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# **Greenhouse Gas Project Methodology Review Report**

## **First Assessment under the Verified Carbon Standard (VCS)**

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### **Client:**

The World Bank

### **Methodology:**

VCS Proposed Methodology: Adoption of sustainable agricultural land management (SALM)

### **Scientific Certification Systems**

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Report Date: 05 October 2011

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## 1. Introduction

This report concludes the first assessment under the VCS Double Approval Process for the Proposed VCS Methodology “Adoption of sustainable agricultural land management (SALM)” authored by Neil Bird and The World Bank BioCarbon Fund. This report contains five important sections pertinent to VCS and accreditation requirements. Details of the validation objectives and scope are provided in this section, while an overview of the validation process is provided in the next section. A special section provides a brief overview of the methodology and some important remarks by the validation team. Finally, the report contains sections that address findings and corrective actions, and the official validation opinion.

### 1.1 Objectives

- Assess conformance of the new methodology with VCS Standards.
- Evaluate the new methodology based on guidance given under the Verified Carbon Standard Program, including an assessment of VCS program requirements and the following: eligibility criteria, baseline approach, additionality, project boundary, emissions, leakage, monitoring, data and parameters, and adherence to the project-level principles of the VCS program.
- Determine the need for clarification or requests for change to the proposed new methodology.
- Determine approval status in the first independent assessment of the double approval process.

### 1.2 Standards used to Assess New Methodology

- VCS Version 3.1
- VCS Methodology Approval Process Version 3.1

### 1.3 Methodology Criteria

SCS assessed the new methodology to ensure that all requirements of the VCS standards for the double approval process have been addressed. SCS assessed whether or not the new methodology respects the principles of the VCS standards.

Assessment included, but was not limited to, an evaluation of the methodology’s inclusion of the following:

- applicability criteria that defines the area of project eligibility;
- a process that determines additionality;
- determination criteria for the most likely baseline scenario; and
- all necessary monitoring aspects related to monitoring and reporting of accurate and reliable GHG emission reductions or removals.

### 1.4 Methodology Scope

The scope of this validation assessment encompassed an assessment of the new methodology against the following requirements of the Verified Carbon Standard (VCS):

- VCS Version 3.1
- VCS Methodology Approval Process Version 3.1
- VCS Guidance for Agriculture, Forestry and Other Land Use Projects (AFOLU)

The assessment was performed using the client-supplied new methodology and other supporting documentation including referenced, published scientific literature, reports and exiting methodologies.

### **1.5 Conflict of Interest**

Prior to beginning the validation project, an evaluation was conducted to identify any potential conflicts of interest associated with the project. No potential conflicts were found for this project.

## **2. Methodology Review**

### **2.1 Assessment Team**

*Kyle Holland, Lead Verifier:* Mr. Holland is a Verification Forester with Scientific Certification Systems and an approved VCS AFOLU expert in the categories of REDD and IFM. He is a Certified Forester (CF #3770) and is completing his Ph.D. in forest biometrics and statistics at the University of California, Berkeley. Mr. Holland also possesses graduate degrees in forestry and over ten years of professional experience in both public and private forestry.

*Todd Frank, Verifier:* Mr. Frank has a proven track record of effectively managing verification projects having overseen the growth and development of the SCS Greenhouse Gas Verification Program since its inception. Mr. Frank holds a master's degree in International Environmental Policy from the University of California San Diego and a Bachelor's degree from the University of California at Berkeley. Mr. Frank is certified as a lead verifier under the CAR, VCS, CCB, CCX, and TCR programs and has formal training in ISO 14064 and ISO 9001. He has served as lead verifier for a wide range of projects across various industries, globally. Mr. Frank also has experience in emissions trading and offset project development experience having worked on the first project ever to be validated to the CCB standard. Mr. Frank serves on the Verification Advisory Board for The Climate Registry and serves on the Advisory Board for Northern Arizona University's Climate Science Solutions master's program.

*Rebecca Ryals, Technical Expert:* Ms. Ryals holds a BS in Environmental Science from Marywood University and a Masters of Environmental Management (MEM) with an emphasis in ecosystem science and management from Duke University. She is currently pursuing a Ph.D. in Ecosystem Ecology and Biogeochemistry at the University of California, Berkeley. Her research focuses on the potential for soil carbon sequestration in managed rangeland ecosystems.

### **2.2 Description of Methodology Review Process**

The new methodology was assessed using a process and evaluated for conformance. The following elements of were examined as part of this process for conformance:

- The appropriateness and adequacy of the eligibility criteria;
- The appropriateness and adequacy of the approach for determining the project baseline;
- The appropriateness and adequacy of the approach/tools for the determination of whether the project is additional;
- The appropriateness and adequacy of the approach to define the project's physical boundary and sources and types of gases included;
- The appropriateness and adequacy of the approach for calculating baseline emissions, project emissions and emission reductions;
- The appropriateness and adequacy of the approach for calculating leakage;
- The appropriateness and adequacy of monitoring;
- The appropriateness and adequacy of monitored and non-monitored data and parameters used in emissions calculations;
- Adherence to the project-level principles of the VCS Program, overall; and

- An Assessment Report with internal technical review.

The methodology review process incorporated six parts: standards review, methodology review, comparison, corrective action, technical review and opinion. The applicable standards listed in Section 1.4 of this report were thoroughly reviewed and compared to the new methodology. Upon comparison, corrective actions were issued to improve the methodology and bring the methodology into conformance. Finally, the methodology was independently reviewed by a third, internal technical reviewer prior to issuing a validation opinion.

### 2.3 Types of Findings

In the cases of corrective actions, Non-Conformity Reports (NCR) were issued to the methodology developer. NCRs formally document how and why the new methodology failed to comply with the standards outlined in Section 1.4. In some cases, New Information Requests (NIR) were issued. NIRs are used to formally request information, such as: how equations were developed, the meanings of technical terms and abbreviations, referenced publications and supporting documentation. Yet in other cases, Opportunities for Improvement (OFI) were issued. OFIs are professional suggestions or observations that are not required under the standards outline in Section 1.4, however might be useful to the methodology developer.

The methodology developer was encouraged to respond to all NCRs, NIRs and OFIs during the course of the methodology review. Responses to NCRs were allowed sixty days (60) while responses to NIRs were allowed thirty days (30). Responses to OFIs were optional.

## 3. Overview of Methodology

The new methodology, *Adoption of sustainable agricultural land management (SALM)*, is for projects based on increasing aboveground, belowground, and soil carbon stocks and/or reducing greenhouse gas emissions through agricultural management by small land-holders across an aggregated agricultural landscape. Applicable agricultural projects under the methodology are subject to applicability conditions which ensure land degradation in the absence of the project; constant or decreasing soil organic carbon stocks in the absence of the project; no significant increases in greenhouse gas emissions as a result of increasing livestock, displacement of agricultural residues or manure, or fossil fuel use; and the existence of prior studies which justify the use of a particular model for the agro-ecological region in which the project is situated. The methodology establishes a baseline scenario by (1) estimating annual greenhouse gas emissions from the use of synthetic fertilizers, nitrogen-fixing species, combustion of agricultural residues, and removal of woody perennial vegetation and (2) modelling equilibrium stocks of soil organic carbon using a peer-reviewed model. Justification for use of a particular model is based on previous or preliminary studies that demonstrate the use of the selected model is valid of the specific project region.

In the project scenario, changes in carbon stocks are *quantified* for two pools, aboveground biomass and belowground biomass from woody perennial vegetation, and *modelled* for one pool, soil organic carbon. Changes in carbon stored as above- or belowground woody perennial vegetation are estimated using the CDM A/R tool, "Simplified baseline and monitoring methodologies for small-scale afforestation and reforestation project activities under the clean development mechanism implemented on grasslands or croplands (AR-AMS0001)." Baseline estimates and changes in the soil organic carbon pool through time are monitored using a peer-reviewed model, such as Century or RothC. Emissions due to fertilizer use, nitrogen-fixing species, and biomass burning are also quantified. Data for estimating baselines and monitoring changes in carbon pools (except for the soil organic carbon pool) and greenhouse gas emissions due to agricultural management are recorded with the Activity Baseline and Monitoring Survey developed for this methodology. Uncertainties in these input measurements are quantified and based on these quantified uncertainties, conservative values are used.

### 3.1 Remarks

The methodology was substantially revised and improved to conform to the standard. The methodology developers should be commended for their commitment to the validation process and to the development of a robust methodology to monitor soil carbon storage in agricultural areas.

During the course of the assessment, the validator and methodology developers sought additional guidance from VCS regarding the robustness of a solely model-based approach to estimating and monitoring soil organic carbon pools versus an approach using field sampling in combination with models. While repeated field-based monitoring provides real measurements of soil carbon stocks, statistically relevant monitoring is intensive and may not be feasible for facilitating soil carbon projects with small land-holder farmers in a heterogeneous project area.

Upon conclusion of this first assessment, the methodology allows for the estimation of baseline soil organic carbon and changes over time using a peer-reviewed soil model, such as Century or RothC. The chosen model is to be parameterized using data gathered from preliminary studies by the project proponent or published research. The model and model inputs must be suited to a particular geographic area, as defined by the Agro-ecological Zone (AEZ) methodology. Additionally, project developers using the SALM methodology will consider the applicability conditions for appropriate use of a model.

## 4. Validation Findings

### 4.1 VCS 2007.1 Standard

This is the overall conformance to the VCS 2007.1 Standard with specific reference to project level requirements (Section 5) and methodologies (Section 6).

#### 4.1.1 Section 5, Project level requirements

This is the specific conformance to Section 5 of the VCS 2007.1 Standard.

**Findings:** The methodology sufficiently addresses all project level requirements. Methodology section I.5 describes the relevant GHG sinks and sources. Types of data intended for users are outlined in section III, while uncertainty is addressed in section IV.2.8. Data required to parameterize soil carbon models are further described in the accompanied annex, "Technical Guidelines: Activity Baseline and Monitoring Survey Guidelines for Sustainable Agricultural Land Management Practices." Parameterization of soil carbon models is a critical component of this methodology because the methodology aims at agricultural management practices that increase soil carbon pools. Further, models are the sole tool proposed to estimate baseline and monitor changes in soil carbon pools throughout the project.

Initially, some of the components of the methodology were unclear. Belowground carbon pools were identified as a pool that would be impacted by project activities. Originally, there was no indication how the belowground pool would be estimated (NIR Number 12 of 12 Dated October 12, 2009). The validator also thought a concise summary with a description and timing of the components of the method should be included (NCR 2 of 5 Dated October 12, 2009). The method developers have clarified these aspects and update the methodology.

As mentioned above, accurate parameterization of models is critical to the use of the methodology. Initially it was unclear how soil carbon models would be parameterized to a specific project or project area and whether a model-only approach following the IPCC Tier 2 Good Practice Guidelines (Chapter 3.3.1.2.1.1) was a robust approach (NCR 4 of 5 Dated October 12, 2009). These issues were clarified by the method developers by including an applicability condition for model selection and

validation (see section 4.2.1 below) and technical guidelines annex (see section 4.2.7 and 4.2.8 below).

**Conformance:** Yes  No  N/A

**Non-Conformity Reports:** NCR Number 2 of 5 Dated October 12, 2009

NCR Number 4 of 5 Dated October 12, 2009

**New Information Requests:** NIR Number 12 of 12 Dated October 12, 2009

**Opportunities for Improvement:** None

#### **4.1.2 Section 6, Methodologies**

This is the specific conformance to Section 6 of the VCS 2007.1 Standard. Validation within this section was accomplished by reviewing the general requirements, potential carbon pools, determination of baseline), methods for determining additionality and requirements for monitoring. Many methodology requirements described in section 6 of the standard are subject to validation as described in the VCS Program Normative Document: Double Approval Process. These validation elements are presented in section 4.2 of this report in order to facilitate categorization, although they apply to both section 6 of the standard and to the double approval process.

**Findings:** The methodology addresses all requirements specified in VCS 2007.1. Applicability criteria defining the area of project eligibility is outline in methodology section I.4. Criteria for additionality, baseline determination, and monitoring are outlined in methodology sections II.3, II. 4 and IV respectively.

A number of features of the methodology were revised to better conform to requirements specified in VCS 2007.1, Section 6. Applicability conditions in section I.4 were revised to clarify the terms "forest land," "area," "significant," and "agricultural pressure" (NIR Number 1 of 12 Dated October 12, 2009). Based on these definitions, the eligibility condition requires that land is degraded and/or degrading, according to the CDM EB approved "Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities."

Criteria for additionality were better defined. Initially, fossil fuel usage additional to the baseline was considered insignificant and not included in leakage estimates. Methodology developers responded by strictly defining "significance" using the CDM EB approved tool, "Estimation of GHG emissions related to fossil fuel combustion in A/R CDM project activities" (NCR Number 1 of 5 Dated October 12, 2009). Baseline changes in soil organic carbon pools in ecosystems experiencing agricultural pressure was originally assumed to be zero (see section 4.2.2 below). The method developers justified this assumption adding an eligibility condition requiring that the project proponents demonstrate that the land is degraded and/or degrading (NIR Number 6 of 12 Dated October 12, 2009). The methodology relies on activity-based models to measure and monitor soil organic carbon pools, following IPCC Tier 2 Good Practice Guidelines, rather than direct measurements. As originally written, the validator was concerned that the process for selecting, validating, and using soil carbon models was not fully described and could result in inaccurate estimates of project changes in soil carbon pools. The process of monitoring soil carbon pools using a peer-reviewed soil carbon model was clarified by the methodology developers by adding a technical guideline annex and a strict eligibility condition for the validation and parameterization of the selected model. (NCR 2 of 3 Dated January 13, 2010, NCR 3 of 5 Dated October 12, 2009, NCR Number 5 of 5 Dated October 12, 2009).

**Conformance:** Yes  No  N/A

**Non-Conformity Reports:** NCR Number 1 of 5 Dated October 12, 2009

NCR Number 3 of 5 Dated October 12, 2009

NCR Number 5 of 5 Dated October 12, 2009

NCR Number 2 of 3 Dated January 13, 2010

**New Information Requests:** NIR Number 1 of 12 Dated October 12, 2009

NIR Number 6 of 12 Dated October 12, 2009

**Opportunities for Improvement:** None

#### **4.2 VCS Normative Document: Double Approval Process**

These are the minimum validation elements that are listed in Section 5.1.2, *Scope of Assessment of new Methodologies* of the VCS Normative Document: Double Approval Process.

##### **4.2.1 Eligibility Criteria**

Assessment of whether the methodology's eligibility criteria are appropriate and adequate.

**Findings:** In section 1.4, the methodology specifies a set of nine conditions necessary for the methodology to be applicable. Initially, some of the terms used in this section were ill-defined, such as "forest-land" and "significant" (NCR Number 1 of 3 Dated January 13, 2010 and NIR Number 1 of 12 Dated October 12, 2009). The methodology was amended to fully explain each of the applicability conditions.

Importantly, the use of models rather than field-based measurements may not always be the most robust and conservative approach to monitoring soil carbon pools. Applicability condition (i) and the accompanied justification define specific situations in which a model-based approach is appropriate as well as criteria by which the validity of the selected model is to be assessed (NCR 3 of 3 Dated January 13, 2010). Specifically, models are selected and verified based on preliminary studies in the agro-ecological region in which the project is situated. This process follows IPCC Tier 2 Good Practice Guidelines (Chapter 3.3.1.2.1.1). Since it is possible climate and soil data at the scale of the agro-ecological region may not be equal to the smaller-scale soil conditions of individual projects, it is critical that the model be validated with independent observations from field locations within the project regions and representative management practices (e.g. applicability condition (i)).

**Conformance:** Yes  No  N/A

**Non-Conformity Reports:** NCR Number 1 of 3 Dated January 13, 2010

NCR Number 3 of 3 Dated January 13, 2010

**New Information Requests:** NIR Number 1 of 12 Dated October 12, 2009

**Opportunities for Improvement:** None

##### **4.2.2 Baseline Approach**

Assessment of whether the approach for determining the project baseline is appropriate and adequate.

**Findings:** The approach for determining the project baseline involves estimating emissions and sinks identified in methodology section 1.5, as well as defining the geographic project boundary. Estimation of baseline emissions from the use of N-fixing species, burning of biomass, and removal of existing woody perennials uses several relevant tools from the Clean Development A/R Working Group or equations reflective of the IPCC convention for estimating greenhouse gas emissions.

The approach to estimating baseline soil organic carbon pools in the project area rely on a process-based, scientifically-acceptable model. The total baseline soil organic carbon for the project area is estimating using area-weighted average values of model input parameters for each management practice identified in the project boundary. Thus, data inputs used to parameterize the models has a critical impact on estimating baseline soil carbon. Initially, the criteria for parameterizing the model

involved gathering data from a Farmer Self Assessment (FSA). The FSA would be a unique component of this methodology, and would rely on individual small land-holder farmers to collect and document necessary data for model parameterization. It was the concern of the validator that the FSA approach was not standardized within the project boundary and lacked an internal method for data quality control. The validator asked for example documentation, guidelines for collecting data, and process for evaluating the data be included with the methodology for project proponents (NIR Number 7 of 12 Dated October 12, 2009). In response, the methodology developers discarded the FSA approach. Instead, project proponents are required to design and implement activity baseline. Instructions for collecting information is now outlined in the annex, "Technical Guidelines: Activity Baseline and Monitoring Survey Guidelines for Sustainable Agricultural Land Management Practices."

Additionally, soil organic carbon model assumptions and applicability are detailed in the eligibility criteria (NIR Number 2 of 12 Dated October 12, 2009). Selection and validation of the model require data collected from preliminary research done in the project area.

**Conformance:** Yes  No  N/A

**Non-Conformity Reports:** NCR Number 1 of 5 Dated October 12, 2009

**New Information Requests:** NIR Number 2 of 12 Dated October 12, 2009  
NIR Number 7 of 12 Dated October 12, 2009

**Opportunities for Improvement:** None

#### 4.2.3 Additionality

Assessment of whether the approach/tools for determining whether the project is additional are appropriate and adequate.

**Findings:** The original assumption proposed by methodology developers was that baseline changes in soil organic carbon pools is zero, and that this assumption is conservative. Soil organic carbon pools are in flux in most ecosystems, and are affected non-linearly by management practices. It is possible that business as usual practices in managed agricultural ecosystems increase soil organic carbon. Thus, the assumption that baseline rate of soil carbon accumulation is zero is problematic (NIR 6 of 12 Dated October 12, 2009). To address this, methodology developers defined an eligibility criterion that reflects a process to ensure additionality of changes in soil carbon pools.

The eligibility criterion reflects a strategy to ensure additionality of increases in soil carbon pools. Specifically, the eligibility criteria asserts that the methodology is only appropriate for lands that are degraded and/or degrading, according to the CDM EB approved "*Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities*" (NIR Number 1 of 12 Dated October 12, 2009). As defined by the tool, lands classified as "degraded" and/or "degrading" have evidence of soil compaction, soil erosion, and decline in organic matter content, as well as a reduction in plant cover or productivity. Based on current scientific thinking, these degradation characteristics are also directly related to losses in soil organic carbon pools. Thus, it is very likely that degraded and/or degrading ecosystems are not increasing soil organic carbon pools, and under most circumstances likely to be losing carbon in soil. With this provision, it is the opinion of the validator that additionality is adequate and assumptions are appropriately conservative.

**Conformance:** Yes  No  N/A

**Non-Conformity Reports:** None

**New Information Requests:** NIR Number 1 of 12 Dated October 12, 2009  
NIR Number 6 of 12 Dated October 12, 2009

**Opportunities for Improvement:** None

#### **4.2.4 Project Boundary**

Assessment of whether an appropriate and adequate approach is provided for the definition of the project's physical boundary and sources and types of gases included.

**Findings:** Methodology section II.1 outlines a procedure to delineate project boundary. Initially, some terms or wording related to the project boundary and the implications for delineation of a project boundary were confusing or vague. For example, estimation of greenhouse gas sources and sinks within the project boundary was suggested by using "cluster analysis or any other means" of aggregating small land parcels within the project boundary (NIR 8 of 12 Dated October 12, 2009, NIR 10 of 12 Dated October 12, 2009). In response, the methodology developers clarified grouping of agricultural lands within the project boundary.

It is also important to note that the definition of the project boundary affects validation of the soil organic model (NIR 3 of 12 Date October 12, 2009). Models are verified with data derived from research studies and publicly-available data from the Agro-ecological Zone methodology.

**Conformance:** Yes  No  N/A

**Non-Conformity Reports:** None

**New Information Requests:** NIR Number 3 of 12 Dated October 12, 2009  
NIR Number 8 of 12 Dated October 12, 2009  
NIR Number 10 of 12 Dated October 12, 2009

**Opportunities for Improvement:** None

#### **4.2.5 Emissions**

Assessment of whether an appropriate and adequate approach is provided for calculating baseline emissions, project emissions and emission reductions.

**Findings:** The proposed methodology primarily accounts for changes in soil organic carbon pools. However, emissions associated with agricultural management practices which may sequester carbon in soil are also included for a full accounting of net greenhouse gas sinks. Emissions types, thus, are limited in scope. Initially, eligibility criteria required that emissions from fossil fuels additional to baseline scenarios were "insignificant," but this term was poorly defined (NCR Number 1 of 5 Dated October 12, 2009). In response, the methodology was revised to demonstrate significance using the CDM EB approved tool "*Estimation of GHG emissions related to fossil fuel combustion in A/R CDM project activities*". Emissions from fertilizer use is estimated using an equation. The form of this equation and parameterization of coefficients relied on the price of fertilizer. The validator requested sample data on the price of organic fertilizer use for a representative national dataset. The methodology developers included this information with the PDD (NIR Number 9 of 12 Dated October 12, 2009).

**Conformance:** Yes  No  N/A

**Non-Conformity Reports:** NCR Number 1 of 5 Dated October 12, 2009

**New Information Requests:** NIR Number 9 of 12 Dated October 12, 2009

**Opportunities for Improvement:** None

#### **4.2.6 Leakage**

Assessment of whether the approach for calculating leakage is appropriate and adequate.

**Findings:** Methodology section III.2 identifies five potential sources of leakage. Potential leakage due to displacement of biomass or manure and to the use of fossil fuel for cooking and heating is

limited by the applicability conditions. Potential market leakage due to an increase in the amount of fossil fuels used by vehicles that ship agricultural products to the market is considered market leakage and ignored. Increases in non-renewable biomass burning for cooking is likely minimal, but nevertheless accounted for using the small scale methodology AMS-I.E. *Switch from Non-Renewable Biomass for Thermal Applications by the User.*

**Conformance:** Yes  No  N/A   
**Non-Conformity Reports:** None  
**New Information Requests:** None  
**Opportunities for Improvement:** None

#### **4.2.7 Monitoring**

Assessment of whether the monitoring approach is appropriate and adequate.

**Findings:** The methodology monitoring approach relies entirely on the use of models parameterized for the agro-ecological region using data from preliminary research studies, rather than project-level field-based measurements (NCR Number 3 of 5 Dated October 12, 2009). Process-based models, such as Century or RothC, have been validated and used by the scientific community for a wide range of agroecological conditions. Use of these models can project changes in soil carbon pools due to changes in management practices. Models are especially valuable tools when working in heterogeneous project areas, in which statistically-relevant field sampling would be intensive and financially infeasible. The major trade-off to using this approach is that real changes in soil carbon are not monitored through time. As a result, it would be difficult to determine whether model projections were accurate.

The validator identified two major concerns with a purely modeling approach to soil carbon monitoring. The first concern deals with the accuracy of the model. Ultimately, the quality of the results of soil biogeochemical models is directly related to the quality of data put into the model. Initially, the methodology suggested the use of “locally-derived parameters” as inputs to the model (see NIR Number 7 of 12 Dated October 12, 2009 and discussion in Section 4.2.2 above). This vague concept was substantially revised to include an annex outlining relevant data needed to parameterize most soil organic carbon models (see “Technical Guidelines: Activity Baseline and Monitoring Survey Guidelines for Sustainable Agricultural Land Management Practices”). Further, an applicability condition was included, which specified the process in which a model can be selected and validated for a specific project. According to the applicability condition, a preliminary research study and data from the Agro-ecological Zone (AEZ) will be used to validate the model

The second concern with the methodology’s modeling approach to monitoring soil organic carbon is that it lacks a mechanism to ground truth the model projections throughout the duration of the project. Methodology developers also included a detailed justification and clarification for the use of model based soil carbon monitoring approach. It is evident that the developers have consulted a number of soil scientists and experts, who influenced their model-based approach to soil carbon monitoring within the context of the proposed methodology.

Due to the uncertainties surrounding the use of models to monitor changes in soil carbon and the lack of precedence in VCS soil carbon methodologies, additional guidance was sought from VCS by both the validator and the methodology developers to determine the robustness of this approach.

The following guidance was issued from the VCS on August 4, 2010:

*Based on the above, the VCSA recommends that a practice based model, as proposed by the SALM methodology, should be considered as an acceptable approach to monitoring changes in soil carbon. However, the VCSA also recommends the following.*

- 1) *The methodology shall have strict requirements to estimate uncertainty in the model, and the model shall be calibrated to the project region using peer reviewed empirical studies from the same agro-ecological zone. Furthermore, the methodology shall apply a discount on the net estimate of emission reductions based on the quantification of uncertainty.*
- 2) *Conservative values are to be used for input parameters, and a conservative approach is to be taken to quality assurance procedures for managing data and information to ensure that emission reductions are not over-estimated.*
- 3) *The methodology shall provide a pathway for measurement or use of empirical data where practical. The model shall be updated every 5 years based on relevant data such as studies conducted in the region. Such data can be used to refine the model over time and decrease uncertainty.*

Upon guidance from VCS, the methodology was updated and found to be in conformance in most regards. However, non-conformities existed with regard to the quantification of uncertainty and conservative values (points 1 and 2 above). Subsequently, clarifications were made to the methodology regarding measures of uncertainty (NCR Number 1 of 3 Dated September 15, 2010), uncertainty in non-agricultural input parameters (NCR Number 2 of 3 Dated September 15, 2010) and sample size determination for estimating uncertainty in parameters (NCR Number 3 of 3 Dated September 15, 2010).

**Conformance:** Yes  No  N/A

**Non-Conformity Reports:** NCR Number 3 of 5 Dated October 12, 2009  
 NCR Number 1 of 3 Dated September 15, 2010  
 NCR Number 2 of 3 Dated September 15, 2010  
 NCR Number 3 of 3 Dated September 15, 2010

**New Information Requests:** NIR Number 7 of 12 Dated October 12, 2009

**Opportunities for Improvement:** None

#### **4.2.8 Data and Parameters**

Assessment of whether monitored and not monitored data and parameters used in emissions calculations are appropriate and adequate.

**Findings:** Data collected for monitoring greenhouse gas emissions and carbon sinks are outlined in methodology section IV.1.2 and elaborated upon in the annex, “Technical Guidelines: Activity Baseline and Monitoring Survey Guidelines for Sustainable Agricultural Land Management Practices.”

The importance of data gathered to parameterize soil organic carbon models is described above in Section 4.2.7 of this report. Initially, the methodology did not specify the procedure for collecting and verifying soil and environmental data to be used as model inputs. Instead, suggestions of using locally-derived data was offered but not explained in detail (NCR Number 4 of 5 Dated October 12, 2009, NIR Number 4 of 12 Dated October 12, 2009). The Farmer Self Assessment was also initially proposed as a mechanism for collecting data. In response, methodology developers included an applicability condition that specifies models must be validated using preliminary studies in the project area. Additionally, the Farmer Self Assessment was replaced with an annex of technical guidelines for the project proponent to gather data for models. Two OFIs were issued to clarify some of the text within the technical guidelines (OFI Number 1 of 2 Dated January 13, 2010, OFI Number 2 of 2 Dated January 13, 2010).

No mechanisms were originally proposed to validate modeled and field data (NCR Number 2 of 3 Dated January 12, 2010, NIR Number 4 of 5 Dated October 12, 2009, NIR Number 11 of 12 Dated October 12, 2009). While the applicability condition validates baseline soil carbon estimates, it does not address monitoring or evaluating model results over time

Upon guidance from VCS, the methodology was updated and found to be in conformance in most regards. However, non-conformities existed with regard to the quantification of uncertainty and conservative values (points 1 and 2 above). Subsequently, clarifications were made to the methodology regarding measures of uncertainty (NCR Number 1 of 3 Dated September 15, 2010), uncertainty in non-agricultural input parameters (NCR Number 2 of 3 Dated September 15, 2010) and sample size determination for estimating uncertainty in parameters (NCR Number 3 of 3 Dated September 15, 2010).

**Conformance:** Yes  No  N/A

**Non-Conformity Reports:**  
 NCR Number 2 of 5 Dated October 12, 2009  
 NCR Number 4 of 5 Dated October 12, 2009  
 NCR Number 5 of 5 Dated October 12, 2009  
 NCR Number 2 of 3 Dated January 13, 2010  
 NCR Number 1 of 3 Dated September 15, 2010  
 NCR Number 2 of 3 Dated September 15, 2010  
 NCR Number 3 of 3 Dated September 15, 2010

**New Information Requests:**  
 NIR Number 4 of 12 Dated October 12, 2009  
 NIR Number 5 of 12 Dated October 12, 2009  
 NIR Number 7 of 12 Dated October 12, 2009  
 NIR Number 11 of 12 Dated October 12, 2009  
 NIR Number 1 of 1 Dated January 13, 2009

**Opportunities for Improvement:**  
 OFI Number 1 of 2 Dated January 13, 2010  
 OFI Number 2 of 2 Dated January 13, 2010

**4.2.9 Adherence to the Project-Level Principles of the VCS Program**

Assessment of whether the methodology adheres to the project-level principles of the VCS Program.

**Findings:** It is the opinion of the validator that the methodologies adheres to the project-level principles of the VCS program (see section 4.1.1 of the report).

**Conformance:** Yes  No  N/A

**Non-Conformity Reports:** None

**New Information Requests:** None

**Opportunities for Improvement:** None

**5. Validation Opinion, Assessment Statement**

Following completion of SCS’s duly-accredited validation process, the first validation in the double approval process and our review of the methodology version 7 dated September 28, 2011, it is our

opinion that the proposed methodology, *Adoption of Sustainable Agricultural Land Management*, conforms to the scope as defined in Section 1.4 of this report, namely the VCS Version 3.1 Standard. As the first validators in the double approval process, we support all changes resulting from the second validation.

## **6. Eligibility Criteria for Validators**

### **6.1 Eligibility Criteria**

The following required evidence, if available, is provided for Non-ARR AFOLU methodology elements in conformance with Section 4.7 of the *VCS Program Normative Document: Double Approval Process*.

#### **6.1.1 Eligibility Criteria 2 for Non-ARR AFOLU**

Kyle Holland is an AFOLU approved expert for the IFM project category. Kyle Holland served as lead auditor.

#### **6.1.2 Eligibility Criteria 3 for Non-ARR AFOLU**

Scientific Certification Systems has not completed at least ten project validations in any sectoral scope.

### **6.2 Supplied Evidence**

The above supplied evidence is adequate per Section 4.7.3 of the *VCS Program Normative Document: Double Approval Process*.

## **7. Corrective Action Requests**

Please see section 2.3 of this report for descriptions of the types of corrective action requests. Please see section 4 for references to these corrective action requests.

## Non-Conformity Reports:

### **NCR Number 1 of 5 Dated October 12, 2009**

**Finding:** All fossil fuel usage that is additional to the baseline must be accounted. Please account for fossil fuel usage (even if "insignificant") or make applicability condition (i) strict.

**Proponent Response on December 10, 2009:** The methodology now states that:

The insignificance of the emissions due to an increase in fossil fuel use for agricultural management and/or for cooking and heating shall be demonstrated using the CDM EB approved tool "*Estimation of GHG emissions related to fossil fuel combustion in A/R CDM project activities*".

The demonstration of the insignificance then is left to the project proponents as part of the PDD.

**Auditor Response:** This finding was addressed by defining the term "significant," based on the CDM EB "Tool for testing significance of GHG emissions in A/R CDM project activities." The text accompanying the reference to this tool defines significance as "the sum of increase in greenhouse gas emissions from the increase in the number of livestock, displacement of manure, increase in fossil fuels from agricultural management and increase of fossil fuels for cooking as a result of the project is less than 10% of the emissions reductions by the project." This definition is incompatible with the aforementioned tool, which considers greenhouse gas emissions insignificant if the emissions are lower than 5% of net anthropogenic reductions.

NCR 1 of 3 for January 13, 2010 was issued in response.

### **NCR Number 2 of 5 Dated October 12, 2009**

**Finding:** Below ground carbon pools (i.e. root biomass) are identified in Table 1 as a pool that will be impacted by SALM activities. There is no indication throughout the rest of the proposal that below ground carbon pools will be explicitly measured or modeled. The project proponent must correct Table 1 or explain how below ground biomass will be measured or modeled.

**Proponent Response on December 10, 2009:** A more complete and transparent description of pools included in the project is given in Table 1.

The increase in below ground biomass of woody perennials planted as part of the SALM practices was part of the originally submitted methodology. The below ground biomass of woody perennials in the baseline is covered using the approved CDM Tool "*Estimation of changes in the carbon stocks of existing trees and shrubs within the boundary of an A/R CDM project activity*"<sup>i</sup> (Section II.4.4). The text of the approved tools is not included in the SALM methodology but is referred to by the methodology.

The below ground biomass of woody perennials in the project is covered using the approved CDM small scale methodology "*Simplified baseline and monitoring methodologies for small-scale afforestation and reforestation project activities under the clean development mechanism implemented on grasslands or croplands AR-AMS0001*"<sup>ii</sup> (Section III.1.4). The approved methodology is not included in the SALM Methodology but is referred to by the methodology

The increase in below ground biomass of annual crops is not considered part of the methodology

since in the IPCC accounting system, biomass in annual crops is ignored.

**Auditor Response:** This finding has been partially addressed. Table 1 provides more explicitly explains the above- and belowground pools of interest to the methodology. Two CDM tools are referenced in Sections 11.4.4 and III.1.4 to estimate changes in C stocks of trees and shrubs in the baseline and project, respectively. However, the new text in Table 1 does not refer to these tools. Although redundant, it would be clearer to refer to the tools here as well.

Additionally, the language in Section 11.1.4 “Project removals from woody perennials” referencing the CDM A/R tool, “Simplified baseline and monitoring methodologies for small-scale afforestation and reforestation project activities under the clean development mechanism implemented on grassland or croplands,” is ambiguous. The section instructs the use of the tool to calculate PRWP<sub>t</sub>, the project removals from woody perennials using “portions” of the tool. This section should explicitly which portions should be used. For example, the tool often uses belowground living biomass of grassland (e.g. non-woody vegetation).

OFI 1 of 2 for January 13, 2010 was issued in response.

#### **NCR Number 3 of 5 Dated October 12, 2009**

**Finding:** There are no proposed mechanisms for monitoring changes in soil organic carbon pools. The VCS Standard requires that a justification for not selecting relevant carbon sources, sinks, or reservoirs for regular monitoring. This requirement is clear in the VCS AFOLU methodological tool, Step 6. The project must describe how soil organic carbon will be monitored throughout the life of the project.

**Proponent Response on December 10, 2009:** No corrective action is required. From: Verified Carbon Standard Guidance for Agriculture, Forestry and Other Land Use Projects, 18 November 2008

Guidance on Baseline for ALM Projects (Page 16)

*For ALM projects, pre-project C stocks for baseline estimation can be determined from measured inventory estimates using approved methodologies and/or activity-based estimation methods (e.g. IPCC 2006 GL), considering current and previous management activities. If activity-based methods are used for soil C stocks, stock estimates should be determined relative to the computed maximum C stocks that occurred in the designated land area within the previous 10 years.<sup>27</sup> Minimum baseline estimates for N<sub>2</sub>O and CH<sub>4</sub> emissions should be based on verifiable management records (e.g. fertilizer purchase records, manure production estimates, livestock data) averaged over the 5 years prior to project establishment.*

Guidance on Estimating net emissions reductions and GHG removals. (Page 30)

*Measurement of cropland and grassland soil management projects can include activity-based model estimates or direct measurement approaches or a combination of both. The IPCC 2006 Guidelines for National Greenhouse Gas Inventories (<http://www.ipccnggip.iges.or.jp/public/2006gl/index.htm>) provides guidance for three ‘tiers’ of estimation methods; with progressively higher tier number, data requirements and complexity increase but uncertainty is reduced.*

*Tier 1 methods involve the use of IPCC equations and default stock change and emission factors specified for broadly defined climate, soil and land use and management conditions. Tier 2 methods use the IPCC equations, but with more regionally relevant stock change/emission factors. Estimation of stock change and/or soil emission factors for Tier 2 methods should be based on data*

*from replicated field experiments having a duration of at least five years (preferably longer), for climate and soil conditions and management activities representative of the project conditions, using established, reliable measurement methods. Stock change factors for soil C or woody biomass C that are based on experiments of less than 20 yrs duration should be projected over no more than 20 years. Tier 3 methods use more complex, dynamic models which have been validated for conditions representative for the project area, and/or direct measurements of C stock changes and/or N2O and CH4 made on the project area. Tier 3 model-based estimates and measurements should span the range of soil, climate and land use/management conditions for the entire project area.*

Given the guidance above, direct measurement is not required. In the methodology we are using a Tier 2 approach where in the PDD activities are measured and a well established developed model (e.g. RothC or CENTURY) is used to estimate more regionally relevant stock change /emission factors. An applicability condition has been added which requires that the project proponents demonstrate that the use of the selected model is valid for the project region. Evidence to support the suitability of the selected model is given in the PDD as it is project dependent. The stock change factors are applied using the IPCC equations.

For the component of the project that includes an increase in trees, the additional soil organic carbon is not included. For this reason, the methodology should be considered a conservative.

**Auditor Response:** No action was taken to address this finding. The methodology developers have opted to use the IPCC Tier 2 methods, which would rely on activity-based model estimates rather than direct measurements of soil carbon. Tier 3 methods would reduce uncertainties and would be suitable to projects of this size. No justification is given to explain why Tier 2 would be a more suitable method.

An applicability conditions was added which partially resolves the disadvantages of a method relying solely on models. The applicability condition attempts to validate choice of selected model based on “studies (for example: scientific journals, university theses, or work carried out by the project proponents).” This applicability condition is a good avenue for justifying the use of model, but should be more specific. For example, is it ok that the model performs well with a specific management in another region, or should the model be coupled with ground truthing from the actual project region? What level of accuracy is required for the model to be acceptable?

NCR 2 of 3 for January 13, 2010 was issued in response.

#### **NCR Number 4 of 5 Dated October 12, 2009**

**Finding:** The methodology proposes that “locally derived parameters” should be used in combination with the IPCC Tier 2 Soil methodology. Define the required parameters as well as the mechanisms for collecting, organizing, and using locally derived parameters.

**Proponent Response on December 10, 2009:** No Change to the methodology. Recorded parameters will be documented in the PDD.

It is our opinion, based on the approach by the CDM Executive Board, that

- 1) a methodology should not be based on a single algorithm or model (in this case soil model – e.g. RothC or CENTURY); and
- 2) the parameters depend somewhat on the activity being undertaken.

Both of these we consider a part of the PDD and not part of the methodology since the methodology should be kept a generic as possible.

If this is not acceptable to the VCS, then the name of methodology would need to be worded to something like:

*Adoption of sustainable agricultural land management, specifically the reintegration of crop residuals with or without manure additive, evaluated using the RothC soil organic carbon model*

If this is what the VCS wants then we will change the methodology.

Alternatively, we recommend that the methodology remains unchanged and the parameters required to the model the activities and a description of the model itself be included in the PDD.

**Auditor Response:** The method developers addressed this finding without making change to the methodology, stating that the parameters required will be part of the PDD and not part of the methodology. This approach is only acceptable if issues surrounding the heavy reliance on a model is addressed thoroughly.

NCRs 2 and 3 of 3 for January 13, 2010 were issued in response.

#### **NCR Number 5 of 5 Dated October 12, 2009**

**Finding:** The parameters listed in the monitoring methodology sampling design do not include soil organic carbon, a required pool for monitoring (see NCR3 dated 10/12/09). Please add this parameter.

**Proponent Response on December 10, 2009:** No corrective action is required. From: Verified Carbon Standard Guidance for Agriculture, Forestry and Other Land Use Projects, 18 November 2008

Guidance on Baseline for ALM Projects (Page 16)

*For ALM projects, pre-project C stocks for baseline estimation can be determined from measured inventory estimates using approved methodologies and/or activity-based estimation methods (e.g. IPCC 2006 GL), considering current and previous management activities. If activity-based methods are used for soil C stocks, stock estimates should be determined relative to the computed maximum C stocks that occurred in the designated land area within the previous 10 years.<sup>27</sup> Minimum baseline estimates for N<sub>2</sub>O and CH<sub>4</sub> emissions should be based on verifiable management records (e.g. fertilizer purchase records, manure production estimates, livestock data) averaged over the 5 years prior to project establishment.*

Guidance on Estimating net emissions reductions and GHG removals. (Page 30)

*Measurement of cropland and grassland soil management projects can include activity-based model estimates or direct measurement approaches or a combination of both. The IPCC 2006 Guidelines for National Greenhouse Gas Inventories (<http://www.ipccnggip.iges.or.jp/public/2006gl/index.htm>) provides guidance for three 'tiers' of estimation methods; with progressively higher tier number, data requirements and complexity increase but uncertainty is reduced.*

*Tier 1 methods involve the use of IPCC equations and default stock change and emission factors specified for broadly defined climate, soil and land use and management conditions. Tier 2 methods use the IPCC equations, but with more regionally relevant stock change/emission factors.*

*Estimation of stock change and/or soil emission factors for Tier 2 methods should be based on data from replicated field experiments having a duration of at least five years (preferably longer), for climate and soil conditions and management activities representative of the project conditions, using established, reliable measurement methods. Stock change factors for soil C or woody biomass C that are based on experiments of less than 20 yrs duration should be projected over no more than 20 years. Tier 3 methods use more complex, dynamic models which have been validated for conditions representative for the project area, and/or direct measurements of C stock changes and/or N2O and CH4 made on the project area. Tier 3 model-based estimates and measurements should span the range of soil, climate and land use/management conditions for the entire project area.*

Given the guidance above, direct measurement is not required. In the methodology we are using a Tier 2 approach where in the PDD activities are measured and a well established developed model (e.g. RothC or CENTURY) is used to estimate more regionally relevant stock change /emission factors. Evidence to support the suitability of the selected model is given in the PDD as it is project dependent. The stock change factors are applied using the IPCC equations.

For the component of the project that includes an increase in trees, the additional soil organic carbon is not included. For this reason, the methodology should be considered a conservative.

**Auditor Response:** This finding is not addressed and relates to issues of the acceptability of using the IPCC Tier 2 method with no direct measurements (see NCR 3).

NCR 2 of 3 for January 13, 2010 was issued in response.

#### **NCR Number 1 of 3 Dated January 13, 2010**

**Finding:** This finding is in response to NCR 1 of 5 for October 12, 2009. The CDM EB "Tool for testing significance of GHG emissions in A/R CDM project activities" states that greenhouse gas emissions are insignificant if the emissions are lower than 5% of net anthropogenic reductions. The methodology states insignificance as "the sum of increase in greenhouse gas emissions from the increase in the number of livestock, displacement of manure, increase in fossil fuels from agricultural management and increase of fossil fuels for cooking as a result of the project is less than 10% of the emissions reductions by the project." These definitions are inconsistent and therefore the methodology developer must justify one definition over the other.

**Proponent Response on February 10, 2010:** The inconsistency has been corrected in the latest version of the methodology. We have adopted the more stringent definition of significance.

**Auditor Response:** This finding was addressed fully by correcting the definition of "significant" to be compatible with the CDM EB "Tool for testing significance of GHG emissions in A/R CDM project activities." Corrections are made in the text on page 4.

#### **NCR Number 2 of 3 Dated January 13, 2010**

**Finding:** This finding is in response to NCR 3 of 5, and NCR 5 of 5 for October 12, 2009. The methodology developers have opted to use IPCC Tier 2 methods, which would rely on activity-based model estimates rather than direct measurements of soil carbon. Provided guidance from VCS, Tier 3 methods must be used to reduce uncertainty in monitoring. The methodology must specify the periodic sample measurements of the soil carbon pool to validate the accuracy of activity-based

model estimates.

**Proponent Response on February 10, 2010:** See included letter below.

**Auditor Response:** The issue of whether IPCC Tier 2 or Tier 3 methods are appropriate was elaborated on in an accompanied letter. This needs to be explored further, with guidance from VCS.

#### **NCR Number 3 of 3 Dated January 13, 2010**

**Finding:** This finding is in response to NCR 3 of 5, and NCR 5 of 5 for October 12, 2009. Applicability condition (i) is to ensure, to some degree, the validity of the selected model. The methodology developer must specify criteria by which the validity of the selected model is to be assessed.

**Proponent Response on February 10, 2010:** Tighter and more specific applicability conditions have been added. Validity is demonstrated by acceptance of the model in the agro-ecologic region by the scientific community.

**Auditor Response:** In response to the previous finding, the methodology developers included additional text within applicability condition (i), which specifies how users of the methodology could choose a model. The text is sufficient, insofar as it emphasizes the use of a model that is appropriate for the agro-ecological region of the project. The primary soil organic models (RothC, CENTURY, DNDC) were developed in an agricultural context. The models require few, but important, data inputs for parameterization. The developers reference the agro-ecological zone (AEZ) methodology as a source for data inputs. These data may be a reliable and inexpensive resource for data inputs, including weather and soil properties. However, the AEZ acknowledges limitations to these data sets, including uneven data quality across regions and a further need for ground-truthing. If the models are parameterized incorrectly and not ground-truthed (i.e. validated) initially, the outputs may be incorrect. Field sampling initially and over the course of the project (not necessarily every year) would help to validate the models.

#### **NCR Number 1 of 3 Dated September 15, 2010**

**Finding:** This finding is in response to NCR 2 of 3 for January 13, 2010. Steps 1 - 4 do not adhere to the guidance issued by VCS on July 27, 2010. Specifically, estimates of the 95% confidence interval and deductions for variance greater than +/- 15% of the mean are absent, inconsistent or misinterpreted in the methodology.

**Proponent Response on October 12, 2010:** Text changed to include 95 confidence level with a 15% precision and a methodology to discount estimates if the uncertainty is greater than 15% has been included.

**Auditor Response:** This is now in conformance with the VCS guidance.

#### **NCR Number 2 of 3 Dated September 15, 2010**

**Finding:** The methodology must quantify uncertainty in the model. The methodology only quantifies

uncertainty in agricultural-related input parameters to the model.

**Proponent Response on October 12, 2010:** The uncertainty analysis specifically includes temperature, precipitation and clay content parameters as well.

**Auditor Response:** This has been clarified in the methodology.

#### **NCR Number 3 of 3 Dated September 15, 2010**

**Finding:** The methodology assumes a normal approximation for uncertainty estimates based on large sample theory. However, the methodology does not specify minimum sample sizes to ensure some level of convergence to normality in sampled model input parameters. The methodology refers to "sampling effort" but does not relate sampling effort to sample size. The methodology refers to "95/10 confidence/precision as the criteria for reliability of sampling efforts" but it is unclear what "95/10" means as precision is the inverse of variance.

**Proponent Response on October 12, 2010:** Sampling intensity is dependent upon several variables, amongst others the size of the project. Hence to prescribe a minimum number of samples is a redundant argument and it is difficult to judge the sample numbers *a priori*. We have checked with the approach in other A/ R methodologies and none of the methodologies prescribe a minimum number of samples. The minimum sample numbers are tied to the desired reliability and this is consistent with the approach adopted in the methodology. Informal opinion from experts in forest sampling confirms that the approach is consistent with good practice. Project proponents can begin and adjust the sampling intensity based on the uncertainty of model output.

**Auditor Response:** Language about precision has been clarified in the methodology and clear criteria have been set for the determination of sample size.

#### **New Information Requests (NIR):**

#### **NIR Number 1 of 12 Dated October 12, 2009**

**Finding:** Please provide clear definitions for the following terms:

- 'forest land' and 'area' in the context of the term 'forest land in the area' of part (e);
- 'significant' of parts (f), (g), (h), (i), and (j);
- 'agricultural pressure' of part (b)

**Proponent Response on December 10, 2009:** The methodology has been changed to rectify the problems identified by the reviewer.

1) Eligibility condition (b) has been reworded to

*The land is degraded and will continue to be degraded or continue to degrade;*

As well to simplify the baseline, the amount of cropland must remain constant or increase with time (See VCS\_WB\_NIR.10\_Area of Cropland\_101209\_Response

2) The methodology continues to require the use of the CDM EB approved "Tool for the

*identification of degraded or degrading lands for consideration in implementing CDM A/R project activities”*

3) The definition of forest land makes reference to the host country national definition for the purposes of CDM

Significance is defined as that the sum of all insignificant emissions is less than 10% of the project benefits

The methodology now uses the CDM EB Approved EB approved *“Tool for testing significance of GHG emissions in A/R CDM project activities”*

(<http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-04-v1.pdf>)

**Auditor Response:** The changes partially address the findings. The eligibility condition (b) has been reworded and “degraded” was defined using the CDM “Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities.” Since the terms “degraded” and “degrading” have slightly different meanings according to the tool, the changes should be made in the text of the eligibility condition (in italics):

“b) The land is degraded *and/or degrading* and will continue to be degraded or continue to degrade.”

The term significance has now been defined, but conflicts with the tool cited. This finding was addressed by defining the term “significant,” based on the CDM EB “Tool for testing significance of GHG emissions in A/R CDM project activities.” The text accompanying the reference to this tool defines significance as “the sum of increase in greenhouse gas emissions from the increase in the number of livestock, displacement of manure, increase in fossil fuels from agricultural management and increase of fossil fuels for cooking as a result of the project is less than 10% of the emissions reductions by the project.” This definition is incompatible with the aforementioned tool, which considers greenhouse gas emissions insignificant if the emissions are lower than 5% of net anthropogenic reductions.

NCR 1 of 3 for January 13, 2010 was issued in response.

#### **NIR Number 2 of 12 Dated October 12, 2009**

**Finding:** Please state the assumptions of the RothC and CENTURY models in the applicability conditions.

**Proponent Response on December 10, 2009:** RothC applicability conditions will be added to the PDD in an Annex.

**Auditor Response:** This finding asked for a statement of the assumptions of the Roth-C and CENTURY models. The methodology developers addressed this finding by providing a document entitled “Technical guidelines: Activity baseline and monitoring survey guideline for sustainable agricultural land management practices (SALM).” This document is an excellent addition overall and includes suggestions for resources available for required model parameters. The following comments should be addressed to improve the document:

1. Add even number page numbers. Only the odd pages are numbered.
2. On page 4, the following bolded statement is misleading : Step 1: Selecting a suitable model: In Africa RothC and CENTURY are the most widely used models to predict soil carbon stock changes. **Therefore, they have been tested for their suitability.** This is ambiguous and implies that the models are valid for any project. This conflicts with the

new applicability condition added to test model verification.

3. On page 7, selection of sampling size seems adequate, but it is not clear whether the same group will be selected for each survey or if the selection will be random each time. This is addressed on page 10, section 2.4, but should be reiterated on page 7.

OFI 2 of 2 for January 13, 2010 was issued in response.

#### **NIR Number 3 of 12 Dated October 12, 2009**

**Finding:** The RothC and CENTURY models are designed for specific spatial scales. The definition of the project boundary should be suited to the spatial scale of the selected model. Revise the definition of the project boundary to include the scale of the selected model (local, regional or landscape areas). Include a range for the size of the project area defined by the project boundary.

**Proponent Response on December 10, 2009:** The applicability of the selected model will be discussed in the PDD.

In general all soil organic models are not defined for specific scale, but they give estimates either per hectare or per m<sup>2</sup>. This does not mean that they are applicable at this scale.

**Auditor Response:** This finding is adequately addressed by the new document provided, "Technical guidelines: Activity baseline and monitoring survey guideline for sustainable agricultural land management practices (SALM).

#### **NIR Number 4 of 12 Dated October 12, 2009**

**Finding:** Please provide the IPCC Tier 2 Soil methodology as specified on page 11.

**Proponent Response on December 10, 2009:** From IPCC 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan. Page 5.15

##### **Tier 1**

*For mineral soils, the estimation method is based on changes in soil organic C stocks over a finite period following changes in management that impact soil organic C. Equation 2.25 (Chapter 2) is used to estimate change in soil organic C stocks in mineral soils by subtracting the C stock in the last year of an inventory time period (SOC<sub>0</sub>) from the C stock at the beginning of the inventory time period (SOC<sub>0-T</sub>) and dividing by the time dependence of the stock change factors (D). In practice, country-specific data on land use and management must be obtained and classified into appropriate land management systems (e.g., high, medium and low input cropping), including tillage management, and then stratified by IPCC climate regions and soil types. Soil organic C stocks (SOC) are estimated for the beginning and end of the inventory time period using default reference carbon stocks (SOC<sub>ref</sub>) and default stock change factors (FLU, FMG, FI).*

##### **Tier 2**

*For Tier 2, the same basic equations are used as in Tier 1 (Equation 2.25), but country-specific information is incorporated to specify better the stock change factors, reference C stocks, climate regions, soil types, and/or the land management classification system.*

In this methodology we are recommending using a soil organic carbon model (e.g. RothC or

CENTURY) to estimate the improved stock change factors.

**Auditor Response:** Text from IPCC Tier 2 was provided as requested. However, there is not an adequate justification for using Tier 2 as opposed to Tier 3, or for relying solely on models and not direct measurement if using Tier 2.

NCR 2 of 3 for January 13, 2010 was issued in response.

#### **NIR Number 5 of 12 Dated October 12, 2009**

**Finding:** The proposed methodology (page 8 and 11) states “See the appendix for a detailed formulation of this technique” in reference to using locally derived parameters. No appendix or further detail is provided for either statement. Please provide the referenced appendix or further detail.

**Proponent Response on December 10, 2009:** The information requested is project specific. It has been provided in the associated PDD (submitted with the revised methodology)

**Auditor Response:** This finding is adequately addressed. The text referring to an annex was removed, and the new document provides guidelines for selecting a model and suggestions for retrieving local parameters.

#### **NIR Number 6 of 12 Dated October 12, 2009**

**Finding:** It may not always be conservative to assume that SOC changes are zero under agricultural pressure. There may be circumstances in which agricultural practices increase soil organic carbon (for example, SOC may increase if constant manure application is a common practice). Please provide additional justification for zero change in SOC.

**Proponent Response on December 10, 2009:** The methodology has been changed to require that the project proponents demonstrate that the land is degraded and remains degraded or continues to degrade.

Degrading or degraded land that remains degraded has no increase in soil organic carbon.

**Auditor Response:** This finding is adequately addressed. The methodology was changed to require that project proponents demonstrate the land is degraded and/or degrading. This would justify a zero change in soil organic carbon, conservatively. The original methodology did not include this stipulation and would allow for the inclusion of projects with increasing soil carbon stock under business as usual that would be incorrectly assumed to be held constant. This may lead to an overestimation of carbon sequestration. The added eligibility requirement addresses this issue.

#### **NIR Number 7 of 12 Dated October 12, 2009**

**Finding:** It is the opinion of the verifier that the Farmer Self Assessment (FSA) is critical to this methodology. Therefore, the authors should provide an example of a standardized FSA documentation and guidelines for collecting data and training under this methodology. These

documents and guidance are essential to evaluating the feasibility of this methodology on other project types. Additionally, it is unclear how FSA data will be quality checked. Please provide additional information on the FSA, guidance for the FSA, training, and methods for checking the quality of the FSA data.

**Proponent Response on December 10, 2009:** The FSA has been replaced with an "activity baseline and monitoring survey" (ABMS) since it was decided that the project proponents would perform the survey rather than the farmers themselves.

An example of the "activity baseline and monitoring survey" (ABMS) is included in the PDD that is submitted with the revised methodology.

**Auditor Response:** The concern that the proposed Farmer Self Assessment (FSA) was ill-defined was rectified by replacing the FSA with an Activity Baseline and Monitoring Survey (AMBS). According to the AMBS, the project proponents will perform the survey rather than the farmers themselves. An example of the survey as well as instructions for implementing the survey were included.

OFI 2 of 2 for January 13, 2010 was issued in response.

#### **NIR Number 8 of 12 Dated October 12, 2009**

**Finding:** It is the opinion of the verifier that the statement "Using cluster analysis or any other means..." to describe how management practices can be aggregated is too vague. Techniques for clustering management should be better defined. This is particularly important when considering changes in SOC pools as they relate to management. Please provide a clearer description of cluster analysis or references to cluster analysis techniques.

**Proponent Response on December 10, 2009:** In the methodology we mentioned the use of cluster analysis. During the development of the project document, it was clear that cluster analysis was not needed since the driver for increasing the soil organic carbon is dominated by what is done with the crop residuals and manure. This allows for a simplified stratification.

We have removed reference to cluster analysis. We have also added a recommended minimum stratification

*It is recommended that the project proponents stratify by crop system, use of residuals and application of manure as a minimum.*

**Auditor Response:** This finding is adequately addressed. All ambiguous mention of cluster analysis was removed from the methodology.

#### **NIR Number 9 of 12 Dated October 12, 2009**

**Finding:** Fertilizer use is estimated using an equation. To support the implicit form of this equation as well as the parameterization of a and b, please provide sample data on the price of organic fertilizer and fertilizer use for a representative national dataset.

**Proponent Response on December 10, 2009:** The requested information will be provided in the PDD submitted with the revised methodology.

As the project was being developed it became clear that the use of fertilizers in the project area is insignificant and that this was not really an issue. Nevertheless we will add the information requested to the PDD.

**Auditor Response:** This finding is addressed.

#### **NIR Number 10 of 12 Dated October 12, 2009**

**Finding:** Please describe how the area of cropland (BA\_C,t) is estimated for year t under the baseline. Applicability condition (b) implies that the area of cropland might change under the baseline due to increasing pressure.

**Proponent Response on December 10, 2009:** We have an applicability condition that the area under cropland cultivation is constant or increasing in absence of the project. Since croplands have less soil organic carbon than forests or grasslands, if the area increases the baseline soil organic carbon decreases.

Assuming that the area under cultivation is constant is therefore a conservative assumption.

**Auditor Response:** This finding was addressed by adding the applicability condition “c) The area of land under cultivation in the region is constant or increasing in the absence of the project.”

#### **NIR Number 11 of 12 Dated October 12, 2009**

**Finding:** The use of a peer-reviewed analytic soil organic carbon model, such as RothC or CENTURY, has potential for establishing a baseline estimate for the soil organic carbon pool. However, the methodology is lacking in data showing a relationship between the measured and modelled values of soil organic carbon. Please include this information with the uncertainty associated with the model and measured values as well as the definition of the acceptability threshold.

**Proponent Response on December 10, 2009:** Uncertainties are project and model dependent. An uncertainty analysis will be provided in the PDD that accompanies the revised methodology

**Auditor Response:** This finding was not adequately addressed, and relates to previous issues discussed above regarding the sole use of models. The finding requested a coupling of measured soil carbon data and modelled data.

NCR 2 of 3 for January 13, 2010 was issued in response.

#### **NIR Number 12 of 12 Dated October 12, 2009**

**Finding:** Please provide a concise summary with a description and timing of the components of the SALM. Additionally, include a description of the net benefits proposed by the methodology. For example, the introduction of wood stoves is mentioned on page 17 of the methodology but is not fully described.

**Proponent Response on December 10, 2009:** 1. The components of the SALM are included in the

PDD that accompanies the revised methodology.

2. The text on the use of stoves has been removed.

**Auditor Response:** This finding was addressed by removing text on the use of stoves and providing components of the SALM with the accompanied PDD.

#### **NIR Number 1 of 1 Dated January 13, 2010**

**Finding:** The methodology does not specify the soil depth increment or depth increments that are to be included when modelling or measuring soil carbon stocks. The methodology developer must specify, or provide some criteria to establish, the soil depth increment or depth increments.

**Proponent Response on December 10, 2009:** Text has been added that specifies that the soil organic carbon is modelled to a depth of 30 cm.

**Auditor Response:** The authors have included text that specifies the depth increment (0-30cm) at which the soil organic carbon is to be modelled. This text may need alteration because models have different specifications. For example, the CENTURY SOM sub-model actually specifies that the model is only valid for 0-20cm depth. However, the RothC and DNDC models are variable depending on initial sampling depth used when parameterizing the model.

#### **Opportunities for Improvement (OFI)**

#### **OFI Number 1 of 2 Dated January 13, 2010**

**Finding:** This finding is in response to NCR 2 of 5 for October 12, 2009. Table 1 explains the above- and belowground pools of interest to the methodology. Two CDM tools are referenced in Sections II.4.4 and III.1.4 to estimate changes in C stocks of trees and shrubs in the baseline and project, respectively. However, the new text in Table 1 does not refer to these tools. Although redundant, it would be clearer to refer to the tools here as well.

**Proponent Response on December 10, 2009:** Methodology has been amended to reference all tools in the tables mentioned.

**Auditor Response:** All the tools are now referenced in table 1.

#### **OFI Number 1 of 2 Dated January 13, 2010**

**Finding:** This finding is in response to NIR 2 of 12 for October 12, 2009. The methodology developers provided a document entitled "Technical guidelines: Activity baseline and monitoring survey guideline for sustainable agricultural land management practices (SALM)." This document is an excellent addition overall and includes suggestions for resources available for required model parameters. The following comments should be addressed to improve the document:

1. Add even number page numbers. Only the odd pages are numbered.
2. On page 4, the following bolded statement is misleading : Step 1: Selecting a suitable model: In Africa RothC and CENTURY are the most widely used models to predict soil carbon stock changes. Therefore, they have been tested for their suitability.” This is ambiguous and implies that the models are valid for any project. This conflicts with the new applicability condition added to test model verification.
3. On page 7, selection of sampling size seems adequate, but it is not clear whether the same group will be selected for each survey or if the selection will be random each time. This is addressed on page 10, section 2.4, but should be reiterated on page 7.

**Proponent Response on December 10, 2009:** Text has been added to the “Guidelines” to clarify the issues raised.

**Auditor Response:** *I did not see an updated version of the Technical Guidelines: Activity Baseline and Monitoring Survey Guideline for Sustainable Agricultural Land Management Practices document with the revisions. These were minor revisions, but it would be nice to see the changes.*

## Responses to C-Lock Technology Comments on Proposed VCS SALM Methodology (Oct 2009)

Public Comment	Method Developers' Response	Validators' Comments
<p>Baseline approach. The apparent assumption of constant C stocks during the project crediting period seems to rule out a dynamic baseline and doesn't recognize that biological C stocks are always in flux, if not due to changes in management then due to non-anthropogenic influences. We believe that a dynamic baseline is a better representation of reality.</p>	<p>I agree but            1) In an effort to keep the "first" methodology simple we have made that assumption.            2) The methodology does not need to solve all systems at one. The dynamic baseline should be covered by a subsequent methodology</p>	<p>The comment was addressed satisfactorily. With the addition of the applicability condition (b) "The land is degraded and will continue to be degraded or continue to degrade", the assumption that changes in soil organic carbon stocks are zero can be considered conservative.</p>
<p>Applicability. (b) "pressure to remain in agriculture" ? This criterion needs to be better defined. How would such pressure be measured?; ( c) How is declining fertilizer use relevant?</p>	<p>Applicability condition has been removed</p>	<p>The comment was addressed satisfactorily. Applicability condition (b) was removed and substituted with the requirement that the land be degraded and/or degrading according to the CDM "Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities." Applicability condition (c) was removed.</p>
<p>Using the CDM additionality tool: the financial analysis components of the A/R tool are unrealistic and onerous to apply to individual, producer-driven ag projects. There should be provision for using regional common practice and sensitivity analyses .. possibly some regional investment analysis could also be applied?</p>	<p>This may be true, but the CDM additionality tool has been accepted.</p>	<p>The comment was addressed satisfactorily.</p>
<p>Fertilizer N<sub>2</sub>O emissions: why are there no provisions for the use of nitrification inhibitors?</p>	<p>The methodology does not need to cover all possibilities. It only needs to be conservative. In the interests of simplicity of this methodology, this will not be added.            This could be added by the reviewer to a new methodology if he/she would want to make this</p>	<p>The comment was addressed satisfactorily. For simplicity, the potential for decreases in soil N<sub>2</sub>O production from the use of nitrification inhibitors was not included.</p>

	modification,	
<p>II.4.5. Specifies that the standard deviation “within each group” should be &lt;10% of the average value. This requires better definition – the uncertainty analysis can be slanted to reduce the SD but that may not be the best estimate of uncertainty. Also, the concept of “equilibrium” with respect to SOC is almost irrelevant in managed systems, since C is always in flux, if not due to management then due to changing climate. It is fine to model a benchmark C stock at project start but one should not expect that stock to remain constant, OR to accurately represent the actual C stocks on specific sites.</p>	<p>The concept of equilibrium carbon stocks is inherent to a IPCC Tier 2 type methodology. The transition period approach in the methodology covers the eventuality that SALM practices change or are discontinued.</p>	<p>The comment was addressed satisfactorily. With the addition of the applicability condition (b) “The land is degraded and will continue to be degraded or continue to degrade”, the assumption that changes in soil organic carbon stocks are zero can be considered conservative. The inclusion of transition period estimates allow for estimates of soil organic carbon in the event that practices are not carried out throughout the entirety of the project period at all project locations.</p>
<p>II.4.6. Baseline sequestration – is assumed to be 0. This assumption is problematic since in N.Am and Europe agricultural C stocks are tending to rise slowly even under BAU management. This is a fundamental problem with this methodology.</p>	<p>The methodology DOES NOT need to cover all situations. It just needs to be conservative. In the interests of trying to keep the methodology simple, we have made this assumption based on applicability condition. The reviewer is welcome to create a new methodology that covers the possibility of dynamic SOC in the baseline.</p>	<p>The comment was addressed satisfactorily. With the addition of the applicability condition (b) “The land is degraded and will continue to be degraded or continue to degrade”, the assumption that changes in soil organic carbon stocks are zero can be considered conservative.</p> <p>Soil organic carbon pools are in flux in most ecosystems, and are affected non-linearly by management practices. It is possible that business as usual practices in managed agricultural ecosystems increase soil organic carbon. Thus, the assumption that baseline rate of soil carbon accumulation is zero is problematic. To address this, methodology developers defined an eligibility criterion that reflects a process to ensure additionality of changes in soil carbon pools.</p>

<p>III.1.6. Estimate of project SOC with transitions. This item is confusing but looks like it requires annual SOC estimates based on a linear extrapolation between the project start date and the new equilibrium, which is scientifically shaky because soil C doesn't accumulate in a linear but rather in an asymptotic fashion. Also it puts too much reliance on a stock projection which is decades into the future.</p>	<p>This assumption is inherent in the IPCC Tier 2 soil methodology.</p>	<p>The comment was addressed satisfactorily</p> <p>It is true that soil organic carbon will accumulate non-linearly, in an asymptotic fashion. However, this assumption is acceptable under the IPCC Tier 2 Good Practice Guidelines.</p>
<p>II.2. Leakage. Non-renewable biomass needs to be defined – the vague reference does not actually point to a definition – just a large collection of documents – and this will cause confusion. It may refer to any biomass that comes in from outside the project boundary?</p>	<p>Please see CDM documents on the definition of non-renewable biomass. They are referenced in the methodology quoted.</p>	<p>The comment was addressed satisfactorily, and the CDM tool provides a definition of non-renewable biomass.</p>
<p>II.3. Net Anthropogenic GHG emissions &amp; removals are calculated from: II.4.7 – III.1.8 – III.2. This looks like Baseline minus Project? Shouldn't it be the other way around?</p>	<p>No, it should not. Project emission reductions are defined as baseline EMISSIONS minus project EMISSIONS.</p>	<p>The comment was addressed satisfactorily.</p>
<p>IV.1.2. Why are fertilizer prices relevant? And why annually?</p>	<p>Originally the thought was that fertilizer use was inversely proportional to price, so a decrease in fertilizer use may not have been a result of the project, but as a result of an increase in price. Nevertheless, this has been removed.</p>	<p>The comment was addressed satisfactorily. The equation for fertilizer use has been updated.</p>
<p>Sampling design. The requirement for data items listed in IV.1.2 to be updated at least every 5 years appears inconsistent with the Table in IV.3.3, which requires ANNUAL updates for most management parameters.</p>	<p>Agreed. This is now part of the methodology</p>	<p>The comment was addressed satisfactorily. The methodology developers included sampling design in section IV, which is elaborated on in an annex – “Technical Guidelines: Activity Baseline and Monitoring Survey Guidelines for Sustainable Agricultural Land Management Practices.”</p>
<p>IV.3.3. Table of data to be recorded for GHG emissions &amp; removals... should there be a</p>	<p>Since the data requirements are model dependent and the model used is project specific,</p>	<p>Data used for model parameterization is a critical component of this</p>

<p>placeholder for “required model data” that is contingent on the model used?</p>	<p>these data appear in the PDD and not in the methodology.</p>	<p>methodology. Applicability condition (e) was included to require the use of previous research in the project area for model validation. The annex, “Technical Guidelines: Activity Baseline and Monitoring Survey Guidelines for Sustainable Agricultural Land Management Practices.” While the validators and guidance from VCS found this approach to be acceptable, the second validator should pay careful attention to the process of model parameterization based on data from agroecological regions.</p> <p>10/22/10 – subsequently addressed per guidance from VCS</p>
<p>Section 1.2 – Selection of Baseline Approach The statement that “agricultural practices can change very slowly...” is an assumption, which in a significant number of cases will not be true. At the very least this must be given as an applicability criteria, such that the proponent must demonstrate that this is true in the area of the project for the type of agriculture being practiced within the project boundary before applying the methodology. In order to do this, some definition of what “very slowly” means must be given. I suspect that the examples being considered were for small scale or subsistence farming, where this statement might in many cases be true. However, at this point this methodology is also potentially applicable to first world agriculture, where this statement might often not be true. This is the key applicability criteria for this methodology,</p>	<p>I have removed the comment about "agricultural practices changing very slowly". I also agree that if this baseline approach is not reasonable then a new methodology will be needed, but one is not required to answer all problems with a single methodology. One is though required to be conservative when making assumptions or simplifications. That would be a different methodology.</p>	<p>The comment was addressed satisfactorily. The final version of the methodology includes strict applicability condition that would limit the utility of the methodology.</p>

<p>since for projects where this is not true a completely different baseline approach will be needed, the tools for which are not given in this methodology.</p>		
<p>Section 1.4 – Below ground biomass A minor point, but the statement “Belowground biomass is expected to increase...” appears to be reflecting some particular project scenario. This may not be true in all project scenarios. The Explanation/Justification should be the same as for Above ground biomass</p>	<p>I agree, but this would be discovered with the methodology. As this is a statement discussing which pools should be included then it should be included. No change to the methodology is needed.</p>	<p>The comment was addressed satisfactorily. Belowground biomass was further defined and included in monitoring methods.</p>
<p>II.4.5 and III.1.5 &amp; 6 – Reliance on modeling for soil C. Existing models are more or less applicable to specific ecosystems and management practices depending on the amount of sampling and truthing which has been done for the models under those circumstances. We would generally suggest that at least some soil sampling be done for the baseline scenario to truth the models. As well, proponents should get access to potential error estimates for the models for the scenarios modeled, and where those error estimates are very large, should use a conservative approach to model results.</p>	<p>As per the VCS guidelines, soil sampling IS NOT REQUIRED.  An estimated of the error is a PDD related issue because it depends on sampling and exactly what type of SALM will be implemented. An error analysis is given in the accompanying PDD.</p>	<p>IPCC Tier 2 Good Practice Guidelines suggest the use of activity-based models and/or field sampling. The use of a model-only approach was a primary concern of the validator, and IPCC Tier 2 and VCS standards were unclear on the justification of a model-only approach for an aggregated, regional project methodology. The validator sought guidance from VCS and finds this approach acceptable, provided that the model is parameterized accurately.  10/22/10 – subsequently addressed per guidance from VCS</p>
<p>4) III.1.5 – Project equilibrium, last paragraph page 10 Not sure what this paragraph means in real terms. There are two possible interpretations – that the standard deviation (Standard error of the mean? At 90% confidence interval? 95% confidence interval?) in the input parameters within any given stratum should be less than 10% of the mean, or that the modeled deviation should</p>	<p>In soil models and the IPCC soil methodology, the SOC comes to a stable equilibrium after many years (20 years), if the same practice is applied. I refer the commenter to the IPCC Tier 1 methodology. We are proposing an IPCC Tier 2 methodology using the modelling to create the values appropriate for the project situtaion.</p>	<p>The comment was addressed satisfactorily, given the appropriate use of IPCC Tier 2 methodology and a model-only approach.  10/22/10 – subsequently addressed per guidance from VCS</p>

<p>be less than 10%. This latter interpretation relies on an ability of the model to forecast such deviation, which in turn relies on the degree to which the model has been truthed for the specific circumstances obtaining under the project scenario. This is a very important consideration, which needs to be well defined, and workable in the real world. This section deserves a detailed explanation.</p>		
<p>III.1.6 – Soil organic carbon with transitions  Ranges of error for values of D also need to be estimated. This is an area where very little data exists. Proponents will need to demonstrate that the figure they use is conservative. I would recommend removing the option to use the IPCC default 20 years, since in many cases this will be significantly wrong, and non-conservative. I would also note that this equation assumes a straight line function. This is a reasonable approach at this time, given the paucity of data, but should be reviewed as more data is gathered, as in many cases variations on sine curves may be more accurate.</p>	<p>As this IS an IPCC Tier 2 methodology, the use of the 20 year default is justified. Contrary to the reviewer’s comments, in warm climates, the transition period tends to be faster than 20 years. And since we are discussing increases in SOC, assuming 20 years will be that the SOC accumulates slower with the project. Thus the methodology is conservative.</p>	<p>The comment was addressed satisfactorily.</p>
<p>VI.1 - Equation 11  Subtraction of area burnt from the area should only be applied to above ground portion, not both.  Fracrenew is not correctly applied in this equation. For instance, an alfalfa field that is only renewed every 3 years does not have 1/3 the emissions of one that is renewed every year. Although there may be some effects associated with renewal, these effects are very site specific and hard to model. Conservatively this factor</p>	<p>This equation is a paraphrase of the IPCC 2006 guideline method for calculating emissions from N-fixing species. There both terms are included. Please see the IPCC 2006 guidelines for N-fixing species.</p>	<p>The comment was addressed satisfactorily.</p>

should be removed.		
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