

BITUMEN METHODOLOGY ELEMENT ASSESSMENT REPORT



Document Prepared By First Environment, Inc.

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Summary:

First Environment, Inc. (First Environment) was retained to provide the second assessment in the VCS double-approval process for the proposed Methodology Element titled, "Substitution of Bitumen Binder in Hot Asphalt Production and Usage." The Methodology Element provides procedures for monitoring and calculating emission reductions associated with the substitution of a portion of the bitumen binder used in conventional hot asphalt paving for a sulphur product.

The methodology assessment process consists of an independent third-party review of the new Methodology Element. In particular, the methodology assessment shall confirm that the Methodology Element is consistent with all relevant VCS rules and procedures. The assessment of the new Methodology Element is done through a double-approval process, according to the VCS Standard and is necessary to provide assurance to stakeholders of the quality of the new Methodology Element.

The methodology assessment was conducted using the VCS Standard, v3.3 as the criteria. Additionally, First Environment followed guidance in the VCS Methodology Approval Process, v3.4 and the VCS Program Guide, v3.4 and applied its professional judgment as informed by ISO 14064-3 in assessing the proposed methodology.

During the assessment process, First Environment issued several clarification and corrective action requests – all of which were addressed sufficiently by Shell. First Environment is of the opinion that the "Substitution of Bitumen Binder in Hot Asphalt Production and Usage," as described in Version 1.11 of the Methodology Element dated January 23, 2014 meets all relevant VCS requirements.

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1 INTRODUCTION

This report is provided to Shell as a deliverable of the Verified Carbon Standard (VCS) Methodology Element (ME) assessment process for the proposed VCS ME titled “Substitution of Bitumen Binder in Hot Asphalt Production and Usage.” This report provides a description of the steps involved in conducting the second methodology assessment as a part of the VCS double-approval process and summarizes the findings of the second methodology assessment.

First Environment, Inc. (First Environment) was provided copies of the ME, dated June 15, 2012, and the first assessment report, dated June 20, 2012. Based on this documentation, the Audit Team performed a document review and desktop audit, which resulted in corrective action and clarification requests (discussed later in this report), and revisions to the ME. The version of the ME, dated June 21, 2013, originally served as the basis of the conclusions presented herewith. Following the report reconciliation process (see Section 6), First Environment reviewed the final version of the ME dated January 23, 2014 to confirm that the conclusions represented in this report remain valid.

1.1 Objective

The purpose of the methodology assessment is to have an independent third party assess the conformance of the ME with VCS requirements.

1.2 Scope and Criteria

The methodology assessment scope is defined as an independent and objective review of the proposed ME. The methodology assessment is conducted using the *VCS Standard, 4 October 2012, v3.3* (VCS Standard) as the criteria. The *VCS Methodology Approval Process, 4 October 2012, v3.4* (VCS Methodology Approval Process); the *VCS Program Guide, 4 October 2012, v3.4* (VCS Program Guide); and the ISO 14064-3 standard guided First Environment’s process.

First Environment and Shell have agreed that a reasonable level of assurance be applied to this assessment.

1.3 Summary Description of the Methodology Element

The ME is applicable to projects that substitute a portion of the bitumen binder used in conventional hot asphalt with an alternative solid sulphur modifier. Greenhouse gas (GHG) emissions reductions are achieved through the avoided production of a proportion of bitumen binder and aggregate from hot-mix facilities and through reduced fossil fuel consumption due to lower mix production temperatures required for asphalt production using solid sulphur modifiers. The ME provides procedures for determining methodology applicability, establishing the project boundary, determining the baseline scenario, demonstrating additionality, monitoring fuel consumption and other relevant parameters, and finally, quantifying baseline and project emissions and total emission reductions.

2 ASSESSMENT APPROACH

2.1 Method and Criteria

The following assessment process was used:

- conflict of interest review;
- selection of assessment team;
- kick-off meeting with Shell;
- development of the validation plan;
- desktop review of the ME and other relevant documentation;

- follow-up discussions with Shell for supplemental information, as needed, as well as the corrective action cycle; and
- assessment report development.

The validation process was utilized to evaluate whether the ME was consistent with the stated criteria. A methodology assessment checklist was developed which summarizes the criteria used to evaluate the ME, the conformance of the ME with each criterion, and the Audit Team's assessment findings.

Conflict of Interest Review

Prior to beginning any assessment project such as this, First Environment conducts an evaluation to identify any potential conflicts of interest associated with the project. No potential conflicts were found for this project.

Audit Team

First Environment's audit team consisted of the following individuals who were selected based on their assessment experience.

Lead Auditor – Iris Caldwell
Auditor – Howard Kanter, Jeff Daley
Internal Reviewer – James Wintergreen

Audit Kick-off

The assessment process was initiated with a kick-off conference call on October 18, 2012 between First Environment and the primary Shell contact, Timo Makinen. The communication focused on confirming the assessment scope, objectives, criteria, schedule, and the information required for the methodology assessment.

Development of the Validation Plan

Based on the information discussed during the kick-off conference call, the Audit Team formally documented its validation plan and provided the validation plan to Shell.

Desktop Review

The Audit Team performed a desktop review of the ME and supporting documentation, as further described in Section 2.2 below.

Corrective Actions and Supplemental Information

The Audit Team issued requests for corrective action and clarification during the methodology assessment process, as described in Section 2.5. The corrective action and clarification requests and the responses provided by Shell are summarized in Section 4.

Assessment Reporting

This methodology assessment report documents the methodology assessment process and identifies its findings and results.

2.2 Document Review

Applicability requirements, baseline approach, additionality, project boundary, emissions quantification, leakage, monitoring, data and parameters, and other pertinent criteria were assessed to evaluate the ME against VCS program requirements. In order to help inform the assessment, First Environment reviewed

the references cited in the ME as well as other approved methodologies. Discrepancies between the assessment criteria and the ME were considered material and identified for corrective action, as further described in Section 2.5.

2.3 Interviews

The Audit Team held teleconferences with the following individuals during the course of the methodology assessment:

- Timo Makinen – Shell
- Ian Kuwahara – The Prasino Group, Inc.
- Liz Brennan – The Prasino Group, Inc.

2.4 Use of VCS-Approved Expert

A VCS-approved expert was not retained for the purposes of this methodology assessment because the methodology element does not involve the use of performance standards or fall under the Agriculture, Forestry, and Other Land Use project type.

2.5 Resolution of Any Material Discrepancy

As described in Section 2.1, the Audit Team issued formal requests for corrective action, clarification, and supplemental information during the methodology assessment process. In particular, discrepancies between the ME and the VCS Standard were identified for corrective action and required appropriate justification. Clarification and supplemental information requests served to provide the Audit Team additional context or background information in order to complete the assessment process. Shell was given the opportunity to resolve the requests through the submittal of additional evidence or justification, revisions to the ME and/or other means as appropriate. The specific corrective action and clarification requests issued by the Audit Team, as well as the responses provided by Shell, are summarized in Section 4.

2.6 Internal Quality Control

First Environment is an accredited validation and verification body by the American National Standards Institute (ANSI). This accreditation assures the quality controls inherent in our assessment process, which includes an independent internal review process as required by the ISO 14064-3 standard. The Internal Reviewer, who is selected as a senior member of First Environment's staff, conducts a high-level review of the methodology assessment activities and conclusions and confirms that they are consistent with the assessment criteria as well as First Environment's internal management procedures. All issues identified during the internal review are resolved before the issuance of deliverables to the client.

3 ASSESSMENT FINDINGS

3.1 Applicability Conditions

The ME clearly identifies criteria by which to assess the eligibility of hot-mix asphalt projects using a solid sulphur modifier. Specifically, the ME requires that eligible projects must meet the following applicability conditions:

- The most reasonable and credible baseline scenario is the production and use of conventional hot-mix asphalt for paving.
- In the baseline, the solid sulphur modifier is produced as a byproduct of other industrial processes and is not produced for use as an extender or modifier in the paving process.

- Project activities may be implemented at existing hot-mix facilities (brownfield sites) or at new facilities (Greenfield sites) as a best practice technology.
- A proportion of the bitumen binder used in conventional hot-mix asphalt production is substituted with Sulphur Extended Asphalt Modifier (SEAM). Other binder substitute products that replace bitumen are not eligible; however, additives which facilitate the substitution of bitumen with SEAM are allowed.
- The project must adhere to requirements and procedures established by the SEAM manufacturer for appropriate handling, storage, and use as well as construction specifications and mix design in order to ensure the production of asphalt in a manner that is safe and functionally equivalent to conventional hot mix asphalt.
- The resulting asphalt product must meet all applicable legal and technical requirements. In the absence of technical specifications for asphalt, project proponents must demonstrate that asphalt produced under the project condition provides the equivalent function to asphalt that would have been produced under the baseline condition.
- Reclaimed asphalt pavement (RAP) mixes are eligible if they are mixed at a hot-mix facility (not in-situ) and if an equivalent or lower proportion of RAP is used in the baseline scenario compared to the project scenario.

The criteria identified provide a clear basis for determining the ME's applicability to potential project activities. First Environment concluded that the applicability conditions given in the ME are appropriate, adequate, and consistent with the VCS Standard.

3.2 Project Boundary

The project boundary encompasses the operation of a single hot-mix asphalt facility as well as upstream emissions from electricity generation and production and processing of bitumen, aggregate, and other asphalt additives. The project activity may consist of numerous paving sites, or "paving segments," as defined in the ME. The ME identifies relevant sources of baseline and project emissions and indicates whether each is included or excluded from the project boundary.

First Environment determined that the ME provided sufficient criteria to establish the project boundary and that all relevant emission sources and GHGs are included.

3.3 Procedure for Determining the Baseline Scenario

The ME requires the use of the Clean Development Mechanism's (CDM) "Combined tool to identify the baseline scenario and demonstrate additionality" (Combined Additionality Tool) in order to determine the baseline scenario. Because the CDM is an approved GHG program under the VCS, First Environment considered the use of the Combined Additionality Tool an acceptable approach consistent with the VCS Standard.

The ME also provides additional guidance for projects that involve the use of RAP. More specifically, baseline emissions cannot be claimed for RAP displaced by SEAM as part of the project. This ensures that the quantification and monitoring methodologies identified in the ME are adequate and appropriate. However, the ME does allow project proponents to make adjustments to the volumes or proportions of bitumen binder—with approval from the Validation and Verification Body—to provide a conservative assertion.

3.4 Procedure for Demonstrating Additionality

The ME requires the use of the Combined Additionality Tool, or the CDM's "Tool for the demonstration and assessment of additionality" (Additionality Tool) in order to demonstrate project additionality. Because the CDM is an approved GHG program under the VCS, First Environment considered the use of either the Combined Additionality Tool or the Additionality Tool an acceptable approach consistent with the VCS Standard.

3.5 Baseline Emissions

The ME provides procedures and equations for the calculation of baseline emissions. Specifically, baseline emissions are quantified by summing emissions due to the production and processing of bitumen and aggregate; the storage, drying, and hot-mixing of bitumen binder; and the generation of electricity required for the operation of the conventional hot-mix facility.

The quantities of bitumen and aggregate used in the baseline scenario are estimated by multiplying the mass of asphalt produced in the project scenario by the mass fraction of bitumen and aggregate required for conventional hot-mixing. Baseline emissions from production and processing of these materials are determined by multiplying the total quantities of bitumen and aggregate required in the baseline scenario by appropriate emission factors for each.

Baseline emissions due to storage, drying, and hot-mixing include process emissions and fuel combustion emissions. Process emissions are determined by multiplying the quantity of bitumen used in the baseline scenario by the emission factor for conventional hot-mixing, which is determined by either using site-specific sampling data or default values. The volume of fuel combusted during the baseline scenario is calculated based on the heating requirements for conventional hot-mixing. Fuel combustion emissions are then determined by multiplying the volume of fuel by an appropriate emission factor.

Baseline emissions due to generation of electricity are only considered when electricity consumption is greater in the project scenario compared to the baseline scenario. Electricity generation emissions are determined by multiplying the quantity of electricity consumed in the baseline by an appropriate emission factor.

First Environment reviewed all formulae and quantification methods for accuracy and concluded that the approach to calculate baseline emissions is appropriate, adequate, and consistent with the VCS Standard.

3.6 Project Emissions

The ME provides procedures and equations for the calculation of project emissions. Specifically, project emissions are quantified by summing the emissions due to the production and processing of secondary additives, bitumen binder, and aggregate used in the hot-mix production during the project case. Additionally, emissions due to the storage, drying, and hot-mixing of bitumen and the generation of electricity for operating the hot-mix facility are also accounted for as project emissions.

The quantity of secondary additives consumed during the project is estimated by multiplying the percent of additives in the SEAM by the quantity of SEAM consumed. Quantities of bitumen and aggregate consumed during the project are monitored directly. Project emissions from production and processing of these materials are determined by multiplying the total quantities of secondary additives, bitumen, and aggregate by appropriate emission factors for each.

Project emissions due to storage, drying, and hot-mixing include process emissions and fuel combustion emissions. Process emissions are determined by multiplying the quantity of bitumen used during the project by the emission factor for hot-mixing, which is determined by either using site-specific sampling data or default values. The volume of fuel combusted during the project is monitored directly. Fuel combustion emissions are then determined by multiplying the volume of fuel by an appropriate emission factor.

Project emissions due to generation of electricity are determined by multiplying the quantity of electricity consumed during the project by an appropriate emission factor.

First Environment reviewed all formulae and quantification methods for accuracy and concluded that the approach to calculate project emissions is appropriate, adequate, and consistent with the VCS.

3.7 Leakage

There are no sources of leakage emissions associated with the project activity.

3.8 Quantification of Net GHG Emission Reductions and/or Removals

Emission reductions are calculated as the difference between baseline and project emissions. First Environment determined that this approach to calculate emission reductions is appropriate, adequate, and consistent with the VCS Standard.

3.9 Monitoring

The monitoring of all data and parameters required to quantify emissions are described and appropriately defined in the ME. Specifically, the ME establishes requirements for monitoring procedures, measurement frequency, and quality control and quality assurance for all monitored data and parameters. Additionally, the ME specifies that all data shall be retained for at least two years after the end of the last crediting period, consistent with VCS requirements. First Environment determined that the monitoring approach is appropriate and sufficient in order to obtain the necessary data for emission reductions quantification as well as meets relevant requirements in the VCS Standard.

3.10 Data and Parameters

The ME describes all data and parameters required for emission reduction quantification and classifies them as either monitored or not monitored. The descriptions include source of data, unit of measurement, measurement procedures and frequency, default values where appropriate, and other comments necessary for project implementation or validation/verification. The ME requires that factors used in the emission reduction calculations are from reputable sources and/or representative of the emission source or activity for which they relate.

First Environment concluded that the data and parameters given in the ME, as well as the associated requirements for measurement, are appropriate and sufficient to reduce uncertainty in the emission reduction calculations and financial barriers analysis.

3.11 Use of Tools/Modules

The ME references the Combined Additionality Tool and the Additionality Tool. These tools were developed by the CDM, which is an approved GHG program under the VCS.

3.12 Adherence to the Project Principles of the VCS Program

The ME was developed in accordance with the requirements of VCS and adequately addresses the principles of relevance, completeness, consistency, accuracy, transparency, and conservativeness.

3.13 Relationship to Approved or Pending Methodologies

Although several related methodologies were identified during the methodology element development process, the degree to which these existing methodologies would have to be revised in order to incorporate the use of bitumen binder substitution is substantial enough to warrant a new methodology.

3.14 Stakeholder Comments

No public stakeholder comments were received.

4 RESOLUTION OF CORRECTIVE ACTION REQUESTS AND CLARIFICATION REQUESTS

As described above, the Audit Team requested corrective actions, clarification, and supplemental information during the methodology assessment process. The corrective action and clarification requests and the responses provided by Shell are summarized in the tables below:

ID	Corrective Action Request	Summary of Methodology Developer Response	Validation Conclusion
1	<p>The ME does not apply the latest version of the VCS Methodology Template. Specifically:</p> <ul style="list-style-type: none"> Section 2 does not include the Additionality/Crediting Baseline table. Several parameter boxes in Section 9.2 (Electricity P, $EF_{Mixer\ CH_4}$, $EF_{Mixer\ CO_2}$, Rate) are not consistent with the VCS template. Section 9.4 does not exist in the most current template. The template version number in the footer is out-of-date. 	<p>The ME was updated to be consistent with the latest version of the VCS Methodology Template.</p>	<p>Response is acceptable.</p>
2	<p>Section 2 and Table 4 of the ME identify several additional project requirements and underlying assumptions that are not clearly described as applicability conditions in Section 4.</p>	<p>Section 4 was revised to include a more complete list of applicability conditions based on information provided in Section 2 and Table 4.</p>	<p>Response is acceptable.</p>
3	<p>The ME does not address right of use (e.g., identification of project proponent, avoidance of double-counting, etc.).</p>	<p>Language was added to Section 2 of the ME to clearly address right of use and avoidance of double-counting. More specifically, the ME further clarifies that a project proponent may be the technology owner, manufacturer, road owner, or other party associated with the asphalt products produced. To avoid the risk of double counting of environmental credits related to the project activity, the project proponent must demonstrate that other participants along the product supply chain do not claim GHG emission reductions associated with the project activity.</p>	<p>Response is acceptable.</p>
4	<p>The ME does not clearly define "solid sulphur product," or what are considered acceptable substitutes for bitumen binder under this methodology.</p>	<p>Further detail was added to the definition of SEAM. In addition, definitions for "additive" and "binder substitute" were added to Section 3.</p>	<p>Response is acceptable.</p>
5	<p>Please justify the appropriateness of claiming emission reductions from fuel extraction/ processing and electricity generation activities in the baseline scenario.</p>	<p>Baseline emissions from fuel extraction/processing were removed from consideration. This is conservative. The ME was revised to indicate that baseline emissions from electricity generation activities should only be considered when it is conservative to do so.</p>	<p>Response is acceptable.</p>
6	<p>The ME inconsistently describes the project boundary. In particular,</p> <ul style="list-style-type: none"> the project boundaries identified in Figures 1 and 2 do not align with the included SSRs identified in Table 4 and the quantification methodologies given in Section 8 of the ME, and Figures 1 and 2 include additional SSRs that are not described in Table 4. 	<p>The ME was revised to consistently describe the project boundary between Figures 1 and 2, Table 4, and Section 8.</p>	<p>Response is acceptable.</p>

ID	Corrective Action Request	Summary of Methodology Developer Response	Validation Conclusion
7	The equations in Section 8 do not clearly indicate how emissions will be quantified on a CO ₂ e basis or converted to metric tonnes. Please also provide sample calculations to the Audit Team as further support.	The equations were revised to more clearly incorporate the global warming potentials for CH ₄ and N ₂ O. Equations 1 and 12 were revised to include the conversion from kilograms to metric tonnes.	Response is acceptable.
8	The ME does not adequately address procedures for managing data quality. In particular: <ul style="list-style-type: none"> a) The QA/QC guidance in Section 9.2 of the ME does not constitute clear procedures. Please expand the discussion to indicate how project proponents should interpret information gathered through cross-checks and to provide appropriate QA/QC procedures for those parameters with no guidance. b) The ME does not address instrument calibrations on a parameter basis. c) QA/QC guidance in Section 9.3 does not clearly indicate which measures are appropriate for the specific parameters in question. 	The ME was revised as follows: <ul style="list-style-type: none"> a) The QA/QC procedures and calibration guidance was revised and expanded in Section 9.2. Specifically, the cross-checking guidance was expanded to indicate its purpose and frequency. b) Where appropriate, description of instrument calibrations was added to parameter boxes in Section 9.2. c) Because QA/QC guidance was expanded in Section 9.1 and 9.2 for specific parameters, the guidance in Section 9.3 is meant to generally apply to all parameters as appropriate. 	Response is acceptable.
9	Section 9.1 of the ME does not specify which default factors may become out of date in the “Any Comment” box, in accordance with the VCS Methodology template guidance.	The parameter boxes in Section 9.1 were revised to indicate which factors may be updated during the course of the crediting period.	Response is acceptable.
10	The ME does not clearly indicate which monitored parameters should be assessed for data uncertainties and does not provide a clear procedure for estimating a 90% or 95% confidence interval in these cases.	Section 9.3 was revised to indicate which fixed parameters may be subject to uncertainty. Measurement methods are generally adequate to minimize uncertainty for monitored parameters.	Response is acceptable.
11	The ME does not adequately address parameter data sources. In particular: <ul style="list-style-type: none"> a) The information provided in the “Source of data” boxes in Section 9 is either misleading or does not provide sufficient detail regarding the actual sources of data. b) The ME does not consistently require that default values are sourced from recognized, credible sources and are geographically and temporally relevant per Section 4.5.6 of the VCS Standard. c) The ME does not consistently require default values to be representative of project operations. d) Appropriate references are not given for the following default values: C_{Bitumen}, C_{Aggregate}, density of bitumen, T_{hot-mix}, HV_{Fuel i}, Eff, EF_{CB,x}, and %CB. 	The ME was revised as follows: <ul style="list-style-type: none"> a) Additional detail was added to the parameter boxes in Section 9 to further specify the source of data (e.g., estimation from local/regional/national inventories, site-specific analysis, product requirements, etc.) b) More consistent language was added to the “Any comment” box for parameters where default values may be used. Specifically, the ME requires that project proponents must ensure default values are appropriately representative of the project, including geographically and temporally relevant and from recognized, credible sources. c) See response to b) above. 	Response is acceptable.

ID	Corrective Action Request	Summary of Methodology Developer Response	Validation Conclusion
	<p>Provide copies of supporting documentation as necessary.</p> <p>e) Please justify the source of the “typical” content of bitumen binder in hot-mix asphalt used to calculate the emissions factors in Table A2 and provide supporting documentation for these calculations.</p>	<p>d) The default values were sourced from the <i>Quantification Protocol for the Substitution of Bitumen Binder in Hot-mix Asphalt Production and Usage, v1.0</i> issued under the Alberta Specified Gas Emitters Regulation (Alberta Protocol). First Environment concluded that this was an acceptable secondary source per Section 4.5.6 of the VCS Standard.</p> <p>e) The data and source references for Table A2 were updated.</p>	
12	The parameters and equations used for quantifying project emissions from production and processing of additives in Section 8.2 (i.e., %CB and EF _{Production}) do not clearly address other additives besides carbon black.	Sections 8 and 9 were revised to more generically reference all additives, as opposed to only carbon black.	Response is acceptable.
13	Please further clarify and justify the appropriateness of the frequency of sampling and/or measurement identified for parameters in Section 9.2.	The ME was revised to more clearly describe the required frequency of sampling and/or measurement for monitored parameters in Section 9.2.	Response is acceptable.

ID	Clarification Request	Summary of Methodology Developer Response	Validation Conclusion
1	Please further describe what activities constitute a single project.	Additional detail was provided in Sections 2 and 5 regarding the specific activities that constitute a project. The term “paving segment” is used throughout the ME to describe individual paving activities. These can be aggregated together to form a project under VCS as long as the individual activities meet the applicability conditions and involve a single hot-mix facility.	Response is acceptable.
2	Please describe any regulatory or other environmental considerations that are relevant for the substitution of bitumen binder with a solid sulphur product (e.g., permitting, air pollution controls, etc.).	The only significant difference from the use of a sulphur-based replacement to conventional hot-mix bitumen/asphalt is that extra care that must be taken to ensure the mix plant is operated below stated temperature limits. At higher temperatures the potential exists for the formation of toxic hydrogen sulphide gas (H ₂ S) and potentially harmful oxides of sulphur (SO _x). Because the addition of sulphur into the mix creates a “warm mix asphalt,” operation of the mix plant below the required ceiling of 145°C is easily accomplished.	Response is acceptable.

ID	Clarification Request	Summary of Methodology Developer Response	Validation Conclusion
3	Please describe realistic alternatives to the project activity and the types of implementation barriers faced by the project and its alternatives. In addition, further clarify in Section 6 of the ME if any baseline alternatives should be required for consideration by project proponents as part of the determination of the baseline scenario.	There are no specific baseline conditions that should be considered by all project proponents using this methodology. The Combined Tool requires alternatives to be determined on a project-specific basis. Alternative scenarios may include use of other additives for warm mix asphalt, or conventional hot-mix asphalt.	Response is acceptable.
4	Please describe other potential applications for solid sulphur products such as SEAM and whether these products would be produced in the absence of the project activity.	Alternative solid sulphur products include sulphur cements or sulphur-enhanced fertilizers. Molten elemental sulphur is produced as a by-product of oil and gas production upstream of the project in both baseline and project scenarios. This upstream production process includes mixing and solidification of elemental sulphur; therefore, emissions are considered to be equivalent between SEAM production in the project case and production of alternative sulphur products in the baseline case.	Response is acceptable.
5	Please explain why applicability conditions Nos. 3, 4, 6 – 8 are necessary for establishing project eligibility, as opposed to reflecting monitoring plan requirements.	Applicability conditions Nos. 5 and 6 (previously Nos. 3 and 5) ensure that the sulphur product is functionally equivalent to the product that would have been delivered with conventional hot-mix asphalt – specifically, that the sulphur product is safely produced and applied as well as meets the necessary technical performance requirements. The original applicability No. 4 was deleted due to redundancy. The applicability conditions Nos. 6 – 8 were deleted. These requirements were summarized with the parameter boxes in Section 9.	Response is acceptable.
6	Please clarify what evidence a project proponent could provide in order to demonstrate conformance with applicability condition No. 6 (previously No. 5), and further explain the risk that asphalt produced under the project activity is not functionally equivalent to asphalt produced in the baseline condition. Also, please explain why only “local” requirements are considered (as opposed to regional or national requirements).	In a given region, a road authority (e.g., municipality or highway department) would need to provide approval for the use of a SEAM-based product on roads within their jurisdiction. To date, approval for pilots and larger scale re-paving projects in Alberta have been successful in convincing paving authorities in numerous jurisdictions that SEAM-based products are functionally equivalent to conventional hot-mix asphalt. The reference to “local legal and technical requirements” was revised to “all applicable legal and technical requirements” in applicability condition No. 6.	Response is acceptable.

ID	Clarification Request	Summary of Methodology Developer Response	Validation Conclusion
7	Please clarify the potential implications of using reclaimed asphalt pavement (RAP) on project boundary, quantification, and monitoring requirements and revise the applicability conditions in Section 4 of the ME as necessary.	Inclusion of RAP reduces the need for virgin asphalt, so it is possible to combine RAP and SEAM projects, provided the mix temperature does not exceed the ceiling necessary to prevent H ₂ S formation. Applicability condition No. 7 was added to Section 4 to ensure that inclusion of RAP in the baseline or project scenario does not negatively impact the conservativeness of the GHG assertion.	Response is acceptable.
8	Please clarify why emissions are assumed to be "likely" higher in the baseline scenario for most SSRs and how the methodology ensures that these emissions are not higher in the project scenario.	The characteristics of the sulphur-containing binder and its ability to reduce mix plant temperatures mean that emissions will not be higher in the project scenario relative to the baseline scenario. The term "likely" has been removed from Table 4.	Response is acceptable.
9	Please further clarify the relevance of SSRs identified in the methodology. In particular, <ul style="list-style-type: none"> a) please address SSRs that appear to overlap (e.g., hot-mix facility operation; storage of bitumen, drying and hot-mixing; and electricity generation), b) please explain how off-site SSRs are related to or affected by the project activity (e.g., fuel extraction and processing, transportation of sulphur product or SEAM, production of molten sulphur, production of SEAM, and production of other additives, etc.), and c) please explain whether carbon black or other additives would have been produced or used in the absence of the project activity. 	<ul style="list-style-type: none"> a) Detailed discussion of SSRs and the rationale for their inclusion or exclusion can be found in the Alberta Protocol. Each hot-mix plant has its own specific energy use and emission profile. The methodology developer acknowledges that there is potential for perceived overlap in the SSRs; however, at the methodology level, further specificity would risk excluding unforeseen or unexpected types of emission sources in plants that would otherwise be applicable to the intent of the method. b) Emissions from fuel extraction and processing are excluded from the project boundary. Production of molten sulfur is excluded as the quantity of molten sulphur produced in the project and baseline scenarios are functionally equivalent. Production and transportation of SEAM is excluded for simplification, because mixing and solidification of elemental sulphur also occurs in the baseline. Therefore, emissions are considered to be equivalent between the project and baseline scenarios. Production of other additives is included in the project scenario as this may be a significant source of emissions in the project scenario. 	Response is acceptable.

ID	Clarification Request	Summary of Methodology Developer Response	Validation Conclusion
		c) Carbon black is widely produced in the absence of the project but is largely market driven and would likely be produced less in the absence of the project. Additionally, emissions associated with the inclusion of other additives, if any, should be evaluated at the project level.	
10	Please clarify why Section 7 of the Methodology requires the use of both the "Combined tool to identify the baseline scenario and demonstrate additionality" and the "Tool for the demonstration and assessment of additionality".	The ME has been revised to clarify that either tool may be used, but not both.	Response is acceptable.
11	Please clarify how variability in asphalt production specifications (between projects and/or facilities) is accounted for in parameters established ex ante (e.g., $T_{hot\ mix}$).	Additional detail was added to the relevant parameter boxes in Sections 9.1 and 9.2 to allow project proponents to specify a method for determining the parameters on a project-specific basis and aggregating emissions across individual paving segments as opposed to establishing a single value for all paving segments at validation.	Response is acceptable.
12	Please clarify the appropriateness of including a parameter box for moisture content of aggregate in Section 9.1, given that this parameter is not used in the quantification. Please also clarify if this parameter is expected to fluctuate during the project crediting period.	The method by which moisture content is determined is left up to project proponents as this parameter is not directly used in the quantification of emission reductions. The parameter box was removed from Section 9.1.	Response is acceptable.
13	Please clarify the appropriateness of measurement method No. 3 for $Mass_{Aggregate}$ and confirm whether the method would likely overestimate the mass of aggregate.	The third measurement method was revised to read: "Calculation as the difference between the mass of hot-mix asphalt produced and the sum of mass of binder and all additives consumed."	Response is acceptable.

5 ASSESSMENT CONCLUSION

First Environment performed the methodology assessment of the ME as part of the VCS double-approval process. First Environment used the VCS Standard as the criteria for the assessment. The assessment process was further guided by the VCS Methodology Approval Process and the VCS Program Guide.

The review of the ME and the satisfaction of corrective action and clarification requests have provided First Environment with sufficient evidence to determine the fulfillment of stated criteria.

The ME was prepared in accordance with the VCS Standard, the VCS Methodology Approval Process, and the VCS Program Guide. The proposed methodology belongs to Sectoral Scope 4 – Manufacturing industries.

In summary, it is First Environment’s opinion that the ME titled, “Substitution of Bitumen Binder in Hot Asphalt Production and Usage,” dated June 21, 2013, meets all relevant VCS requirements.

6 REPORT RECONCILIATION

As a result of the reconciliation process with the first assessor, additional definitions were added to Section 3 of the ME, several applicability conditions were re-organized, further detail was moved to other relevant sections of the ME, and clarifications were made to the requirements for data and parameters in Sections 9.1 and 9.2. First Environment reviewed these revisions in the version of the ME, dated January 23, 2014, and confirmed that the conclusions described in this assessment report remain valid.

7 EVIDENCE OF FULFILMENT OF VVB ELIGIBILITY REQUIREMENTS

The ME is classified under VCS Sectoral Scope 4 – Manufacturing industries, which falls within the Sectoral Scope Group 01 (GHG emission reductions from fuel consumption), as defined by ANSI. First Environment, Inc. holds accreditation to perform validation for projects under Group 01. First Environment has also completed more than 10 previous methodology and project validations in ANSI Group 01. First Environment, therefore, is eligible under the VCS program to perform assessments for the ME.

8 SIGNATURE

Signed for and on behalf of First Environment on 18 February 2014.



Iris Caldwell, P.E.
Senior Engineer



James Wintergreen
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