeping are not monitored and recorded. The proposed destruction facilities are RCRA permitted by U.S. Environmental Protection Agency and meet the technical performance qualifications to destroy ODS. As a result, it is automatically considered a qualifying destruction facility without further TEAP testing under the Climate Action Reserve's *Ozone Depleting Substances Project Protocol* as well as California Air Resources Board's *Compliance Offset Protocol Ozone Depleting Substances Projects*.

RCE concludes that the methodology deviation applied to the Project is valid and does not negatively impact the conservativeness of the quantification of GHG emission reductions.

### 3.4.8 Monitoring Plan

The Project Proponent included all data parameters monitored and not monitored in the TW Ghana PD Sections 4.1 and 4.2. RCE reviewed the data and parameters during the validation activities and found them to adhere to VM0016 Sections 9.1 and 9.2. RCE reviewed the Project monitoring plan contained in TW Ghana PD Appendix D and found it to be in compliance with VM0016 Section 9.3 with the exception of the methodology deviation described in the previous section of this report.

VM0016 monitoring sections primarily addresses the destruction facility requirements. RCE also validated sections of the monitoring plan not covered in VM0016 regarding chain of custody including the sourcing and collecting of ODS, recovery facility procedures, and transport procedures. RCE validated Tradewater's TW Ghana Chain of Custody and Transportation Compliance Memorandum through reviewing examples of City Waste Recycling fridge collection data sheets, custody transfer documentation, bills of lading, and consolidation reports. RCE found the chain of custody procedures to be adequate and in compliance with VM0016.

RCE concludes that the Monitoring Plan contained in TW Ghana PD adheres to the applied methodology VM0016.

## 3.5 Non-Permanence Risk Analysis

Non-permanence risk analysis is not applicable to the Project Activity.

# 4 SAFEGUARDS

## 4.1 No Net Harm

RCE confirms that no potential environment or socio-economic issues were found during the Project's planning and permitting process.

## 4.2 Environmental Impact

No environmental impact assessments were conducted with respect to the project.

### 4.3 Local Stakeholder Consultation

The Project Proponent provided sufficient evidence that local regulators have been engaged to ensure project compliance with regulations around handling and transport of ODS in Ghana. The Project Proponent also partnered with City Waste Recycling, Ltd. located in Ghana for the collection and aggregation of ODS. City Waste Recycling will provide people the opportunity to voice concerns and questions about the project on their website going forward.

### 4.4 Public Comments

There were no public comments submitted during the public comment period.

## 5 VERIFICATION FINDINGS

### 5.1 Accuracy of GHG Emission Reduction and Removal Calculations

Tradewater calculated the Project's emission reductions in accordance with the equations described in VM0016 and TW Ghana PD. RCE sampled the Project's data and chain of custody documentation during the project activities to ensure the accuracy of reported data and to ensure that there were no transcription errors between data sets. RCE reviewed TW Ghana GHG assertion spreadsheet to ensure the accuracy of the formulas and emission factors applied and verify the functionality of the spreadsheet.

The primary Project data includes the ODS composition analysis and calibrated scale measurements. Tradewater uses these parameters to calculate the amount of eligible ODS destroyed by the Project. RCE verified that validated parameters were appropriately applied in the calculation of emission reductions for the reporting period.

Baseline emissions included three types of eligible refrigerants: R-12, R-114, R-115. Project emissions include only emissions from transportation and destruction of ODS and were subtracted from baseline emissions to calculate total emission reductions.

RCE reviewed calculations for the reporting period and recalculated the emission reductions and found the GHG emission reduction calculations to be in conformance with VM0016 and the validated PD and free of material misstatement.

### 5.2 Quality of Evidence to Determine GHG Emission Reductions and Removals

Tradewater provided adequate documentation for the emission reduction calculations as well as its information flow and data management processes. RCE reviewed the Project's Monitoring Report v1.1, scale calibration documentation, ODS lab analysis, chain of custody documentation, and all emission reduction calculations. Additionally, RCE interviewed Project personnel during the site visit for the verification activities and over the telephone for the validation activities to assess their understanding of the Project equipment and documentation including data management. RCE found the information provided to be transparently documented and in accordance with the validated TW Ghana PD and requirements of VM0016.

## 6 VALIDATION AND VERIFICATION CONCLUSION

RCE conducted a risk-based validation and verification of the TW Ghana project that included a strategic review of the project data, documentation, and emission reduction calculations. The objective of the validation activities was to assess the project design, baseline scenario and monitoring plan, and ensuring compliance to the Project PD and with the assessment criteria defined in Section 1.2. The objective of the verification activities was to conduct an independent assessment of the initial project activity instance and ex-post GHG emission reductions resulting from the Project.

RCE concludes to a reasonable level of assurance that the GHG assertion is free of material misstatement. The emission reductions resulting from ODS destruction for the reporting period 11 September 2018 – 11 September 2018 can be considered in conformance with the:

- Verified Carbon Standard Version 3.7 (21 June 2017);
- VCS Program Guide Version 3.7 (21 June 2017);
- Validation and Verification Manual Version 3.2 (October 19, 2016);
- ISO 14064-3 "Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions"
- Approved VCS methodology VM0016 Recovery and Destruction of Ozone-Depleting Substances (ODS) from Products, v1.1;
- VMD0048 Activity Method for the Determination of Additionality for Recovered and Stockpiled ODS Refrigerant Projects, v1.0

Verified GHG emission reductions and removals in the above verification period:

| Year | Baseline emissions or removals ($tCO_2e$) | Project emissions or removals ($tCO_2e$) | Leakage emissions ($tCO_2e$) | Net GHG emission reductions or removals ($tCO_2e$) |
|---|---|---|---|---|
| 2018 | 19,662.16 | 15.54 | 0.00 | 19,647 |
| **Total** | 19,662.16 | 15.54 | 0.00 | 19,647 |

### Lead Validator and Verifier Signature

Michael Cote
President and Senior Environmental Engineer

### Independent Technical Reviewer Signature

Zach Eyler
Vice President

## APPENDIX A: VALIDATION AND VERIFICATION LIST OF FINDINGS

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|---|---|
| **Issues Log version:** | **6.0** |
| **Project Name:** | **TW Ghana ODS Project** |
| **Project ID:** | **PL1752** |
| **Project Proponent** | **Tradewater, LLC** |

**Validation Findings**

| Corrective Action | Description | Resolution |
|---|---|---|
| **Material CAR 1** | Section 1.5. According to the VCS Standard the project start date is the date on which the project began generating GHG emission reductions or removals. | 10/10/18: Tradewater updated the TW Ghana PD Sec. 1.5. |
| **Material CAR 2** | Section 1.6 The crediting period identified in the project description is greater than 10 years. | 10/10/18: Tradewater updated the TW Ghana PD Sec. 1.6. |
| **Material CAR 3** | Section 1.13. The leakage management section of the Project Description addressed the physical leakage of ODS within the project boundary. It does not address the term leakage as defined by VCS: "Net changes of anthropogenic emissions by GHG sources that occur outside the project or program boundary, but are attributable to the project or program", nor does it address market leakage (ODS substitution of material destroyed). | 10/10/18: Tradewater updated the TW Ghana PD Sec. 1.13. |
| **Material CAR 4** | Section 4.1. Tables are using wrong format (using Section 4.2 format) | 7/29/18: Tradewater updated the table formatting in Section 4.1. |
| **Material CAR 5** | Section 5.3. According to the VCS Project Description template instructions, the Local Stakeholder Impact section should include the process for and outcomes from local stakeholder consultation, including the mechanism for on-going communication with local stakeholders. | 7/29/18: Tradewater updated Section 5.3 to include a mechanism for on-going communication with local stakeholders. |
| **Material CAR 6** | Appendix D. The Monitoring Plan does not include “Procedures for handling non-conformances with the validated monitoring plan. | 7/29/18: Tradewater updated Appendix D to include procedures for handling nonconformances with the validated monitoring plan (Section XV). |
| **Material CAR 7** | Section 2.4 does not discuss R1-R3 as defined credible alternatives and does not include justification as to why they were ruled out. | 7/29/18: Tradewater updated Section 2.4 to reflect the inapplicability of R1-R3 as credible alternatives to the Project. |

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| **Material CAR 8** | Section 3.3 does not adhere to VM0016 methodology where it states that no substitute refrigerant emissions will be calculated for stockpiled consumer quantity CFC. | 11/14/2018: Tradewater provided supporting evidence regarding the Ghana ODS market, thus justifying the baseline scenario and no application of leakage emissions. |
| **Material CAR 9** | Sections 1.13, 2.4, 3.1, 4.1 contain inconsistent language regarding baseline scenario – whether the ODS is used, reused, remain in storage, released to the atmosphere. | 10/10/18: Tradewater updated all sections noted in the finding the TW Ghana PD Sec. 1.13, 2.4, 3.1, and 4.1. |
| **Material CAR 10** | The project emissions from transportation and destruction needs to be 7.5 tonne CO2e/tonne based on the Appendix D conclusion in the Article 5 ODS Project Protocol. | 10/10/18: Tradewater updated the TW Ghana PD Sec. 4.1. |
| **Material CAR 11** | Senior technical review requested minor edits to PD v1.2 Sections 1.8, 1.9, 2.3, 2.6, 3.3, 4.1, 4.2, 5.4, and Appendix E. | 11/29/18: Tradewater updated all sections noted in the technical reviewer findings related to the TW Ghana PD. |
| **Additional Document Request** | | |
| **ADR 1** | VCS ODS Requirements v3.1, Sec. 3.4.1 and VM0016 Sec. 8.3. Provide documentation describing the state of ODS market in Ghana, and showing that stockpiled ODS would not be used or reused to meet any market demand. | 11/05/18: Tradewater has included an affidavit from an ODS wholesaler in Ghana in Appendix E of the TW Ghana PD that supports the claim that stockpiled refrigerants in Ghana would not be re-used and would be leaked into the atmosphere. |
| **Clarifications** | | |
| **CR 1** | Section 5.1. Were any studies reviewed and referenced, or investigations conducted to identify any negative impacts? Any efforts made by Tradewater? | 7/29/18: Tradewater updated Section 5.1 to more completely address the due diligence performed by Tradewater to ensure no net harm. |
| **CR 2** | Section 5.2. Confirm there are no environmental impact assessments of the recovery facility. | 7/29/18: There is not an environmental impact assessment for the recovery facility. The City Waste Facility is permitted by the Ghana EPA. The permit is renewed every 18 months. The most recent is dated December 2017. |

| | | |
|---|---|---|
| **CR 3** | Appendix D. What type of Tradewater or point-of-origin documentation is used to track ODS recovered from end-of-life equipment separately from ODS recovered from stockpiles? Consider referencing the spreadsheet template used in the Applicability Condition Statement and Exhibit A to the Section II or III in the monitoring plan. | 7/29/18: Tradewater set forth in Appendix D, Section 2, the information it will collect and document for ODS collected from one of four different source types. Tradewater may use different forms of documentation throughout the project. |
| **CR 4** | Section 4.2 and Appendix D. Is it reasonable for the monitoring plan to require the quantity of fossil fuel use at the recovery facility to be measured continuously, and heating value & density to be obtained for each fuel delivery? If Tradewater is using Option B (NVC), then consider removing tables and equations for using Wc,i and P,i (Option A). | 7/29/18: Fossil fuel is not used at the recovery facilities at this point and the parameters were removed from the PD. If fossil fuel use should occur in the future the PD states that it will use equations 17-18 of VM0016. |
| **Forward Action Request** | | |
| **FAR 1** | None | |
| **Recommendations for Improvement** | | |
| **RFI 1** | None | |

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|---|---|
| **Issues Log version:** | **2.0** |
| **Project Name:** | **TW Ghana ODS Project** |
| **Project ID:** | **PL1752** |
| **Project Proponent** | **Tradewater, LLC** |

## Verification Findings

| Corrective Action | Description | Resolution |
|---|---|---|
| **Material CAR 1** | Please include in the VCS Monitoring Report a description of how the destruction facility meets the requirements of the Project Description Appendix D.VI. | 10/10/18: Tradewater provided the supporting information and modified the Project Description Section 2.6 to explain the suitability of destruction at RCRA permitted facilities. |
| **Material CAR 2** | The default emission factor for project emissions from transportation and destruction needs to be applied to the total ODS weight (including ineligible material). The Appendix D conclusion in the Article 5 ODS Project Protocol says the default emission factor should be 7.5 tonne CO2e/tonne. | 11/29/18: Tradewater corrected the Ghana Project Assertion Spreadsheet. |
| **Material CAR 3** | Project emissions from electricity use at the Ghana recovery facility are not being included in the emission reduction calculations. | 9/11/18: Tradewater confirmed there are no emissions from electricity use at the Ghana recovery facility as explained in Section 3.3 of the Project Monitoring Report. |
| **Material CAR 4** | Senior technical reviewer requests minor edits to Monitoring Report Sections 1.7, 2.2.1, 2.3, and 3.1. | 11/30/18: Tradewater updated Project Monitoring Report v1.2. |
| **Additional Document Request** | | |
| **ADR 1** | Please provide the VCS Monitoring Report for this reporting period. | 10/10/18: Tradewater provided the Project Monitoring Report for the reporting period. |
| **Clarifications** | | |
| **CR 1** | Why does the Attestation of John Higgins regarding the weighing of cylinders reference the ARB compliance offset protocol? | 10/05/18: Tradewater corrected the attestation to properly reflect compliance with the VCS protocol. |
| **Forward Action Request** | | |
| **FAR 1** | None | |
| **Recommendations for Improvement** | | |
| **RFI 1** | None | |