CO2 UTILIZATION IN CONCRETE – REMOVALS & REDUCTIONS – CARBONCURE – U.S. PROJECT #1 VALIDATION AND VERIFICATION REPORT

Document Prepared by Ruby Canyon Environmental, Inc.

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Summary:

The project takes captured waste CO_2 which would have otherwise been emitted into the atmosphere, or atmospheric CO_2 in the future, (except in cases where CarbonCure could not definitively prove the source of CO_2) and utilizes it as a feedstock in the production of ready-mix concrete. These project activities reduce greenhouse gas (GHG) emissions by sequestering CO_2 via the production of concrete. Cement production is highly energy and carbon intensive, and the Project further reduces GHG emissions by reducing the quantity of Portland cement required in concrete production because of the sequestration of CO_2 in concrete production. The project activity will take place at the location where the concrete is first manufactured (mixed with cement, water, aggregates, etc.). This is a grouped project.

Carbon Cure Technologies, Inc. (CarbonCure) contracted Ruby Canyon Environmental, Inc. (RCE) to complete the validation and verification of Concrete ready mix facilities including facilities in Georgia, South Carolina, and North Carolina. The first crediting period is from 6 November 2018 to 5 November 2025. The first monitoring period verified is from 1 January 2019 to 31 December 2021.

The purpose of the validation is to ensure that the baseline scenario is valid, that the Project complies with the VCS Standard, version 4.3 and VM0043 Methodology for CO_2 Utilization in Concrete Production, that the project plan and GHG calculation methods are materially correct, and that the planned project could reasonably be expected to achieve the claimed emission reductions. The Purpose of the verification is to ensure that the GHG assertion is materially correct, that the data provided to RCE can be documented and if errors or omissions are detected, they be corrected by CarbonCure.

The Project was assessed against the requirements of VM0043, the VCS Standard and the Project Description dated 21 November 2022. As part of the validation and verification activities, RCE reviewed the completeness, conservativeness, and accuracy of the underlying evidence for the Project's assumptions and data sources used.

The scope of the validation and verification includes an assessment of the Project Description and Monitoring report, dated 21 November 2022, and supporting data and documentation against the defined criteria listed below in Section 1.2.

The validation and verification team's method for assessing the project against the above criteria (including the policy, procedures or requirements used to validate the project description and verify the monitoring report) included creating a validation and verification risk assessment and sampling plan. RCE determined which areas of the project contained the highest risk and focused on revieing evidence to mitigate these risks. The validation and verification team included a desk review of project information, a site visit to five of the 43 project facilities and interviews with key personnel involved in developing the project and carrying out the monitoring and metering.

During the validation and verification process, RCE issued a total of 17 findings which include:

- 5 Corrective Action Requests
- 0 Non-material Finding
- 2 Additional Document Requests
- 8 Clarification Requests
- 2 Forward Action Request

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 Methodology. All uncertainties associated with inherent data collection and analysis are properly managed through data controls and quality assurance checks.

RCE states, to a reasonable level of assurance that the Project as described in the Project Description dated 21 November 2022 and the monitoring report dated 21 November 2022 meets all relevant VCS requirements and correctly applies VM0043 with noted deviations.

RCE concludes that that all relevant VCS validation criteria have been satisfied and the Project Activity properly applies the criteria of VM0043. RCE concludes that the baseline is valid and that the emission reductions attributable to the Project Activity are additional to any emission reductions that would occur in the absence of the Project. RCE also confirms that the estimated emission reductions to be claimed during the initial crediting period is a reasonable estimate.

RCE confirms, to a reasonable level of assurance, that the Project's GHG assertion of 14,581 metric tonnes of CO_2 equivalent emissions for the period of 1 January 2019 – 31 December 2021 is fairly stated.

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1 INTRODUCTION

1.1 Objective

The purpose of the validation is to ensure that the baseline scenario is valid, that the Project complies with VM0043 Methodology for CO_2 Utilization in Concrete Production version 1.0, that the project plan and GHG calculation methods are materially correct and meet the requirements of the VCS program, and that the planned project could reasonably be expected to achieve the claimed emission reductions.

The purpose of the verification is to ensure that the GHG assertion is materially correct, that the data provided to RCE can be documented and if errors or omissions are detected, they be corrected by CarbonCure.

1.2 Scope and Criteria

This is the validation of the Project's first crediting period from 6 November 2018 to 5 November 2025. The validation scope is defined as an independent and objective review of the CO_2 injection in ready-mix concrete, including the review of the Project Description (PD) v24.0, dated 17 November 2022. The PD was reviewed against the following criteria:

- Verified Carbon Standard (VCS), v4.3 (Issued 19 September 2019; updated 22 June 2022)
- VCS Validation and Verification Manual version 3.2 (October 19, 2016)
- VCS Methodology VM0043 Methodology for CO_2 Utilization in Concrete Production version 1.0 (5 April 2021)
- Validated Project Description (PD), dated 21 November 2022
- ISO 14064-3:2006 "Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions"

This is the verification of the Project's first reporting period from 1 January 2019 to 31 December 2021 the first crediting period. The verification scope includes the organizational boundaries of 43 ready-mix concrete plants and CO_2 sequestration. The GHG emission sources included are associated with CO_2 captured and injected in concrete, CO_2 from combustion of fossil fuels to produce cement including calcination, CO_2 from incremental increase in project electricity use and fossil fuel combustion, CO_2 emissions from project calcination process, and CO_2 from project electricity use and fossil fuel combustion associated with processing waste CO_2.

RCE conducted the verification based upon the following criteria:

- Verified Carbon Standard (VCS), v4.3 (Issued 19 September 2019; updated 22 June 2022)
- VCS Validation and Verification Manual version 3.2 (October 19, 2016)
- VCS Methodology VM0043 Methodology for CO_2 Utilization in Concrete Production version 1.0 (5 April 2021)
- Validated Project Description (PD), dated 21 November 2022

- ISO 14064-3:2006 "Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions"
- Additionally, RCE reviewed the Project's monitoring period-specific Monitoring Report v21.0 dated 21 November 2022, including the monitoring plan, during verification activities.

1.3 Level of Assurance

RCE conducted the validation and verification activities 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 verification process.

1.4 Summary Description of the Project

The validation assesses the eligibility of the project for the initial crediting period and the verification covers the first monitoring period of the grouped project. RCE reviewed all initial project activity instances (PAIs) and confirmed that each one occurs in the U.S., complies with the eligibility criteria for inclusion of a new PAI, is included in the monitoring report with sufficient technical, financial, geographic and other relevant information to demonstrate compliance with the applicable set of eligibility criteria, was validated at the time of verification against such criteria, has evidence of project ownership, has a start date that is later than the grouped project start date, is eligible for crediting from the start date of each instance through to the end of the project crediting period and none of the instances has left a VCS project to subsequently enroll in another VCS project. RCE also reviewed section 1.4 of the Project Design and confirmed that the project proponent included additional and relevant information for the addition of new instances in the grouped project including baseline scenario, location, validation and verification criteria, start date and crediting period length.

The project activity consists in the use of captured waste CO_2 which would have otherwise been emitted into the atmosphere (except in cases where CarbonCure could not definitively prove the source of CO_2) and utilizes this gas as a feedstock in the production of ready-mix concrete. These project activities reduce greenhouse gas (GHG) emissions by mineralizing CO_2 via the production of ready-mix concrete. This manufacturing process has the additional benefit of requiring less Portland cement, which further reduces emissions from cement production that is highly energy and carbon intensive. The project activity will take place at the location where the concrete is first manufactured (mixed with cement, water, aggregates, etc.), which for this monitoring period will include 43 Thomas Concrete plants, who is one of several stakeholders in this project.

2 VALIDATION AND VERIFICATION PROCESS

2.1 Method and Criteria

RCE used a risk-based assessment approach for the validation and verification process to develop the validation and verification sampling plan as part of the validation and verification activities.

The validation process and sampling plan involved the following independent and objective activities:

- Select a validation team;
- Perform a Conflict of Interest Assessment;
- Conduct a kick-off meeting with CarbonCure;
- Review the PD;
- Develop a validation plan and risk-based sampling plan;
- Review the validity of the baseline scenario;
- Conduct a site visit;
- Review the accuracy of the emission reduction projections for the crediting period;
- Review whether project activities are subject to regulatory compliance;
- Confirm project ownership is accurately described in the PD;
- Confirm the application of VCS Methodology VM0043 Methodology for CO_2 Utilization in Concrete Production version 1.0 (5 April 2021);
- Review the monitoring plan;
- Issue corrective action requests (CARs), additional documentation requests (ADRs), and clarification requests (CRs).
- Issue a joint validation/verification report and representation; and
- Conduct an exit meeting with CarbonCure.

The validation/verification team was selected according to RCE's GHG Verification Policies & Procedures to ensure team members are qualified to perform validation/verification activities pertaining to the Project. The validation/verification team consisted of the following individuals:

Lead Validator: Phillip Cunningham

Senior Internal Reviewer: Michael Coté

Team Member: Issaí Medellín

Prior to validation/verification project activities, RCE performed a Conflict of Interest Assessment to determine whether any potential conflicts exist with the project developer. No issues were discovered that would affect the impartiality or independence of the validation/verification team.

A validation/verification kick-off conference call was held with CarbonCure on 15 July 2022. The purpose of the kick-off conference calls was to introduce the CarbonCure personnel and the RCE validation/verification team, review the validation/verification objectives, process, and VCS requirements, and to confirm the schedule.

RCE reviewed the PD and developed a validation/verification plan and sampling plan that was used throughout the validation/verification of the Project. A risk-assessment was performed based upon the criteria listed above and evidence provided to RCE by CarbonCure that pertained to the current crediting/monitoring period. The validation/verification team confirmed that each facility included in this grouped project met the additionality requirements listed in VM0043 (as opposed to sampling a subset of facilities).

Information in the PD was the primary focus of the validation and sampling plan while the monitoring report was reviewed for the verification. RCE reviewed the PD/MR for completeness and accuracy and used the PD/MR to determine other relevant documents to review and personnel to interview. RCE developed a sampling plan checklist based on the requirements of the VCS standard.

After a preliminary risk assessment of the Project, RCE performed a site visit to 5 Thomas Concrete Plants on 16 and 17 August 2022 where CarbonCure's technology was installed. The Lead Verifier interviewed key personnel, reviewed GHG sources, sinks and reservoirs (SSRs) and viewed relevant monitoring and metering equipment. Following its initial review of all Project documents and the site visit, RCE delivered an Issues Log to CarbonCure with findings that included CARs, ADRs, and CRs. CarbonCure provided responses to all identified issues.

The verification process and sampling plan involved the following independent and objective activities:

- Select a Verification Team;
- Perform a Conflict of Interest Assessment;
- Conduct a kick-off meeting with CarbonCure;
- Review the validated Project Description;
- Review the current Monitoring Report;
- Develop a verification plan and risk-based sampling plan;
- Conduct a site visit with validation;
- Review the project information control systems and quality control procedures;
- Review the Project's emission reduction calculations;
- Issue CARs, non-material findings (NMs), ADRs, and CRs;
- Conduct a senior internal review;
- Issue a joint validation/verification report and representation; and
- Conduct an exit meeting with CarbonCure.

RCE developed a verification plan and sampling plan that were used throughout the verification of the Project. A sampling plan was created after reviewing the Project Monitoring Report (MR), validated PD, and the VCS Standard. A risk-assessment was performed based upon the criteria listed above and evidence provided to RCE by CarbonCure that pertained to the current reporting period.

RCE re-calculated all emission reductions based on raw data outputs from CarbonCure's database, including project emissions from cement, and confirmed that all default emission factors were correct (as opposed to sampling). RCE performed a census of this data as they are considered be medium-high risk.

The sampling plan used simple random sampling approach to review a subset of calibrations for monitoring equipment, CarbonCure Mix Designs and calculations of project emissions from electricity usage, CO_2 transport and CO_2 compression. These items were considered to be low-medium risk and these project emissions made up a small percentage of total Project emissions.

The verification plan was used throughout the reporting period as a basis for assessing the completeness, consistency, accuracy, and transparency of the Project's GHG emission reductions.

Following the close-out of all open items, RCE completed a joint validation/verification report, and submitted the validation/verification for senior internal review.

2.2 Document Review

The validation/verification activities relied heavily on document review. RCE reviewed several versions of the PD and MR and audited underlying evidence, data, records, and supporting documents. RCE cross-checked and compared these documents to the VCS program requirements and communicated any deficiencies to CarbonCure (communicated via a issues log). These documents are listed in Appendix A.

2.3 Interviews

RCE held numerous discussions with the following personnel throughout the verification process:

- Casey Leist, Senior Director– Carbon Finance, CarbonCure
- Ingy El Kafrawy, Business Operations and Credit Inventory Manager – Carbon Finance, CarbonCure

Topics discussed included:

- CarbonCure' process for compiling the PD to meet the VCS Methodology VM0043 Methodology for CO_2 Utilization in Concrete Production version 1.0 (5 April 2021);
- Process for determining that the project was not legally mandated;
- Methods for including relevant SSRs in the Project boundary;
- Ownership structure of the Project;
- Review of documents provided in support of the PD

RCE interviewed the following personnel during the site visit:

- Ingy El Kafrawy, Business Operations and Credit Inventory Manager – Carbon Finance, CarbonCure
- Michael Legrand, Senior Tech Manager – Thomas Concrete

Topics discussed during the site visit included:

- Construction of the project
- Start date
- Methods for data collection
- Ownership structure of Project
- Relevant Project permits
- How concrete production is tracked
- Installation and operation of equipment
- QA/QC procedures for equipment

2.4 Site Inspections

RCE conducted a site visit at five of the 43 Project locations in and around Atlanta, Georgia on 16 and 17 August 2022. RCE randomly selected five facilities in and around the Atlanta metropolitan area to visit in order to gain an understanding of the project activity and to confirm appropriateness of selected sources, sinks and reservoirs (SSRs).

The objective of the site inspection was to confirm the location of relevant Project monitoring equipment (as applicable), confirm that all relevant GHG SSRs were included in the PD and GHG calculations, and confirm that Project personnel were qualified to carry out their respective roles and responsibilities. The site visit activities included a physical inspection of the project operations and a review of the Project's information control systems, data handling, and QA/QC activities.

RCE physically witnessed CO_2 injection into ready-mix batches of concrete, viewed CarbonCure's CO2 injection equipment, viewed the CO_2 meter and observed the plant's database management system in real time measuring relevant components of each concrete batch used to calculate emission reductions. RCE interviewed key personnel (see section 2.3) responsible for the day-to-day operation of equipment, data aggregation and compilation, and overall maintenance of the Project.

2.5 Resolution of Findings

RCE used an Issues Log to request CARs, NMFs, ADRs, and CRs during the validation/verification process. CarbonCure responded to all requests, which were subsequently closed out.

During the verification/validation process, RCE issued a total of 17 findings which include:

- 5 Corrective Action Requests
- 0 Non-material Finding
- 2 Additional Document Requests
- 8 Clarification Requests
- 2 Forward Action Requests

The resolution of findings is summarized in the table found in Appendix B

2.5.1 Forward Action Requests

RCE is issuing two forward action requests which apply to the methodology.

The methodology does not explicitly define what constitutes a mix-design. During the validation and verification, RCE learned that each facility can have thousands of mix designs per year. However, many of these designs are grouped into mix-design "families" which have very similar properties and can be considered as one mix-design for the purpose of these projects. RCE is requesting that CarbonCure work with Verra to amend the methodology to specify what constitutes a mix-design and how many of these mix-design families require compressive strength tests in order for data to be valid.

The groupings and buckets in CarbonCure mix designs are based on the National Ready Mixed Concrete Association (NRMCA) benchmark report. The NRMCA is the leading industry association for ready-mix producers. They perform industry surveys that capture a statistically significant sample of ready-mix plants, the surveys provide the average distribution of plants and mixes that coincide with the buckets used to group mix families/CarbonCure mix designs. The report will be made available to a VVB upon request.

Additionally, CarbonCure has several industry experts attest to CarbonCure mix designs, their groupings as they relate to industry standards and their credibility within the concrete industry. These experts include the largest and most well established suppliers of concrete in the USA as well as technical advisors and mix design experts in the concrete space. These attestations will be made available to a VVB upon request.

The project proponent has included further details to prove the credibility of the application of mix-design families / CarbonCure mix designs in Appendix II of the PD, providing evidence of expert reviews that accredited their approach and the relevant credibility of these experts.

RCE has deemed the attestations provided as proof of expert reviews for CarbonCure's approach to grouping mix designs into mix families as sufficient and credible.

The methodology requires that each mix design measure the baseline and project compressive strength test including the amount of Portland cement saved by injecting CO_2 into the mix-design. In practice, this is not practical or feasible. A project developer may take these measurements when the practice of injecting CO_2 into mix-designs at a facility first takes place. However, once the compressive strength and quality of the project mix-design is confirmed, the plant no longer creates "baseline" mix-designs or mix-design families that are comparable to the Project mix design. RCE is requesting that CarbonCure work with Verra to amend the methodology to include more practical requirements for determining baseline mix-design compressive strength tests and amount of Portland cement saved through project activities.

3 VALIDATION FINDINGS

3.1 Project Details

The project is a grouped project under the Sectoral Scopes 4 (Manufacturing industries) & 6 (Construction) that includes a single project activity; namely, the technologies and measures implemented include capture of waste CO_2 which would have otherwise been emitted into the atmosphere (except in cases where CarbonCure could not definitively prove the source of CO_2) and utilization as a feedstock in the production of ready-mix concrete. All initial project instances are relatively close to each other geographically (baseline and additionally characteristics of each instance is similar). The PD identifies the geographic area as the United States where new project instances may be added. RCE's assessment of the baseline scenario and additionality was based upon the initial instances included within the United States.

CarbonCure established a set of criteria (conditions listed in VM0043) and sufficiently demonstrated the baseline scenario and additionality for these initial project activity instances in the PD. CarbonCure provided evidence to RCE that demonstrated the baseline scenario and additionality for each instance. The Project Proponent has monitoring and metering in place to collect data from all project activity instances. This data is stored in CarbonCure's company database that is backed up on a regular basis. RCE reviewed this data management system and confirmed that it was complete, rigorous, and contained all necessary information to assess the accuracy of the emission reduction claims.

The project is eligible under VM0043 because the technology utilizes captured waste CO_2, which would have otherwise been emitted into the atmosphere (except in cases where CarbonCure could not definitively prove the source of CO_2) and utilizes CO_2 as a feedstock in the production of concrete. Prior to the project initiation, CO_2 from eligible industrial plants was vented to the atmosphere. CO_2 was not injected into ready-mix concrete using technology with the ability to record data prior to the project start date.

Concrete produced from project plants injects CO_2 from CarbonCure's equipment into the ready-mix concrete which uses less cement compared to the baseline ready-mix concrete production.

The project concrete has the same performance as the baseline concrete and is sold in the commercial market. No recycled concrete is used to produce this ready-mix concrete.

The project developer only claims emission reductions from the mineralization of CO_2 in concrete for which the source of waste CO_2 is known (when the source is not known, the proponent only claims emission reductions from avoided cement usage). None of the CO_2 from emission sources is regulated by a Cap-and-Trade program.

According to the methodology the baseline is the continuation of manufacturing concrete through traditional processes (i.e., not through the use of CO_2 capture and utilization technology). Section 3.4.2 Applicability describes in detail how each project activity instance meets the methodology eligibility criteria.

The additionality for all project instances is the same throughout the United States as specified in section 7 of VM0043; specifically, the project activity is not required by law and any additional instances must meet the applicability conditions in the methodology. According to VM0043 there is no capacity limits for the project activity. The project description includes a set of eligibility criteria for the inclusion of new project activity instances.

The project proponent is CarbonCure represented by Casey Leist as the Senior Director of Carbon Finance. Carbonomics, LLC is the consultant of the project and is represented by Seth Baruch as the President of the company. RCE confirmed both of these parties' competencies throughout the validation and verification and confirmed that they hold sufficient knowledge and experience for completing required documentation.

CarbonCure retains ownership by virtue of owning the equipment and process that generates emission reductions. CarbonCure's equipment is used for the injection of CO_2 in ready mix concrete. RCE reviewed the Framework Agreement between CarbonCure (Project Proponent) and Thomas Concrete Inc. that stipulates all Environmental Credits are property of CarbonCure.

The project start date is 6 November 2018 when the latest version of the CarbonCure technology was installed on the first project activity instance. However, the first monitoring period started on 1 January 2019 which was the date that the project proponents data system began accurately recorded the necessary parameters needed to measure emission reductions. This is the first crediting period for the project from 6 November 2018 to 5 November 2025 for a total of seven years (twice renewable). The project's size category is "Project" and will generate less than 300,000 tonnes of CO_2e per year. The estimated emission reductions are 366,400 tonnes of CO_2e over the life of the project. The project is located in the U.S. and the first cohort includes 43 plants owned by company located in the Southwest. A full list of each project instance with geodetic coordinates is listed in the PD and MR. Prior to the project initiation, CO_2 from industrial facilities (the amount captured by project activities) was vented to the atmosphere and the ready-CarbonCure Mix Designs at each plant used more cement than is now required due to CO_2 injection.

The project complies with applicable laws, statutes and other regulatory frameworks. CO_2 is not a regulated pollutant, and no permits are required to carry out the project activity. The project has not been registered nor is seeking registration under any other GHG program. The project also has not been rejected by another GHG program. None of the project locations are located in

jurisdictions under an emissions trading program or that have binding limits. The Project is not seeking any other form of environmental credits.

The project contributes to SDG goal 9 & SDG goal 13 Climate Action. The project activity promotes sustainable industrialization and fosters innovation in infrastructure using low-carbon concrete. The project activity also reduces the consumption of Portland cement, which has a large carbon footprint, while still creating the same quality of concrete.

There is commercially sensitive information included in Appendix 1 of the PD regarding ownership. The information provided as proof of ownership clearly demonstrates that CarbonCure as the legal right to control and operate the project activity. According to VM0043, no sources of leakage have been identified for this project activity. There is no additional information.

RCE concludes that the Project description included in the PD is accurate, complete, and provides an understanding of the nature of the Project. The Project has been implemented as described in the PD.

3.2 Participation under Other GHG Programs

- The Project does not participate under other GHG programs.

3.3 Safeguards

3.3.1 No Net Harm

There are no potential negative environmental or socio-economic impacts because of the Project. The project activity decreases the need for Portland cement production and avoids CO_2 venting to the atmosphere. CO_2 is not a regulated pollutant. The Project contributes to sustainable development goals 9 & 13: climate action.

3.3.2 Local Stakeholder Consultation

Stakeholder engagement was not a part of the project installation and activity, as the project takes place on private land owned by each concrete ready-mix plant. The project activity does not produce impacts beyond the scopes covered by the current operations and permits of each ready-mix concrete plant.

3.3.3 Environmental Impact

The project did not require an environmental impact assessment.

3.3.4 Public Comments

The project did not receive any public comments during its public comment period.

3.3.5 AFOLU-Specific Safeguards

This is a non-AFOLU project and this section is not required.

3.4 Application of Methodology

3.4.1 Title and Reference

The project follows the VCS Standard version 4.3 and uses the following methodology: VM0043 Methodology for CO_2 Utilization in Concrete Production.

3.4.2 Applicability

This is the initial validation of the project's first crediting period. The Project Proponent justified meeting each applicability condition of VM0043 by providing documentation for each project activity instance (PAI) which are located within the same geographic region. RCE confirmed that VM0043 is applicable to this project and reviewed applicability conditions listed in the methodology. Namely:

1. Project activities must manufacture concrete using CO_2 as a feedstock in the production process through a process that requires lower amounts of cement as compared to concrete production processes that do not use CO_2 as a feedstock. RCE confirmed via interviews during the site visit with Thomas' Senior Technical Manager and by reviewing project mix-designs that inject CO_2 that each facility uses less Portland cement for concrete batches and CarbonCure Mix Designs. RCE also reviewed non-project CarbonCure Mix Designs that required more cement as compared to the Project mix-designs that use CO_2 as a feed stock. RCE reviewed the calculation spreadsheets and confirmed that less Portland cement was used to create Project concrete as compared to similar concrete that does not use CO_2.

2. The concrete produced by the project activity must have the same performance (e.g., compressive strength) as the baseline concrete that would have otherwise been used in the absence of the project. Please reference Section 3.4.7 Methodology Deviations regarding the number of tests completed. RCE reviewed the report "Evaluation of Compliance with ASTM C 494 Type S Chemical Admixture Compliance for Concrete" by the engineering and testing firm Bowser-Morner. The document summarizes the testing of six (6) concrete batches for evaluation of compliance with ASTM C 494. On August 8, 2020, representatives from Bowser-Morner witnessed batching of concrete, performed plastic property testing, and cast test specimens from alternating mixes of three (3) control and three (3) test batches that injected CO_2 into the CarbonCure Mix Designs. Testing was performed as specified by Thomas and in accordance with ASTM methods contained in ASTM C 494. RCE reviewed the Laboratory report and confirmed that the concrete samples with the CO_2 injection performed similar to control samples according to ASTM C 39 (compressive strength), ASTM C78 (flexural strength), ASTM C157 (length change) and ASTM C6664 (durability factor).

3. Project activities must produce a concrete material that will be used and sold in the commercial market. All of the Thomas plants sell concrete in the commercial market for numerous applications including building foundations, roads, parking garages etc. During the site visit, RCE reviewed real-time monitoring of concrete trucks distributing concrete in the commercial market.

4. The use of recycled concrete is not eligible in either the baseline or project scenario. RCE confirmed that Thomas does not use any recycled concrete in any of the project CarbonCure

Mix Designs. During the site visit, RCE did not see any evidence that recycled concrete was being used at any of the plants. Site personnel also attested that recycled concrete is not used in any of the project CarbonCure Mix Designs.

5. The methodology is limited to the production of ready-mix concrete, as opposed to pre-cast molds. All plants included in the project are all ready-mix concrete production. None of the sites visited were producing pre-cast molds for commercial sale.

6. Project proponents must source their CO_2 only from sources where the CO_2 would have otherwise been emitted to the atmosphere. If a project proponent cannot show chain of custody for sourced CO_2 then emission reductions cannot be claimed from the injection and mineralization of CO_2 into concrete (emission reductions are still claimed for offsetting cement production). RCE received an email with an attestation from Thomas Concrete's CO_2 provider stating that the CO_2 is not pulled from the Jackson dome. CarbonCure provided additional evidence showing that sources of CO_2 came from an ammonia plant. The Project Proponent is only claiming emission reductions from the injection and mineralization of CO_2 in concrete where evidence exists that the CO_2 would have otherwise been emitted to the atmosphere. The total number of facilities that CO_2 was sourced from is 43. Out of the 43, facilities, 16 had evidence that the CO_2 would have been vented to the atmosphere. The verification team researched the 16 facilities that the project proponent confirmed the source of CO_2 and confirmed that the CO_2 would have been emitted to the atmosphere if not for the Project's intervention. For CO_2 where the source could not be justified, the Project proponent only claimed emission reductions from avoided Portland cement use.

For those facilities where the source of CO_2 was not identified, the project proponent did not claim the emission reductions for mineralization. In order to accurately calculate the baseline scenario 'be_co2_cap' is still used when CO_2 source is unknown. However, when the source of CO_2 is unknown, 'added_emissions_tonnes' uses 100% of the value 'q_co2_meter'. This value is then added to 'project_emissions'. The column in the spreadsheet titled 'emission_reductions' nets out the baseline and project emissions accordingly. This ultimately penalizing facilities where CO_2 source is unknown with the entire value of mineralized CO_2. These facilities do not claim the emission reductions for mineralization.

7. Project proponents must note if CO_2 is sourced from an emissions source that is regulated by a cap-and-trade program. RCE confirmed that the CO_2 source providers are located in states that do not have a regulated cap-and-trade program.

The only tool referenced in VM0042 is the CDM tool to calculate the emission factor for an electricity system and is optional to use. CarbonCure elected to use the eGRID emission factor for each sub-region where facilities are located instead of calculating an emission factor. No other tools or modules are listed in the methodology. RCE confirmed that the Project Proponent is using the correct methodology and tools to account for all GHG SSRs within the Project boundary.

3.4.3 Project Boundary

RCE travelled to five concrete plants included in the project to validate the physical boundaries and inclusion of SSRs. CarbonCure's accounting software lists when the newest version of their CO_2-injection technology was installed. This evidence corresponds with the

project start date and the start date of each instance added to the grouped project. The physical boundaries include the ready-mix concrete site and CarbonCure's equipment near the ready-mix concrete loading platform. The monitoring equipment includes the scale used to weigh each out-going concrete truck and a meter measuring the injection of CO_2 into each batch of concrete produced. CarbonCure estimates electricity consumption of the CO_2 injection equipment.

RCE reviewed the methodology and CarbonCure provided a list of SSRs included in the GHG project boundary:

Sources:

- Captured CO_2
- CO_2 from cement production
- CO_2 from electricity consumption (for the use of CarbonCure's equipment to inject CO_2)
- CO_2 from capturing, compressing and transporting CO_2.

Sinks:

- Mineralization of CO_2 when injected to ready-mix concrete production.

Reservoirs: Not applicable according to the methodology.

RCE review the Project Description, Monitoring report, calculations spreadsheet and performed a site visit to a sample of project concrete plants to confirm inclusion of all SSRs.

The Lead Verifier viewed these systems, interviewed site personnel, and confirmed that the PD lists all relevant SSRs. The selected SSRs correspond with those identified in the applied methodology. RCE confirmed that all relevant SSRs were selected in included in the Project boundary and are described in the PD.

3.4.4 Baseline Scenario

VM0043 specifies the baseline scenario as the continuation of manufacturing concrete through traditional processes (not through the use of CO_2 capture and utilization technology). Additional Portland cement would be required at project facilities and CO_2 from industrial sources would be vented to the atmosphere if not for CarbonCure's technology operating at the initial 43 project ready-mix concrete plants. RCE interviewed plant personnel who confirmed that prior to CarbonCure's technology being installed, concrete mix-designs used additional cement than what is required in the project. RCE reviewed historical/current mix-designs that do not use CO_2 injection at project concrete plants and these require more Portland cement than the equivalent project concrete mix-designs. The project CarbonCure Mix Designs are not the continuation of manufacturing concrete through traditional processes. RCE reviewed the provided data and confirmed it is relevant and correctly described in the PD.

RCE researched injection of CO_2 into ready-mix concrete and could not find any relevant national and/or sectoral polices that would mandate the project activity. CO_2 is not a regulated pollutant in the initial project instance geographic area. The facilities are located

in states that do not have a cap-and-trade GHG regulatory system in place. The methodology specifies (via research from the methodology assessment period) that upgrading waste CO_2 to sufficient quality as to be used in industrial applications is not common practice where the initial project instances are located.

CarbonCure correctly identified the baseline scenario and the scenario reasonably represents what would have occurred in the absence of the project. The identified baseline scenario is justified and is an accurate and reasonable assessment of pre-project conditions. The project description describes how the baseline scenario is relevant through documentary evidence provided as attachments and considers relevant sectoral policies and circumstances when proving that the project activity is additional. RCE confirmed that the identification of the baseline scenario is justified appropriately, supported by evidence and can be deemed reasonable.

3.4.5 Additionality

There is no performance benchmark listed in VM0043. This Protocol uses an activity method for the demonstration of additionality and involves two steps: regulatory surplus and a positive list. There is currently no law or regulation requiring CO_2 injection into mix-design at concrete plants located in the project geographic region. The Project Proponent monitors applicable policies that include language around carbon utilization in concrete. RCE also found no evidence that the project activity was legally required in any of the states where the project activity is located.

The Protocol states that the applicability conditions (listed above in Section 3.4.2 Applicability) represent the positive list for this Project. As the Project has met all applicability conditions of the Protocol, it has also met the conditions of the positive list.

Based on the evidence provided, RCE agrees that the additionality of the project is justified according to the selected methodology.

3.4.6 Quantification of GHG Emission Reductions and Removals

RCE recalculated the emissions using equation 1, 2 and 5(a) of VM0043 and compared results to all tickets reported for this reporting period to confirm baseline emissions. RCE followed step 3 of Appendix IV of the PD to re-calculate emissions from the production of Portland cement (baseline) that would have been used in the absence of the project activity. This step is necessary to calculate the quantity of cement used in the baseline.

The proponent first identified whether a mix design test was available for each ticket (see section 3.4.7 Methodology Deviations). If the test was available then the ratio between amount of cement that would have been used in the baseline mix family and the actual amount of cement used in the project mix family is used. If the test is unavailable, CarbonCure estimated the cement cuts as the weighted average of all available tests minus 1 standard deviation (which is conservative).

The next step depended on whether the tests were available for a particular mix family. CarbonCure followed two different steps:

1. Historical design cement (when mix design test is available) = the ratio mentioned above multiplied by the quantity of cement injected to the mix (measured value). The result is the quantity of cement that would have been used in the baseline.

2. Estimated historical cement = the estimated quantity of cement that would have been needed to be injected into the mix (measured value) divided by 1 minus the cement cut (determined as the weighted average of all available family mix design tests minus 1 standard deviation as stated in the Project Description deviation).

Equation 2 uses the above results multiplied by the Emission factor of cement from "Option 2. Environmental Product Declarations (EPDs)". RCE used EPDs that CarbonCure provided during validation. A total of the 3 EPDs were provided, varying depending on the kind of cement used in each plant. The values used are 1,040 kg CO_{2e}/ ton of cement for Type III Industry average cement, 922 kg CO_{2e}/ ton of cement Type III Industry average cement and 889 kg CO_{2e}/ ton of cement for Portland Type I/II. CarbonCure applied a percent discount from VM0043 because plant-specific data was not available.

CarbonCure uses "Option 2: Default Efficiency of Mineralization" to determine CO_2 captured and mineralized in the concrete. RCE confirmed that this default factor is appropriate because it is listed in the methodology and recalculated the emissions using the quantity of CO_2 measured for each ticket multiplied by the 60% mineralization rate.

RCE recalculated project emissions using equations 6, 7, 8, 11a and 12 from VM0043 and compared them to each ticket generated for the monitoring period. RCE applied equation 7, multiplying the quantity of cement (measured) injected into the ready-mix concrete by the appropriate emission factor of Portland cement to calculate the project emissions from the amount of cement used at the project facility.

RCE calculated project emissions from electricity use at the project facility using equation 8. Electricity usage is multiplied by the appropriate emission factor from each eGRID sub-region where the plants are located (emission factor coming from eGRID, varying depending on the year of which the ticket was generated). CarbonCure estimated electricity usage of project equipment according to section 3.6 of the Project Description and included this as a deviation (see section 3.4.7 Methodology Deviations).

RCE calculated project emissions from the capture, compression and transport of CO_2 to the location where it will be sequestered in concrete using Option 2 and equation 11a from VM0043. RCE recalculated these Project emissions by multiplying the quantity of CO_2 injected into concrete measured for each ticket by the VM0043 default rate of 200 kWh/tonne and by the appropriate eGRID emission factor for the sub-region where the processing plant is located.

RCE used equation 12 to calculate the emissions for the transport with the slight alteration of CO_2 injected to the concrete ready-mix for each ticket. CarbonCure listed this as a deviation as the methodology requires the quantity of CO_2 supplied to the facility be used in this calculation (see section 3.4.7 Methodology Deviations). CarbonCure calculated the miles between the capture to the depot and from the depot to the plant with a conservative approach, including more miles than the actual distance between the facilities. The milage

was multiplied by the emission factor (provided in table 3 of the methodology) for truck transportation (the only transportation type used in the Project).

RCE re-calculated total emission reductions with the above results using equation 6 in VM0043. Leakage emissions are not applicable for this project type according to the methodology. The below table summarizes RCE's re-calculation (values in the table may not add up exactly due to rounding errors):

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)
2019	43,297	41,140	NA	2,157
2020	93,337	88,723	NA	4,614
2021	157,646	149,834	NA	7,811
Total	294,279	279,697	NA	14,581

RCE identified only one uncertainty regarding the electricity emission factors. However, project emissions from electricity usage are extremely small and the risk of a material misstatement is extremely low. RCE used the below source data including all ready-mix concrete tickets that CarbonCure provided including:

- Quantity of CO_2 (measured)
- Quantity of cement (measured)
- Day of the batch production
- Mix design
- Plant ID
- CO_2 supplier ID

For the emission factors RCE used as a reference EPA data, for electricity, reports eGrid2019 and eGrid2020 and for transportation Emission Factors for Greenhouse Gas Inventories (version March 2018, March 2020 and April 2021)

CarbonCure proposed deviations for measurement of how much cement would be added to baseline mix-designs. See the deviations below for a detailed explanation of this process. RCE confirmed that the estimated cement cuts for baseline mix designs followed the proposed methodology deviation.

RCE concludes that CarbonCure has correctly applied the methodology to calculate baseline emissions and project emissions (VM0043 does not include leakage emissions). CarbonCure included all relevant assumptions and data in the PD including references and sources. RCE confirms that these data or reasonable in the context of the project and that it is possible to re-plicate the estimate of baseline emissions based on the information provided in the PD.

RCE's final re-calculation of net GHG emission reductions and removals during the project monitoring period are within the materiality threshold of CarbonCure's assertion. All relevant assumptions and data are listed in the PD (including references and sources where necessary); these data are reasonable in the context of the project and RCE replicated the baseline and project emissions using these data and parameters. RCE also confirmed that all relevant equations were listed in section 4.1 in the Project Description.

3.4.7 Methodology Deviations

There are six methodology deviations listed in the PD; the first deviation is to estimate project equipment electricity usage, the second relates to use of CarbonCure Mix Designs defined in Appendix II of the Project Description, the third involves calculating project emissions from CO_2 injected into project concrete mixes rather than the same calculation performed on all CO_2 received at each concrete facility, the fourth relates to using a conservative approach to estimate reduction in Portland cement for mix-design families that do not have a compressive strength test for baseline and project concrete, the fifth involves limiting required testing and calculation procedures to CarbonCure Mix Designs, and the sixth deviation is the addition of CO_2 to project emissions where the CO_2 source of plants has not yet been identified.

Deviation 1 - It is not possible for a separate electricity meter to measure the consumption of CarbonCure's equipment at each concrete plant. CarbonCure estimated electricity usage based on equipment loads and applied a conservative factor to account for project emissions. Project emissions from electricity consumption of the equipment make up a small fraction (<0.01%) of overall project emissions and CarbonCure's estimation approach is reasonable. This deviation does not negatively impact the conservativeness of the GHG calculations because the proponent used the highest measured electricity usage rate and applied this value to all project equipment.

Deviation 2 - CarbonCure deviated from the methodology defined mix designs. Concrete producers create several mix designs daily all with the same or similar compressive strength performance. The current project involves thousands of mix designs and CarbonCure has aggregated these mix designs into newly defined CarbonCure Mix Designs based on various industry standard criteria and application. These are outlined in Appendix III of the Project Description. Aggregating similar mix designs does not negatively impact the conservativeness of the GHG calculation because the project proponent calculated the average cement cut and applied a one standard deviation deduction (see deviation 4 and 5).

Deviation 3 - CarbonCure made a slight adjustment to the calculation of the emissions associated with the processing of CO_2. For project emissions from processing and transporting of CO_2, the injected CO_2 into concrete is used, rather than the value of total CO_2 transported to a facility, as the emission reduction calculation is done on a Ticket level based on each truck load of concrete poured rather than as the total value transported to a facility.

This deviation does not negatively impact the conservativeness of the GHG calculation. RCE reviewed all shipments of CO_2 for a PAI and confirmed that all of the CO_2 delivered to the facility was injected into the concrete mix. RCE confirmed that it is a valid assumption that all CO_2 delivered to a facility is eventually injected into the concrete mix and that CO_2 is not used for other purposes on-site.

In the initial risk assessment, project emissions from CO_2 processed and transported made up a total of 0.04% of emission reductions. This is an astronomically low value for an SSR and as such, was assigned a very low risk. It is unlikely that this SSR can have a bearing on the overall emission reductions.

RCE believes that reviewing a single facility is sufficient due to the low risk of material misstatement from this SSR. The source data from this facility matched the Project Developer's data exactly. Based on these two items (1. The SSR has an almost non-existent chance of affecting the GHG assertion and 2., the data we did sample matched the project proponent's data exactly), RCE determined that this risk had been properly addressed.

There are also other qualitative reasons for assigning this source a low risk. The CO2 shipped is very expensive. It is unlikely that a facility would subsequently purchase CO2 and then vent that CO2 to the atmosphere instead of using it in the project activity. Also, there are no large CO_2 tanks at the concrete facilities. CarbonCure's equipment has a tiny footprint and cannot hold excessive amounts of CO2.

RCE agrees that this deviation is appropriate as it was not possible to collect the amount of CO_2 shipped to the facility. However, the total amount of injected CO2 is a measured quantity that is recorded in CarbonCure's database. Based on the proof provided by the project proponent that total CO_2 tonnes delivered to a facility is equal to the metered CO_2 injected into concrete for that same time period. The value of total tonnes delivered to a facility is instead replaced with the CO_2 injected into concrete Column R 'q_co2_meter' in the ER spreadsheet. This is identified and approved as a deviation from the methodology by RCE.

The project proponent provided RCE with attestations from the CO_2 suppliers for all the facilities in this project activity containing relevant source, depot and facility addresses to determine the total miles travelled to make the delivery of CO_2 as well as the mode of transport. The calculation for $PE_{CO2transport}$ (as described in Section 4.2 in the PD) uses the value of injected CO_2 and multiplies this accordingly with the values for the mode and distances travelled of CO_2. The attestations from the CO_2 suppliers proved that all CO_2 supplied to all facilities would not have otherwise been sequestered.

RCE believes that the sampling approach is appropriate. Primarily as the sample is one of several approaches the project proponent used to justify their deviation.

- An attestation from the corporation was provided that proves that all facilities included in the project activity are using CO_2 exclusively with CarbonCure mixes

- There are no reported leakages of any kind for the delivery of CO_2 and its storage onsite at the facilities, unless an explosion happened on site no leakages would be possible: note that if such an incident occurred CarbonCure would be notified as this would impact the facilities entire operation

- The sample used to corroborate that total CO_2 delivered to one facility matched 100% with total volume of CO_2 injected for the same time period, as a result it can be applied to all other facilities as there are no differences in the variables between facilities i.e. all facilities have the same CO_2 tank and the same CO_2 injection equipment

- In addition to the above, RCE is aware that the average cost of a ton of CO_2 in the USA comes out to $650/ton, there is no reason that a concrete producer would vent the CO_2 if they were not actively using it for CarbonCure mixes

- The CO_2 tanks installed at concrete producer facilities have no mechanism that would allow a producer to vent CO_2 without using the CarbonCure injection equipment

- Project proponents use the quantity of CO_2 injected when calculating $PE_{CO2processing}$, as it is deemed a relevant value to calculate project emissions associate with CO_2

- Moreover, as the project proponent is using Option 2 for Captured CO_2 (BECO2CAP) that includes a 60% conservative default of mineralization, RCE is confident that the conservative default captures any potential errors that could occur as a result of this deviation

The project proponent provided RCE with attestations from the CO_2 suppliers for all CO_2 supplied to all facilities in the project activity. These attestations noted the CO_2 supply source address, CO_2 depot address and the addresses of the project activity facilities. This attestation also included mode of transport used to transport the CO_2 to and through all addresses.

Deviation 4 - Concrete producers can have thousands of different mix designs which are similar in performance. It is not feasible to perform all required tests for comparing individual baseline and project mix designs to determine plant level cement cut. CarbonCure has proposed an estimated cement cut average with a 1 standard deviation deduction (to be conservative) to the average cement cut of 3 mix-design families that performed the required testing. This average value minus 1 standard deviation is applied to all mix designs that did not measure baseline and project compressive strength / cement cut. Furthermore, as CarbonCure Technologies monitors cement weights per truck load of concrete that is poured for a given corporation, irregular variances in the weight of cement will be noted and amended accordingly in the instance that they diverge from the plant level cement cut average that was applied. RCE confirmed that this deviation does not negatively impact the conservativeness of the GHG calculations because a one standard deviation discount was applied to any mix-designs where the cement cut was unknown.

Deviation 5 - Related to the previous deviation, CarbonCure is applying a deviation of the requirement for compressive strength tests. CarbonCure will conduct the testing at the producer or in a lab (in accordance with the testing procedure listed in Appendix II of VM0043) for baseline and project CarbonCure Mix Designs that comprise 50% or more of the production volume, ensuring a robust, accurate and conservative approach that is also practically feasible. RCE confirmed that this deviation does not negatively impact the conservativeness of the GHG calculations because a one standard deviation discount was applied to any mix-designs where the cement cut was unknown.

Deviation 6 – CarbonCure will add CO_2 measured that is injected into concrete to the project emissions when the CO_2 source of plants has not yet been identified, the same as it would if

the CO_2 source were a geological well. The term included will be called added_emissions_tonnes.

RCE validated all methodology deviations identified in the PD and confirmed they were appropriately applied in the emission reduction calculations. RCE reproduced the electricity factor and applied it to the appropriate parameters when performing recalculations. The verification team also sampled sources of CO_2 from industrial applications. Where sources of waste CO_2 could not be confirmed, the CO_2 was considered to be released and no emission reductions from CO_2 mineralization were claimed.

All deviations are permitted because they relate to monitoring and measurement and they do not negatively impact the conservativeness of the quantification of GHG emission reductions or removals. RCE's overall conclusion is that all listed methodology deviations applied to the project are valid.

3.4.8 Monitoring Plan

RCE confirmed the suitability of the implemented monitoring system by reviewing data collected as inputs into all methodology equations. Due to the nature of this project type, there are very few pieces of equipment that directly measure inputs into the calculations. Monitored parameters are obtained from concrete plant scales (for total weight of concrete batches) and CarbonCure's meter for measuring CO_2 injected into each concrete batch. RCE reviewed a sample of calibrations for scales and the CO_2 flow meters to confirm that the equipment is appropriately maintained and measuring data accurately. RCE reviewed this information and found the implemented monitoring system to be suitable and concluded that data monitored is robust and accurate for the purposes of calculating emission reductions.

RCE concludes the monitoring plan adheres to all requirements of the Methodology. The tables below contain the data and parameters that are monitored and/or measured during the project crediting period and reporting period. RCE reviewed section 5.1 and 5.2 of the project description and confirmed that ex-ante values were included.

DATA AND PARAMETERS AVAILABLE AT VALIDATION

Data/Parameter	EF_{cement}
Data Unit	tCO_2e/t of cement
Description	Emission factor for the production of Portland cement
Source of Data	Project proponent and/or cement production facilities
Value applied:	889 kgCO2e/t of cement, 901 kgCO2e/t of cement, 922 kgCO2e/t of cement or 1,040 kgCO2e/t but this may vary as more plants are added to the project. The plants in the initial project will be using a combination of the industry average for the emission factor of cement that is 1,040 kg of CO2 equivalent per tonne of cement for any time before 2021-03-12 or 922 kg of CO2 equivalent per tonne of cement for any time period where credits are generated after this date. Similarly, for the plants in the initial project, the value for type I/II cement from Holcim - Holly Hill, which has a GHG intensity of 889 kg of CO2 equivalent per tonne of

	cement is also used or the value for type III which has a GHG intensity of 902 kg of CO2 equivalent per tonne of cement. The EPD and Industry Average documentation will be made available to the VVB upon project validation. Similarly, for the plants in the initial project, the value for industry averages may change based on the year of credit generation.
Justification of choice of data or description of measurement methods and procedures applied	Option 2 is being used because Option 1 – Plant Specific Data – is not practical in this case, since producers will source cement from many different plants and in varying quantities from year to year.
Purpose of Data	Calculation of baseline and project emissions, because the use of cement occurs in both the baseline and project scenarios.
Comments	N/A

Data/Parameter	$EF_{CO2,i}$
Data Unit	Tonne of CO_2 per tonne-mile
Description	Emission factor for mode of transport.
Source of Data	See table in Section 8 from EPA Center for Corporate Climate Leadership
Value applied:	0.00023 - until March 2020 0.000223 – March 2020 – April 2021 0.000233 – April 2021 onwards (Assumed mode will be truck, values may vary based on year)
Justification of choice of data or description of measurement methods and procedures applied	This is an accurate and simplified default for considering the emission factors of different modes of transport.
Purpose of Data	Calculation of project emissions.
Comments	N/A

Data/Parameter	Default factor for amount of energy required to capture, treat and compress a tonne of CO_2
Data Unit	kWh/tonne
Description	Default factor for amount of energy required to capture, treat and compress a tonne of CO_2
Source of Data	See Appendix V of VM0043
Value applied:	200 kWh/tonne of CO_2 processed
Justification of choice of data or description of measurement	See Appendix V of VM0043

methods and procedures applied	
Purpose of Data	To provide an option for determining project emissions from capturing CO_2 if that information is not available from the CO_2 supplier.
Comments	N/A

Data/Parameter	Default efficiency of mineralization Ratio
Data Unit	Ratio
Description	Amount of CO_2 injected into the process that gets mineralized into the concrete.
Source of Data	See Appendix VI of VM0043
Value applied:	0.60
Justification of choice of data or description of measurement methods and procedures applied	In some cases, one concrete manufacturer may be producing too many CarbonCure Mix Designs for the testing to be feasible or practical. In this case, project proponents must use a default based on the percentage of CO_2 injected into the process (as determined by a meter) and actually mineralized.
Purpose of Data	This parameter indicates the efficiency of mineralization.
Comments	There have been tests done on this efficiency as outlined in Appendix V of VM0043. These tests show quite a range of results in terms of the efficiency of the uptake of CO_2 into the concrete, and there appears to be little correlation between the efficiency of mineralization and the percent dosing of CO_2. However, the lowest test result is at 76%, meaning that three-quarters of the CO_2 that is injected into the process actually gets mineralized into the concrete. At a conservative default, the assumed efficiency of mineralization will be set at 60%.

DATA AND PARAMETERS MONITORED

Data/Parameter	$Q_{cement,i,p,y}$
Data Unit	Tonne
Description	Quantity of Portland cement used in the project for concrete produced using a project CarbonCure Mix Designs i in year y.
Source of Data	CarbonCure and Individual Concrete Producer
Description of measurement methods and procedures to be applied	Use standard weighing procedures to determine mass of cement used to produce concrete over the course of year Y.
Frequency of monitoring/recording	Measured continuously

Value applied:	Varies according to CarbonCure Mix Designs
Monitoring equipment	Scales
QA/QC procedures to be applied	Any equipment, such as scales, should be calibrated according to the manufacturer's specifications, with calibration certificates available for verification.
Purpose of Data	Calculation of baseline and project emissions.
Calculation method	N/A
Comments	N/A

Data/Parameter	$Q_{Cement,b,i,test\ n}$
Data Unit	Tonne
Description	Quantity of Portland cement used to prepare baseline compressive strength test specimen n for concrete produced using a CarbonCure Mix Designs that results in a concrete of equivalent compressive strength to project CarbonCure Mix Designs i.
Source of Data	CarbonCure and Individual Concrete Producer
Description of measurement methods and procedures to be applied	See Appendix II of VM0043
Frequency of monitoring/recording	Once per project crediting period for each CarbonCure Mix Designs. Any new CarbonCure Mix Designs added during the project crediting period will also be tested.
Value applied:	Varies
Monitoring equipment	Scales
QA/QC procedures to be applied	See Appendix II of VM0043
Purpose of Data	Calculation of baseline emissions by comparing the amount of cement in the project activity concrete and the amount of cement that would be required in the baseline concrete.
Calculation method	N/A
Comments	N/A

Data/Parameter	$Q_{Cement,p,i,test\ n}$
Data Unit	Tonne
Description	Quantity of Portland cement used to prepare project compressive strength test specimen n for concrete produced using project CarbonCure Mix Designs i
Source of Data	CarbonCure and Individual Concrete Producer

Description of measurement methods and procedures to be applied	See Appendix II of VM0043
Frequency of monitoring/recording	Once per project crediting period for each CarbonCure Mix Designs. Any new CarbonCure Mix Designs added during the project crediting period will also be tested.
Value applied:	Varies
Monitoring equipment	Scales
QA/QC procedures to be applied	See Appendix II of VM0043
Purpose of Data	Calculation of baseline emissions by comparing the amount of cement in the project activity concrete and the amount of cement that would be required in the baseline concrete.
Calculation method	N/A
Comments	N/A

Data/Parameter	$Q_{CO2,meter,y}$
Data Unit	Tonne
Description	Amount of CO_2 injected in year y to produce concrete, as determined by a flow meter.
Source of Data	CarbonCure
Description of measurement methods and procedures to be applied	The use of calibrated flow meters. Calibration must be conducted according to the equipment manufacturer's specifications. The amount of CO_2 must be metered before entering the production process and must be subject to standard calibration and QA/QC procedures for the measurement of critical data variables.
Frequency of monitoring/recording	Data must be monitored continuously and recorded on at least a daily basis.
Value applied:	Varies
Monitoring equipment	Flow meter
QA/QC procedures to be applied	Calibration of meters must be conducted according to the equipment manufacturer's specifications.
Purpose of Data	Calculation of baseline emissions when measuring how much CO_2 was injected into the concrete and for project emissions when determining emissions from processing.
Calculation method	N/A
Comments	Project proponents may use a mass-flow meter to measure mass of CO_2. The meter is embedded into the CarbonCure equipment.

Data/Parameter	$Q_{Concrete,i,p,y}$
Data Unit	Tonne
Description	Quantity of concrete produced by the project for project CarbonCure Mix Designs i in year y.
Source of Data	CarbonCure and Individual Concrete Producer
Description of measurement methods and procedures to be applied	Standard procedures to weigh concrete product, standard industry practice for all concrete suppliers.
Frequency of monitoring/recording	Continuous
Value applied:	Varies
Monitoring equipment	Scales
QA/QC procedures to be applied	Standard procedures to ensure accuracy of weighing methods, including manufacturer-recommended calibrations for measuring devices, which would be standard industry practice for all concrete suppliers. Project proponents will keep clear records of all concrete produced and used at construction sites, which can be presented to the validation/verification body.
Purpose of Data	Calculation of baseline emissions
Calculation method	N/A
Comments	CarbonCure will list for each producer the number of design mixes that will be considered for emission reduction calculations and the approximate percentage those design mixes comprise of the entire facility's production. This information will be provided to the VVB.

Data/Parameter	$Q_{elec,y}$
Data Unit	MWh
Description	Quantity of incremental, additional electricity from the grid in year y used to power the equipment needed to operate the project activity in year y (MWH)
Source of Data	CarbonCure and Individual Concrete Producer
Description of measurement methods and procedures to be applied	See Section 3.6
Frequency of monitoring/recording	See Section 3.6
Value applied:	Varies
Monitoring equipment	Electricity meter (see section 3.4.7 methodology deviations)

QA/QC procedures to be applied	N/A as defaults will be used as described in Section 3.6.
Purpose of Data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data/Parameter	EF_{elec}
Data Unit	tCO_2e/MWH
Description	Emission intensity of electricity used to transport CO_2 and at the project facility.
Source of Data	US EPA eGrid
Description of measurement methods and procedures to be applied	eGrid emissions factor published by the US Environmental Protection Agency for the US sub-region where the facility is located (latest available information) may be used. This will be used for determining the emissions intensity of the 200 kWh/ton default. Note that these may vary depending on the year of credit generation.
Frequency of monitoring/recording	Annual
Value applied:	Latest available information
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of Data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data/Parameter	Miles transported in year y by mode i
Data Unit	Miles
Description	Miles of shipped CO_2 to the project site by mode i.
Source of Data	CO_2 supplier, transporter and CarbonCure
Description of measurement methods and procedures to be applied	The company supplying or transporting the CO_2 should provide data to project proponents about the total number of tonnes delivered and total miles driven to the final destination. If the exact location of where each canister/tank of CO_2 was filled cannot be precisely determined by the CO_2 supplier, a reasonable and conservative estimate will be provided based on ALL locations where the particular CO_2 supplier is obtaining its gas. Suppliers may obtain CO_2 from multiple sources, and this may be difficult to track. However, if the

	supplier knew that the furthest location away was X miles, and that is the maximum, that number could be used for all CO_2 because it would be the most conservative.
Frequency of monitoring/recording	Annual
Value applied:	Varies
Monitoring equipment	Google maps or odometers
QA/QC procedures to be applied	Records from CO_2 supplier or transporter should be available at project verification.
Purpose of Data	Calculation of project emissions.
Calculation method	N/A
Comments	N/A

Data/Parameter	$Q_{CO2,supplied,y,i}$
Data Unit	Tonne
Description	Amount of CO_2 procured from a source in year y and brought to the project activity site by mode i.
Source of Data	Purchase and sales records from the project proponent (which may come from the concrete producer) or from CO_2 supplier (see Equation 12).
Description of measurement methods and procedures to be applied	Use of sales records/receipts received by project proponent (which may come from the concrete producer)
Frequency of monitoring/recording	Annual
Value applied:	Varies
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of Data	Determination of project emissions associated with transporting CO_2 to the project site.
Calculation method	N/A
Comments	Note that the variable $Q_{CO2,supplied,y,i}$ is distinct from $Q_{CO2,meter,y}$. The CO_2 supplied to the site is necessary to determine the emissions associated with transporting the gas, and it is possible that CO_2 is brought by multiple transportation modes. This parameter measures that by determining the amount of CO_2 supplied by each mode i. Project proponents should keep accurate records of all CO_2 supplied by different transportation modes. It is logical to assume that all CO_2 from the supplier(s) will equal $Q_{CO2,meter,y}$. However, that cannot necessarily be guaranteed. If some CO_2 supplied is not actually injected, then this

	parameter is conservative because summing $Q_{CO2,supplied,y,i}$ for each mode will always be equal to or greater than $Q_{CO2,meter,y}$. So if anything, this parameter will over count project emissions. Project proponents must demonstrate that the captured CO_2 is coming from a waste source where the gas would – in the absence of the project activity – be emitted. The project proponent should obtain an attestation from the supplier of the CO_2 or provide other evidence that the captured CO_2 would have otherwise been emitted. This parameter is modified by CarbonCure as part of their deviations, using CO_2 injected to the process and measured by a telemetry system instead of CO_2 supplied to the facility. The CO_2 supplied to the facility is here assumed to equal the total amount of CO_2 injected into concrete.

3.5 Non-Permanence Risk Analysis

- The section is not applicable for this Project type.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The Project's start date is 6 November 2018, and the crediting period is seven years from 6 November 2018 to 5 November 2025. RCE is verifying the monitoring period of 1 January 2019 to 31 December 2021 which is within the crediting period. There were no material discrepancies between project implementation and the project description during this monitoring period.

CarbonCure implemented the monitoring plan described in the PD during the monitoring period. The Project Proponent obtained, recorded and compiled all required monitored data and parameters according to the schedule described in the monitoring plan. There was no data gaps or missing data during the monitoring period. There were no material discrepancies between the monitoring system and the monitoring plan described in the PD or between VM0043.

The Project has not participated in nor been rejected by any other GHG programs. The Project is not included in an emissions trading program or any other mechanism that includes GHG allowance trading. RCE found no evidence that the Project has received or sought any other form of environmental credit, and it has not become eligible to do so within the time frame of the monitoring period.

RCE reviewed the Project's sustainable development contributions (SDG) and confirmed contributions to SDG 9– 'Build resilient infrastructure, promote inclusive and sustainable

industrialization and foster innovation' and SDG 13 – 'Take urgent action to combat climate change and its impacts'.

For this monitoring period, CO_2 was injected and mineralized in the ready-mix concrete production at 43 concrete plants in Georgia, South Carolina & North Carolina. The Project relies on data recovered from every batch (ticket) of ready-mix concrete produced and accumulated in CarbonCure's data management system.

Project data for this monitoring period includes injected CO_2, cement and CO_2 transportation distances. RCE observed no discrepancies between the monitoring system operations and Project Description or the Monitoring Plan except as described in the methodology deviations.

RCE verified that the Project has been implemented as described in the Project Description and confirmed that the Project meets the requirements of the VCS Standard.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

The Project Proponent calculates the Project's emission reductions in accordance with the equations described in VM0043 and the Project Description. RCE sampled the Project's raw data (automatically measured electronically at each concrete facility and stored in a database) collected from all tickets for the dates included in the monitoring period to ensure the accuracy of reported data and to ensure that there were no material errors in the calculations. After the Project Proponent revised the emission reduction calculations based on corrective action request made during the validation and verification, RCE found only minor discrepancies related to rounding and these discrepancies did not materially impact the final emission reduction totals.

RCE reviewed CarbonCure's GHG assertion spreadsheet to ensure the accuracy of the formulas, emission factors applied, and functionality of the spreadsheet. CarbonCure applied the correct default values from the Project Description to the equations in the assertion spreadsheet and RCE confirmed there were no transcription or transposition errors by manually re-calculating the total emission reductions and comparing these values to CarbonCure's assertion and monitoring report. There is a low risk of manual transposition errors as all project data is automatically recorded by a data acquisition and handling system at each of the concrete plants. RCE found the GHG emission reduction calculations to be in conformance with VM0043, the Project Description, and free of material misstatement. The table below lists a description for how each data and parameter used to calculate the GHG emission reductions was reviewed.

Data and Parameter	Accuracy GHG emission reductions and removals, including accuracy of spreadsheet formulae, conversions and aggregations, and consistent use of the data and parameters	Methods and formulae set out in the project description for calculation baseline emissions, project emissions and leakage have been followed	The appropriateness of any default values used in the monitoring report

EF_{cement}	RCE reviewed the use of Option 2 and confirmed that the project proponent used the correct industry average of this parameter to calculate baseline emissions using equation 2 from VM0043.	RCE confirmed the project proponent used the values listed in the PD and followed equation 2.	Confirmed that the correct default values (industry averages) was appropriate to the project.
$EF_{CO2,i}$	RCE reviewed values from EPA Center for Corporate Climate Leadership and confirmed use of these values to calculate project emissions using equation 10 from VM0043.	RCE confirmed the project proponent used the values listed in the PD and followed equation 10.	Confirmed that the default values from EPA were appropriate for calculating transport emissions.
Default factor for amount of energy required to capture, treat and compress a tonne of CO_2	RCE reviewed the Option 2 in VM0043 and confirmed that the project proponent correctly applied this using equation 11a from the methodology.	RCE confirmed the project proponent used 200 kWh/tonne of CO_2 processed to calculate project emissions.	This value is directly from VM0043 and is therefore appropriate for the project.
Default efficiency of mineralization	RCE confirmed the value from Appendix VI of VM0043 was used to calculate baseline emissions.	RCE confirmed the project proponent used 0.60 as listed in VM0043	Confirmed that the correct default value is appropriate because it is listed in VM0043.
$Q_{cement,i,p,y}$	Confirmed appropriate conversion of measured data to VM0043 values to quantify baseline emissions using equation 7.	RCE sampled raw data from project facilities to confirm correct data was used in emission reduction calculations.	N/A; this is a measured value.
$q_{Cement,b,i,test\ n}$	Confirmed for a sample of mix-design families that this test procedure was carried out and met the specifications of VM0043.	RCE sampled a selection of tests for a set of mix-design families to confirm eligibility criteria.	N/A; this is a measured value.
$q_{Cement,p,i,test\ n}$	Confirmed for a sample of mix-design families that this test procedure was carried out and met the specifications of VM0043.	RCE sampled a selection of tests for a set of mix-design families to confirm eligibility criteria.	N/A; this is a measured value.
$Q_{CO2,meter,y}$	Confirmed appropriate conversion of measured data to VM0043 values to quantify baseline emissions using equation 5a and project emissions using equation 11a.	RCE sampled raw data from project facilities to confirm correct data was used in emission reduction calculations.	N/A; this is a measured value.
$Q_{Concrete,i,p,y}$	Confirmed appropriate conversion of measured data to VM0043 values to	RCE sampled raw data from project facilities to confirm	N/A; this is a measured value.

	quantify baseline emissions using equation 5.	correct data was used in emission reduction calculations.	
$Q_{elec,y}$	Confirmed that the default electricity usage for project equipment calculated by project proponent and subsequently used to calculate project emissions using equation 8.	RCE confirmed the project proponent calculate the correct MWh for each reporting year based on total injected CO_2.	Confirmed that the project proponent's value was appropriate for the project.
EF_{elec}	RCE reviewed values from EPA eGRID and confirmed use of these values to calculate project emissions using equation 8.	RCE confirmed the project proponent used correct eGRID values.	Confirmed that the default values were appropriate for calculating emissions from electricity use based on facility location.
Miles transported in year y by mode i	RCE reviewed a sample of how miles from CO_2 supplier facilities are calculated by the Project Proponent using a web application or odometer readings using equation 12.	RCE sampled raw data from project facilities to confirm that correct data was used in emission reduction calculations.	N/A; this is a measured value.
$Q_{CO2,supplied,t,i}$	Confirmed appropriate conversion of measured data and application using equation 12.	RCE sampled raw data from project facilities to confirm that correct data was used in emission reduction calculations.	N/A; this is a measured value.

Baseline emissions are calculated by determining emissions from the production of Portland cement that would have been used in the absence of the project and adding them to the emissions associated with the quantity of CO_2 mineralized into the concrete. RCE reviewed the baseline emission calculations for each ticket. The manufacturer's requirements for scale calibrations (total weight of a concrete batch) are based on the department of transportation office and materials testing for each state. The concrete scales are commercial scales and must be certified on a timely basis according to each region's standards. The manufacturer of the flow meter recommends calibrations annually. RCE sampled a subset of flow meter calibration reports and confirmed that CarbonCure followed manufacturer requirements for calibration frequency and that all calibrations were within tolerance.

Project emissions are calculated by determining the emissions from the production of Portland cement used in the ready-mix concrete process, emissions associated with the use of electricity by CO_2 injection equipment and emissions related to processing and transporting CO_2 to the ready-mix concrete plant. CarbonCure estimated electricity usage for the project CO_2 injection equipment and applied a deviation (see Section 3.4.7 Methodology Deviations).

The methodology specifies a default factor to estimate processing and transporting CO_2 to project concrete plants. While the project proponent facilitates the installation of CO_2 tanks at producer facilities, the producer and CO_2 supplier ultimately sign a partnership independent to the project proponent. Therefore, the project proponent does not receive any information on the total amount of CO_2 supplied at a producer facility.

The project proponent provided RCE proof through attestations that all the facilities use the CO_2 transported to their facilities only for injection into concrete. CarbonCure was able to acquire the purchase orders for all of the CO_2 suppliers to a single facility. This evidence established that the total amount of CO_2 supplied for the sample year matched exactly with total CO_2 injected at the facility. RCE determined that there is a low risk that CO2 transported is being vented to the atmosphere through some other means specifically because there is no other use for CO_2 at these facilities other than injection into concrete. Further, each concrete facility is paying for the CO_2 supplied and it would not be in their business interest to vent a commodity.

RCE concludes the Project GHG emission reductions and removals have been quantified correctly in accordance with VM0043, the Project Description, and the monitoring plan.

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

The Project Proponent provided adequate documentation for the emission reduction calculations as well as its information control systems and data management processes. RCE reviewed the Project's Monitoring Report, applicable measured data, and all emission reduction calculations. RCE confirmed that the monitoring report contained enough information for a reader to reproduce the emission reduction calculations.

As described in section 4.1, RCE performed recalculations of emission reductions from raw data, checked all functionality of the Project spreadsheets. RCE found the information provided to be transparently documented and in accordance with the Project Description and requirements of VM0043.

RCE interviewed CarbonCure staff members, and reviewed data collection processes and operational systems used to collect and report data. RCE found the systems employed result in adequate data collection and presentation with reliable controls. Quality assurance activities are present through data review techniques conducted by CarbonCure personnel. RCE confirmed the Project's management and staff to be highly qualified and competent and determined that the GHG management system is sufficient to generate accurate and reliable data.

RCE concludes the Project data used to determine the GHG reductions to be of sufficient quantity and appropriateness of quality in all instances.

5 VALIDATION AND VERIFICATIONCONCLUSION

The scope of the validation and verification included the Project activities carried out at multiple concrete production plants in Georgia, North Carolina and South Carolina that reduced GHG emissions compared to the baseline.

The goal of the project validation is to ensure that the project plan and GHG calculation methods are materially correct and meet the methodology requirements. The project meets the eligibility

requirements of the VCS program and VM0043, and the planned project could reasonably be expected to achieve the claimed emission reductions.

RCE confirms that the validation was performed in accordance with the VCS Program Guide, Version 4.2, and VCS Standard, Version 4.3 in addition to VM0043 Methodology for CO_2 Utilization in Concrete Production with no qualifications or limitations. The Project Activity will result in a reduction of GHG emissions through injecting waste CO_2, that would otherwise been emitted to the atmosphere, into concrete CarbonCure Mix Designs at several concrete plants. CarbonCure provided the verification team with data that is relevant, complete, consistent, accurate, transparent and conservative.

Upon completion of the crediting period validation process RCE concludes that all relevant VCS validation criteria have been satisfied and the Project Activity properly applies the criteria of VM0043. RCE concludes that the baseline is valid and that the emission reductions attributable to the Project Activity are additional to any emission reductions that would occur in the absence of the Project.

All CARs, ADRs, and CRs raised by RCE have been satisfactorily resolved by the Project Proponent. The ex-ante emission reductions from the Project Activity are estimated to be 366,400 tonnes of CO_2e over a 7-year crediting period from 6 November 2018 to 5 November 2025, resulting in an average of 52,343 tonnes of CO_2e annually throughout the crediting period. RCE considers it likely that the estimated quantity of emission reductions may be achieved by the Project Activity should the assumptions and operational conditions remain the same including expansion of the project activity subsequent to project validation.

The goal of the verification is to ensure that the GHG assertion is materially correct, that the data provided to RCE can be documented and if errors or omissions are detected, they be corrected by the Project Proponent. The data and information supporting the GHG assertion were historical in nature.

RCE conducted a risk-based analysis of the CO_2 Utilization in Concrete – Removals & Reductions – CarbonCure – U.S. Project #1 including a strategic review of the Project data, documentation, and emission reduction calculations. RCE concludes to a reasonable level of assurance that the GHG assertion is free of material misstatement. The emission reductions resulting from CO2 injection into concrete CarbonCure Mix Designs for the reporting period

1-January-2019 to 31 December 2021 can be considered in conformance with the following criteria:

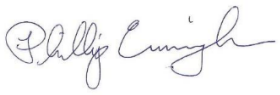
- VCS Standard version 4.3 (22 June 2022);
- VM0043 Methodology for CO_2 Utilization in Concrete Production;
- Validated VCS Project Description, 21 November 2022; and
- ISO 14064-3:2006 "Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions"

Verification period: From 1-January-2019 to 31-December-2021

Verified GHG emission reductions and removals in the above verification period (values in the table may not add up exactly due to rounding errors):

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)
2019	43,296	41,139	NA	2,157
2020	93,336	88,723	NA	4,613
2021	157,645	149,834	NA	7,811
Total	294,277	279,696	NA	14,581

Lead Validator/Verifier Signature



Phillip Cunningham

Environmental Scientist

Independent Reviewer Signature

Michael Coté

President

APPENDIX A: DOCUMENTS REVIEWED

1. Plant attestation emails regarding applicability conditions
2. Information regarding CO_2 sources to confirm applicability conditions
3. Fiscal Note Regulations on Concrete Injection
4. Electrical data for estimating project electricity usage
5. Holcim_Holly_Hill_EPD
6. Calibration Certificates for CarbonCure CO_2 injection technology:
   2018-0103-LC-60-August13-79-Calibration
   2022-0640-LC-60-June3-640-Single-Calibration
   2022-0579-LC-60-April5-579-Single-Calibration
   2020-0288-LC-60-September1-268-Calibration
   2020-0283-LC-60-August27-258-Calibration
   2020-0274-LC-60-August13-248-Single-Calibration
   2020-0272-LC-60-August10-246-Single-Calibration
   2020-0271-LC-60-August10-245-Single-Calibration
   2020-0239-LC-60-June4-213-Single-Calibration
   2018-0099-LC-60-July20-75-Calibration
7. Sample of CarbonCure Mix Designs and tickets confirming source data for emission reduction calculations
8. EPD Industry Averages 2021
9. Monitoring Plan Summary
10. Install dates of upgraded technology
11. Salesforce system screenshots:

Acworth.png

Alpharetta.png

Atlanta updated.png

Atlanta.png

Buckhead.png

Charleston.png

Conway.West.png

Cumming.png

CummingWest.png

Doraville.png

Fuquay-Varina.png

Gainesville.png

Greenville.png

Hiram.png

Knightdale.png

Lawrenceville.png

Lawrencville updated.png

Lithonia.png

Morrisville.png

Myrtle Beach.png

Savannagh.png

Savannah.East.png

Spartanburg.png

Suwanee.png

Tucker.png

West Street.png

12. Concrete contracts regarding the ownership of the environmental attributes
13. Redacted ownership agreements
14. Addresses of the CO_2 capture locations and depots
15. Cement scale calibrations for Concrete Plants:

Acworth.pdf

Athens.pdf

Doraville.pdf

Greer.pdf

Jasper.pdf

Powdersville.pdf

Savannah.pdf

Suwanee.pdf

Upstate.pdf

West Street.pdf

16. Project Description version 1 to 30.
17. Monitoring report version 1 to 27.
18. Cement cut calculation.
19. Emission reduction calculation spreadsheet.

APPENDIX B: RESOLUTION OF VALIDATION & VERIFICATION FINDINGS

Corrective Action Request (CAR), Non-Material Finding (NMF), Additional Documentation Request (ADR), or Clarification Request (CR) #	Finding and Date	Section of Protocol/ Methodology/ Program Document	Project Developer Response and Date	RCE response and Date	Additional Project Developer Response and Date	Additional RCE Response and Date	Open or Closed
CAR 1	The project start date does not match the evidence.	1.7 Project Start Date	**September 22, 2022:** This is the earliest date that the latest version of our technology was installed in the field, we upgraded our CO2 Injection System. Multiple pieces of evidence are provided to support the chosen project start date of November 2018. Please note that this is a slight change to the value noted in the Project Description, and it will be updated.	**September 23, 2022:** RCE reviewed the evidence provided and requested a sample of 24 plants installation dates.	**October 7, 2022:** CarbonCure provided requested documents.	**October 20, 2022:** RCE detected some anomalies in the evidence and requested a clarification. Refer to CR5.	closed
CAR 2	The Project Description does not comply with all the requirements in the template. Please update the following sections based on the template: 1.3 1.7 1.8 1.9 1.10 1.11 3.3 3.6 4.1 4.2 4.4 5.1 5.2 5.3	1.4 Project Documentation	**October 7, 2022:** On this date CarbonCure provided version 5 of the PD with updates to the sections mentioned in this CAR. From that date until November 21, 2022 RCE requested several changes to PD to comply with the Methodology, Standard and Template. The final version approved by RCE(version 30) was provided November 21, 2022.	**November 22, 2022:** RCE approved the last version of the Project Description.			closed
CAR 3	The Monitoring report does not comply with all the requirements in the template and Standard. Please update the following sections based on the template: Cover sheet 1.1 1.5 1.6 1.7 1.11 3.2 3.3 4.2 4.3 4.4 5	1.4 Project Documentation	**October 7, 2022:** On this date CarbonCure provided version 5 of the PD with updates to the sections mentioned in this CAR. From that date until November 21, 2022 RCE requested several changes to MR to comply with the Methodology, Standard and Template. The final version approved by RCE(version 27) was provided November 21, 2022.	**November 22, 2022:** RCE approved the last version of the Monitoring Report.			closed
CAR 4	CarbonCure's definition of a mix-design is not the same as RCE's understanding of what the Protocol requires.	Equation 3	**November 16, 2022:** The Protocol is ambiguous when defining the term "mix-design". CarbonCure proposes to instead use mix-design "families" in place of mix-designs. Mix-designs included in a family are similar enough in properties to allow for accurate accounting of emission reductions.	**November 16, 2022:** RCE approves this deviation and is issuing a forward action request (FAR 1); see below. RCE reviewed CarbonCure mix design definition and agrees with grouping different mix designs into families.			closed
CAR 5	The required data per mix design has not been provided. Please provided the data for each mix design including the quantity of portend cement used in each baseline and project mix design.	Equation 3	**November 16, 2022:** As concrete producers can have many different mix designs which are similar in performance, the number of tests required to compare individual baseline and project mix designs to determine the cement cut is not practically feasible. As a result, CarbonCure will: a) conduct the testing (in accordance with the testing procedure listed in Appendix II of VMD043) for baseline and project CarbonCure Mix Designs that comprise 50% or more of the production volume; b) for the CarbonCure Mix Designs that this testing was conducted for, use the results of the testing data to quantify the cement cut; c) for the CarbonCure Mix Designs that this testing was not conducted for, CarbonCure will use the average cement cut from (b) (that is, the CarbonCure Mix Designs that conducted the testing) and apply a 1 standard deviation deduction to ensure conservatism.	**November 16, 2022:** RCE approves this deviation because CarbonCure is using a conservative statistic approach of cement reduction and is issuing a forward action request (FAR 2); see below.			closed
NMF 1							
ADR 1	Please provide documentation for the amount of emission reductions being claimed during this monitoring period.	VMD043 Quantification of GHG Emission Reductions and Removals	**September 8, 2022:** A summary of the real value of emission reduction calculations has been measured "(b) Monitoring Plan Summary" under the tab "Real Values Summary Calcs".	September 9, 2022: Closed RCE received the documentation.			closed
ADR 2	Please provide a description of the "contract" shared to substantiate ownership of environmental attributes from the project activity.	VCS Standard Section 3.6 Ownership	**September 8, 2022:** The contracts included are amendments to older contracts or are plant additions to the framework agreement that is in the latest data packet. As a result, all the plants included in these documents are adding language around ownership of emissions reductions/removals to CCT for all of the concrete poured by [redacted] retrospectively from the June 24th date.	**October 19, 2022:** RCE requested more detail regarding contractual language.	**October 20, 2022:** •There is a Framework Agreement - this is an agreement that sets out the terms of the relationship between CCT and [Redacted]. This is where you'll find the definitions of Credits defined in full. This agreement includes the first 28 facilities that were signed between CCT and [Redacted] •There is a Batch Amendment Agreement - this agreement is for the same 28 facilities noted above, it recognizes the existence of the framework agreement and includes language that is included in the screenshot below that expresses that any and all credits generated prior to 2020 are still under CCT ownership. •There are multiple Implementation Forms - these are simply forms that add any facilities that occurred following June 2020 to the above two agreements	**October 19, 2022:** RCE confirmed this data as sufficient evidence for claiming ownership of all environmental benefits from the project activity.	closed
CR 1	Please clarify why the 'vf_transport_mode' emission factor is not consistent with this same emission factor listed in the PD.	VMD043 Section 8.2	**9/8/2022:** CarbonCure provided an updated spreadsheet and reference for the correct emission factors used in the calculations.	**9/8/2022:** Closed RCE received the documentation and confirmed appropriate values used.			Closed
CR 2	Please explain why the 'EF_cement' emission factor is not consistent with the same emission factor listed in the PD.	VMD043 Section 8.1	**9/8/2022:** CarbonCure included a column with the type of cement used and provided the EPDs. The emissions factors that are in use are for the year on which the "ticket" was generated and not just one emissions factor per zone per all the years reported.	**9/8/2022:** RCE confirmed 2 values with the EPDs but one value is not matching.	**11/3/2022:** Carbon explained that the value not matching was not included in the PD nor MR, but was included in the previously shared EPDs in a different section.		Closed
CR 3	Please clarify why the 'EF_cement' emission factor used in the calculations do match what is listed in the PD.	VMD043 Section 8.2	**9/8/2022:** CarbonCure explained that values differ because the source of cement is not always Holcim Holly. An industry average EPD was shared with RCE.	**9/8/2022:** The industry average EPD emission factor does not match with what is reported. Please provide an explanation.	**9/22/2022:** There are two EPDs used for the industry average, for different time periods. The 1.04 value is from the document dates 2021/03/12. The 0.922 value is from the document for the time period after 2021/03/12. A new EPD was provided to RCE.	**9/8/2022:** Closed CarbonCure provided a new industry average EPD and this new value matches the calculations.	Closed
CR 4	Please clarify the term "Added_emissions_tonnes" listed in the calculation spreadsheet.	VMD043 Section 8.2	**9/8/2022:** CarbonCure explained that this value was added to deal with those plants where we do not know the CO2 source. In these instances, we consider all of the CO2 we are injecting to be emissions added to the process.	**9/8/2022:** RCE agrees with the conservativeness of the concept. Please update the PD to include any deviations.	**10/07/2022:** CarbonCure provided an updated PD.	**10/07/2022:** Closed The updated PD includes the added emissions as a methodology deviation.	Closed
CR 5	Please explain why the installation date is 2007 for some evidence shared in data packet 5.	1.7 Project Start Date	**10/20/2022:** CarbonCure explained that there was a slight error in our Canadian v. USA date format in some of those files. An updated version is shared.	**10/26/2022:** Closed RCE found discrepancies and requested additional information / clarification and the issue was resolved.			Closed
CR 6	Please explain and include a description of how CarbonCure determined the value for "Capture_to_depot_miles".	VMD043 Section 8.2	**10/20/2022:** CarbonCure explained that there we calculate the distance by taking the straight-line distance between the two points, doubling it (because it's a round-trip), and then adding 50% because real-life paths aren't straight lines. This was deemed the most conservative approach to calculating the distance travelled by trucks as they typically do not follow the travel paths noted in maps and sometimes make additional stops along the way.	**10/26/2022:** Closed RCE agrees that the calculation is conservative.			Closed
CR 7	Please clarify why the monitoring report mentions 56 sites with Carbon Cure technology installed if the file "(4) Install Dates - All Producers v2" has 158?	VCS Standard Project Description for Grouped Projects 3.5.19	**10/20/2022:** CarbonCure explained that the total and correct number based on the install dates for this particular company's spreadsheet you have is 43 sites, relevant documents edited and attached. Please keep in mind that as this is a grouped project and the date for the total number of projects for this monitoring report is not the same as for the entirety of all our grouped projects.	**10/26/2022:** Closed RCE reviewed the data and confirmed that the correct number of sites is included in the monitoring period.			Closed
CR 8	The assertion spreadsheet uses a default cement cut of 5% if the baseline and project mix cement cuts are unavailable. However, Equation 3 requires that the "Quantity of Portland cement used (e.g., metric tonnes) to prepare project compressive strength test specimen n for concrete produced using project mix design I (emphasis added)". Please clarify how the project is meeting the requirement for quantity of Portland cement is being measured for each mix design.	Section 8.1 Equation 3 of VMD043	**11/02/2022:** CarbonCure explained that they have the evidence and will be shared on 11/04/2022.	**11/16/2022:** RCE received the evidence and a new spreadsheet with updated calculations. See CAR 4.			Closed
Forward Action Requests (FARs)							
1	The methodology does not explicitly define what constitutes a mix design. During the validation and verification, RCE learned that each facility can have thousands of mix designs per year. However, many of these designs are grouped into mix-design "families". RCE is requesting that CarbonCure work with Verra to amend the methodology to specify what constitutes a mix-design and how many of these mix-design families require compressive strength tests in order for data to be valid.						
2	The methodology requires that each mix design measure the baseline and project compressive strength test including the amount of Portland cement saved by injecting CO2 into the mix-design. In practice, this is not practical or feasible. A project developer may take these measurements when the practice of injecting CO2 into mix-designs at a facility first takes place. However, once the compressive strength and quality of the project mix-design is confirmed, the plant no longer creates "baseline" mix-designs or mix-design families that are comparable to the Project mix design. RCE is requesting that CarbonCure work with Verra to amend the methodology to include more practical requirements for determining baseline mix-design compressive strength tests and amount of Portland cement saved through project activities.						