SUMMARY OF COMMENTS & RESPONSES
DRAFT U.S. AND CANADA BIOCHAR PROTOCOL VERSION 1.0

Three sets of comments were received during the public comment period for the Climate Action Reserve (Reserve) draft U.S. and Canada Biochar Protocol Version 1.0. Staff from the Reserve provide summarized comments and responses to the comments below. The public comment period for the draft protocol was November 21, 2023, to December 21, 2023. In addition to the comments below, a number of editorial comments were submitted but are not listed below, which were likewise considered by the Reserve for the final version.

The comment letters can be viewed on the Reserve's website at http://www.climateactionreserve.org/how/protocols/ncs/biochar/dev/ .

COMMENTS RECEIVED BY:

1. Myles Gray, **U.S. Biochar Initiative**
2. Alicia Klepfer, **Grain Ecosystem**
3. Matt Plasek, **Climate Robotics**

General Comments

1. **COMMENT:** Several comments were made pointing out grammatical errors, omitted references, and incorrect webpage addresses. **(Grain Ecosystem)**

   RESPONSE: Edits were made to the protocol to correct the errors described.

2.2 Project Definition

2. **COMMENT:** Please clarify text on page 4 that states biochar "…contains eligible levels of stable carbon." We believe the intent of this statement is that the "eligibility level" is based on the stability of the carbon (i.e. H:C ratio and permanence factor) but could be misinterpreted as there being a minimum amount of carbon required to be eligible. **(Grain Ecosystem)**

   RESPONSE: The referenced sentence in the protocol has been updated to simply state that biochar produced under the project is eligible to the extent it satisfies all eligibility requirements stated throughout the protocol, including in relation to the persistence of the carbon that it contains.

3. **COMMENT:** We understand from the methodology that there is no timing requirement or limitation for when the biochar can be applied based on its date of production (for instance, biochar produced in 2024 could be stockpiled and then applied in 2027 and the project could still be verified with sufficient evidence and CRTs generated in 2027). In the absence of data that demonstrates that biochar does not decay when stockpiled for extended periods of time (whether in containers or left in the open), we would urge the Reserve to implement a time limit for biochar application (such as, biochar needs to be applied within 18 months after production to remain eligible for crediting) that ensures the carbon within the biochar is sequestered and the permanence factors given in the Protocol are accurate. **(Grain Ecosystem)**

   RESPONSE: There is no time limit for when biochar must be applied under the protocol. However, your point is well taken. While the Reserve does not believe there is a need to require that biochar be applied within a certain time frame, we recognize that stockpiling biochar for an extended time prior to application to an end use may result in some degradation occurring similar to what would occur if the biochar was applied as a soil amendment or similar end use. As a result, the protocol has been updated to indicate that biochar stored in excess of 1 year before being applied to an end use for which the permanence factor for agricultural applications is <u>not</u> applied must have a degradation factor applied to the quantified amount of carbon removals (Equation 5.12) based on an annualized degradation rate derived from the permanence factor for agricultural applications relevant to the location where the biochar was stored. This calculation will be built into the Biochar CRT Calculation Tool.

2.3 Project Developer

4. **COMMENT:** The proposed protocol assumes that project developers are biochar end-users. This approach is not viable and appears to be inconsistent with other aspects of this proposed protocol, which seems to be written under the assumption that project developers are, in fact, biochar producers. Most importantly, very few biochar end-users could

implement the complex monitoring, reporting, and verification requirements presented in this proposed protocol.

Instead of assuming end users are project developers, end users wishing to retain carbon removal attributes associated with biochar production can simply contractually purchase carbon removal credits bundled with biochar (i.e., buy the credit with the physical product) or instead, they could purchase biochar bundled with the carbon removal attributes outside of the voluntary carbon market (i.e., end users can just purchase biochar for which no carbon removal credits have been issued). **(U.S. Biochar Initiative)**

RESPONSE: The Reserve has changed the default project developer to be the biochar producer as a reflection of overarching concerns raised by your comment and similar comments submitted by others. Of particular concern to the Reserve is the reduction of the risk of double-counting in relation to projects credited via other programs. Although the producer will be considered the project developer by default, the option still is provided to allow other entities to obtain ownership of the project and issued credits via written agreement. In any event, the requirement is to notify end users (or intermediary distributors, such as retailers or entities mixing biochar with other products before distributing to the final end use destination) of the existence of the carbon project associated with the biochar being acquired. The intent of such notifications is to provide transparency to end users of the crediting for C contained in the biochar so as to limit the risk of double-counting such carbon with the carbon claimed by another carbon project.

5. **COMMENT:** The Protocol states: "the project developer is assumed to be the end user of the biochar" (page 6). Based on what has been seen in the market to date, we strongly recommend that the Reserve change this statement to be "the project developer is assumed to be the producer of the biochar." First, the carbon can be assumed to be sequestered at the time of pyrolysis/thermochemical conversion, assuming there is no release of the carbon such as burning. Although the end user of the biochar may be the last entity in custody of the carbon, the biochar producer usually has far greater stake in the project given the high cost of most biochar production facilities. Additionally, not only will it be exceptionally difficult to gather signed contracts from all end users under the current language, but it may undermine development of biochar projects when the biochar producer is not guaranteed or assumed to be the project developer as there is a risk that they will not receive the revenue/ownership of the carbon credits. **(Grain Ecosystem)**

   RESPONSE: Please see response to Comment #4.

6. **COMMENT:** In practice, across certified biochar projects all over the world, biochar producers are acting as project developers, in particular, situations where the end users are farmers. Arguably this is because biochar producers are best situated in practice to ensure eligibility, MRV, data quality, agreements, logistics, etc. at each stage of the carbon removal process.

   Further as stated, "…the project developer is assumed to be the end user of the biochar since they are the entity responsible for providing for the long-term persistence of the carbon sequestered in the biochar and, thus, the permanence of the credits being issued." If the biochar producer is finally responsible for quality metrics of the biochar material and soil application and integration or mixing with compost, etc., then the applied biochar carbon removal has virtually zero physical risk of reversal, giving support to the argument that biochar producer is in fact the entity responsible for long-term persistence of the carbon

sequestered.

Therefore, we recommend the default of the biochar producer as the project developer. It is unclear if a different default would cause additional difficulties or not since end-users are attesting to end-use already, but given the CAR proposed default would be different than what happens today typically, there may be legal or other unforeseen difficulties that could create unnecessary friction in biochar carbon removal efforts. **(Climate Robotics)**

RESPONSE: Please see response to Comment #4.

3.2 Project Start Date

7. **COMMENT:** Regarding the start-up testing described on page 8, we believe it would be beneficial to clarify that biochar produced within the potential 9 months of project initiation is not eligible for credits (crediting only beginning on the project start date), assuming that is the intent. Furthermore, we would like to recommend this period be lengthened to 12 months, given the long construction timelines for equipment (5-7 months, generally) as well as the current unknowns in the industry with how best to scale and make equipment more efficient/effective since few facilities have been producing at scale or for continuous extended periods of time to date. We also believe it would be worth clarifying if there is a limit or threshold on the percentage of total production or production rates referenced as support for being able to claim a start-up period specifically when the business was "not functioning at scale" (page 8). **(Grain Ecosystem)**

   RESPONSE: After further consideration, the Reserve agrees with your recommendation and has updated the start-up testing period in reference to the project start date to 12 months. It is our understanding that the set up and testing of biochar production equipment and resulting biochar can potentially be an iterative process, especially given the relative nascent status of the industry and biochar production. Additionally, the ongoing emergence of production technology innovations further underscores the logic for providing for a longer potential start-up period. Therefore, allowing for additional time for production under a given configuration to become more well established seems reasonable, as long as all other provisions related to documenting the start-up period are met.

   As for clarification with respect to a limit or threshold of start-up production relative to post-start date production, the guidance in the protocol has been modified so that the indication for the biochar production operation not functioning at scale is based on the reduced production rate(s) on a time scale (daily, weekly, or monthly) relevant to the production process employed after the project start date. Take for example a scenario in which biochar is produced on a daily batch basis five days a week under the project. During the start-up period, biochar was produced for several days, with a two-week pause in production to await laboratory testing results from the biochar produced during those several days. After adjustments are made to the production configuration, several more daily batches are produced and tested for quality, with this overall cycle repeating until the desired biochar outcomes are obtained. In that scenario, the project developer should demonstrate that the weekly (or perhaps monthly) production rate was less than the rate of production under the project, with a description of why the time scale used for the rate basis was selected.

8. **COMMENT:** We would also like to clarify what the start date is for mobile equipment (i.e. pyrolysis or gasification equipment that can be loaded onto a truck and transported to a new location for biochar production) since this date could technically be defined for the

equipment itself (first usage after manufacturing) or based on location (first date of biochar production in a new location, after the equipment has been transported). **(Grain Ecosystem)**

RESPONSE: Clarification was added to protocol to indicate that the start date for mobile equipment is based on when production begins under a discrete operation, as may be defined by a contract for producing biochar from biomass harvested from a specific landowner's holdings or when equipment is used in locations that have no direct or clear relationship with a prior production location.

3.4 Additionality

9. **COMMENT:** We would like to clarify if there is any specific requirement or guidance regarding the statement under Waste and By-Product Biomass, point 2: “The project developer must be able to characterize the typical fate of the project feedstocks.” Does “characterizing” the fate require any supplementary evidence? **(Grain Ecosystem)**

   RESPONSE: The project must provide a general characterization of the typical fate of the feedstock used for the project. Supporting evidence/documentation will likely be necessary to support the characterization and may include (though not be limited to) governmental resource reports or peer-reviewed studies, referred consultations with local resource agencies/experts, or direct records of prior disposition of a feedstock stream (e.g., if waste biomass produced on an ongoing basis from a facility is being redirected for biochar production).

10. **COMMENT:** Under Purpose-Grown Biomass, point 2: “have minimal or no negative impacts on soil organic carbon over a time scale of several years” we recommend that “several years” be defined with a quantitative value in order for this parameter to be implemented effectively. **(Grain Ecosystem)**

    RESPONSE: Soil disturbance is the primary concern the referenced provision is intended to address. As such, we are modifying the protocol to specifically state that tillage is not allowed, other than for site-preparation to establish the perennials species initially allowed under the protocol, as per the Eligible Biochar Feedstocks List. Miscanthus and switchgrass typically only require tillage for site prep/establishment. Once established, mowing and potentially fertilization are the main activities each year, which involve minimal soil disturbance. Thus, project developers must be able to attest that tillage was not used to manage the purpose-grown biomass crop after plant establishment.

11. **COMMENT:** We would also appreciate if clarification were added to the section on pre-existing facilities specifically for mobile equipment. For instance, if mobile equipment has been used to create biochar in the past, is it considered a pre-existing facility? What if the owner of the equipment sells or transfers ownership to another buyer, but the original owner did not collect any records of production and the new owner cannot establish production levels prior to their own project start date? If the same piece of mobile equipment is transported to multiple locations, can each location be considered as part of the same project or do they need to be aggregated into a grouped project? Mobile equipment is of increasing interest in locations that have large wildfire risk, where they can transport the equipment to multiple locations with large fuel loads rather than transporting the fuel loads to a singular location. **(Grain Ecosystem)**

RESPONSE: The Reserve has added clarification to the performance standard test for biochar production to indicate that pre-existing production using mobile equipment is considered differently than equipment that is permanently located. The protocol now indicates that production using mobile equipment is considered pre-existing to the extent that such production is part of a coordinated effort that existed prior to the submission of the project to the Reserve. For example, production of biochar using mobile equipment under a contract to process biomass removed during eligible forest fuel thinning activities would be considered pre-existing production.

12. **COMMENT:** The proposed protocol indicates that biochar production volumes which began prior to the carbon credit "project start date" (i.e., the start date for crediting under this proposed protocol) are not eligible because such activities qualify as "business-as-usual". We believe this is both a fundamental misunderstanding of the biochar industry but also an unfair penalty against early adopters.

    Generally speaking, existing biochar production in the U.S. and Canada can be classified as either intentional or unintentional biochar. Unintentional biochar producers are primarily biomass energy power plants, which can produce biochar by ceasing the business-as-usual approach of reinjecting high-carbon fly ash (i.e., biochar) material into boilers to generate slightly more power and to dispose of this material. We strongly support applying the proposed "business-as-usual" standard to such unintentional biochar producers if any of this material is not typically re-combusted.

    Intentional biochar producers use pyrolysis, gasification, or other methods to produce biochar. These facilities are, by and large, operated by companies and individuals whose goal in producing biochar is to sequester carbon. This is particularly true for those companies and individuals that began production prior to the availability of carbon removal credits for biochar, as many of these companies are barely economically viable. Such facilities are far from "business-as-usual", and the proposed protocol unfairly penalizes these early adopters, motivated by carbon sequestration, from financially benefiting from their activities. **(U.S. Biochar Initiative)**

    RESPONSE: The Reserve understands there are early actors that have been providing climate benefits and fully appreciate the desire to reward them for their pioneering efforts. We do allow production during the two years leading up to the adoption of the protocol to be eligible for crediting, as long as all protocol requirements can be met. Furthermore, we do allow project developers to reach out to us for a determination about additionality with respect to pre-existing production if they believe they have a case to be made. However, we are likely unable to reward someone with a history of production unless there are mitigating circumstances that indicate carbon credit sales are required to sustain production. While the Reserve appreciates the role that early adopters have played, such biochar production represents "business as usual" activities that typically cannot be credited.

13. **COMMENT:** We would like to ask for explicit clarification if projects are eligible to generate credits if they are generating electricity from their biochar production heat output and selling it back to the grid. **(Grain Ecosystem)**

    RESPONSE: Projects generating electricity from the heat output of biochar production are eligible to be issued credits while selling the electricity generated back to the grid. However, the basis for crediting is only the carbon sequestered in the biochar. The protocol does not recognize the emissions benefits associated with the generation of electricity.

14. **COMMENT:** Regarding the mandatory reporting of EQIP payments (Page 13), what if the project is using an intermediary entity and EQIP program payments are not reported directly to the project? Similarly, what if buyers are using the EQIP program but don't report it at the time of purchase of the biochar? **(Grain Ecosystem)**

    RESPONSE: The question posed highlights some of the challenges around payment stacking. Given the nuances involved, the Reserve prefers to have such enhancement payments disclosed, as indicated in the protocol, so that the specific conditions and context of any payment stacking can be considered and evaluated on an individual basis. To help with the scenarios presented in your questions, we have inserted language into the protocol indicating that project developers should inquire of other entities associated with any project phase as to whether they are receiving enhancement payments. Nevertheless, since the production and use of biochar requires distinct qualifying characteristics and actions to be taken at each individual phase of a project (biomass acquisition, biochar production, biochar application) to produce a climate benefit, payments stacked with the project during an individual phase is less likely to impact a project's additionality.

15. **COMMENT:** The proposed protocol includes discussion of credit stacking, but the information provided is general and open-ended in nature. We recognize that credit stacking related to biochar is complex and evolving, however, we recommend that additional language be added to the proposed protocol, or in a future version of the protocol to provide additional clarity on credit stacking.

    Among credit stacking opportunities for biochar, we recommend considering updating the language related to agricultural soil carbon credits. Specifically, while the carbon contained in biochar (for which a carbon removal credit is issued) should not be eligible for inclusion in soil-based carbon credits, we believe that additional carbon benefits from using biochar as a soil amendment should be allowed including reduced soil nitrous oxide emissions and increased accumulation of non-pyrogenic soil carbon (i.e., "negative priming"). While the science and monitoring, reporting, and verification associated with allowing such stacking may be complicated, we believe that technological advances in soil carbon monitoring, including the ability to differentiate between pyrogenic and non-pyrogenic carbon, may create opportunities for such credit stacking in the future. **(U.S. Biochar Initiative)**

    RESPONSE: The Reserve has provided some additional nuance in the credit stacking examples in the protocol. However, credit stacking among carbon projects is an emerging concept in carbon markets and, as you have correctly noted, is complex. Therefore, every potential stacking scenario needs to be reviewed and approved by the Reserve so we can carefully evaluate each proposed scenario.

16. **COMMENT:** Additionally, we recommend including additional guidance related to the embodied carbon associated with biochar that is sold "de-coupled" from its carbon removal credit. We anticipate that most biochar producers who use this proposed protocol will sell biochar carbon removal credits separately form the physical biochar in a de-coupled manner. Under this framework, the resulting physical biochar should be considered a zero-carbon material in the context of value-chain emissions accounting systems. We recommend including text to clearly indicate that physical biochar de-coupled from carbon removal credits should be considered zero-carbon. **(U.S. Biochar Initiative)**

RESPONSE: The Reserve appreciates the concern expressed by the comment. Our programmatic intent (as discussed in the Reserve Offset Program Manual) is to ensure the climate benefits for which a project—and associated biochar—is awarded credits are not subject to double-counting under another system, including as a part of assertions toward GHG targets or inventory with respect to value-chain accounting systems. To address this concern within the context of biochar projects, the Reserve has added a provision to Section 2.3 of the protocol, requiring that the project developer notify the end user(s) of project biochar of the carbon credits associated with the biochar. The overall intent is to ensure that the accounting for a carbon credit happens once and only once. Consumers of biochar whereby the carbon benefits have already been counted elsewhere cannot also make the same quantitative claim. Making some type of non-quantitative claim about the use of a lower/no carbon material may be permissible (e.g., acknowledging use of a lower carbon product but not counting the use of biochar quantitatively against an entity's carbon footprint), although the Reserve cannot address the wide variety of such potential claims in the protocol.

3.5 Permanence

17. **COMMENT:** We would appreciate clarification if an $H:C_{org}$ value of exactly 0.7 is eligible or not. **(Grain Ecosystem)**

    RESPONSE: Thank you for pointing out the inconsistency between different references to $H:C_{org}$ threshold values in the protocol. All references to an $H:C_{org}$ value have been updated to indicate that $H:C_{org}$ values must be less than 0.7.

3.7 Environmental and Social Safeguards

18. **COMMENT:** In Table 3.1, please clarify "Lack of separation between biochar and pyrolysis gases in reactor and discharge" and how this would be determined. **(Grain Ecosystem)**

    RESPONSE: Clarification has been added to Table 3.1 based on the recommendations from Buss et al. (2022).[1] The authors of that study found that PAH condensation can be avoided when pyrolysis units are designed in certain ways. Where pyrolytic gases and solids are not separated within the pyrolysis unit, the discharge chamber needs to be heated (either actively using external input or passively via residual heat from the pyrolysis unit). Alternatively, pyrolysis gases and solids must be separated within the pyrolysis unit, such as occurs when pyrolysis gases are extracted close to the feedstock entry point.

4 GHG Assessment Boundary

19. **COMMENT:** We would like to suggest that mobile equipment transportation be included as an SSR within the Project GHG boundary, as transport of large equipment can result in significant fuel emissions. **(Grain Ecosystem)**

    RESPONSE: The Reserve agrees that emissions from the transportation of mobile biochar production equipment should be included as an SSR and have added it to the GHG assessment boundary. We have also added a new subsection and equation to Section 5 to indicate how such emissions are to be calculated.

[1] Buss, W., Hilber, I., Graham, M. C., & Mašek, O. (2022). Composition of PAHs in biochar and implications for biochar production. *ACS Sustainable Chemistry & Engineering*, *10*(20), 6755-6765.

20. **COMMENT:** The proposed protocol requires accounting for methane emissions from Projects but disregards such emissions from Baselines. While biochar production facilities can release small amounts of methane emissions during production, essentially all other eligible Baseline biomass feedstock fates also generate some amount of methane including combustion of biomass for electricity or heat production, open-pile burning of biomass for disposal, mastication and piling of material, or use as mulch. We believe the proposed methane accounting approach unfairly penalizes biochar producers but also does not accurately represent baseline methane emissions.

    We recommend applying a consistent accounting approach to both Project and Baseline methane emissions, either by neglecting such emissions in both or counting them in both. If such emissions are counted in both, we recommend including standardized emissions values for different biomass feedstock alternative fates in the Biochar CRT Calculation Tool. Such values can be found in numerous peer-reviewed publications. **(U.S. Biochar Initiative)**

    RESPONSE: The concern about this imbalance is understood. However, the exclusion of baseline emissions is intentional and is a conservative safeguard. Methane emissions in the baseline are challenging to assert, especially since some feedstocks may end up being either decomposed or combusted, presenting an attribution problem. Furthermore, the variability in baseline conditions from location to location and lack of sufficient data to develop standardized emissions factors that takes into account such variability led us to conclude that an attempt to incorporate a calculated baseline would be too fraught with potential inaccuracies or lead to improper baseline representations, especially in relation to decomposition-related emissions. As a result, we decided to employ a conservative baseline approach that assumes no baseline emissions is most appropriate at this time. That said, we will evaluate the potential to include such avoided emissions in a future version of the protocol.

21. **COMMENT:** Under the proposed protocol, avoided emissions associated with electricity production are not counted while emissions associated with electricity consumption in transportation, feedstock processing, biochar production, and biochar processing are counted. We believe that electricity produced by biochar producers (i.e., as a co-product of biochar production) should be eligible to “offset” emissions from electricity consumption, provided that emissions associated with this electricity are accurately attributed using the adjustment factor equations. Under this approach, a biochar producer co-producing excess electricity (i.e., producing more electricity than they consume) would be able to reduce their overall Project emissions by counting all of their electricity consumption as derived from biomass sources, which is likely to have a lower carbon intensity than grid average electricity. Further, we believe this approach more fairly accounts for the benefits of converting pyrolysis gases into low-carbon biomass electricity. **(U.S. Biochar Initiative)**

    RESPONSE: The Reserve understands the concern expressed by the comment and desire to credit for avoided emissions associated with biochar. However, a range of issues are tied up with accounting for avoided emissions from generated electricity that we did not believe possible to include in this initial version of the protocol. We will evaluate the potential to include such avoided emissions in a future version of the protocol.

5.2 Calculating Project Emissions

22. **COMMENT:** For Equation 5.3 regarding the adjustment factor, there are scenarios where electricity is being generated but it is only used on-site so it is not metered. In this case can it still be estimated and included in the calculation? **(Grain Ecosystem)**

    RESPONSE: For projects where electricity is co-produced with biochar and is only used on onsite, the project developer must provide a reasonable estimation of the amount of electricity generated and describe the basis for their estimation. The protocol has been modified to reflect this guidance for the estimation of any co-product amounts that are not directly measured.

23. **COMMENT:** Generally, would this approach [to applying the adjustment factor] still apply when the project is producing other by-products that don't have great BTU value but still have monetary value, such as wood vinegar? **(Grain Ecosystem)**

    RESPONSE: The intent of the adjustment factor is to avoid unnecessarily penalizing projects when they are producing additional products alongside biochar and the proportion of the emissions associated with the conversion of biomass into any such product can be reasonably attributed. GHG emissions are the primary concern of the protocol and the ultimate focus of the adjustment factor. Since the production of wood vinegar is not expected to come at the expense of other co-products or with an increase in overall emissions or biomass input, there is no need to consider its production in the calculation of the adjustment factor. However, the Reserve will continue to review co-production settings to ensure the adjustment factor is updated as necessary to account for co-products that do influence emissions.

24. **COMMENT:** Under the proposed protocol, the adjustment factor for emissions related to biochar production (as opposed to co-products) is based on the thermal value (Btu) of materials being used for different purposes. While this approach may be viable for some biochar producers, for many biochar producers this will require submission of biochar samples for additional analyses than are included in common biochar analysis frameworks, such as the International Biochar Initiative (IBI) standards. We recommend that an alternative adjustment factor calculation framework, based on organic carbon, be provided as a lower cost approach that still achieves the same end goal of attributing emissions between biochar and co-products. **(U.S. Biochar Initiative)**

    RESPONSE: The Reserve understands the process for calculating the adjustment factor may be more in line with some biochar production operations than others currently. However, the approach outlined in the protocol accounts for the major influences on emissions associated with biochar in co-production settings. It is our understanding that the laboratory analyses required to determine energetic content of biochar is not cost-prohibitive and is generally well available. While an adjustment factor based on organic carbon may be a reasonable alternative in limited situations, it would not account for non-carbon-based products such as thermal energy or electricity. Nevertheless, to address the concerns about the practicality of collecting the necessary data to calculate the adjustment factor, the protocol has been modified to indicate that the project developer may opt to simply use an adjustment factor value of 100%, which would result in a simple—albeit perhaps overly conservative—attribution of all emissions associated with biochar production to the project.

25. **COMMENT:** We would appreciate clarification as to why Feedstock Production and Feedstock Transport NOT include AF (adjustment factor for proportional allocation of emissions in co-production settings) but Feedstock processing does? It would seem that these categories would be treated similarly in regards to co-production. **(Grain Ecosystem)**

    RESPONSE: The Reserve agrees the adjustment factor should be applied to feedstock production and transport emissions. The protocol had been updated to reflect this.

26. **COMMENT:** We would also suggest that in Equation 5.8, methane should not be pro-rated based on *AF*. Since methane has a higher GWP than carbon dioxide, it may not be beneficial in the short term for projects to be sequestering carbon if they are also producing methane at high rates. This would also disincentivize projects from generating electricity with greater emission factors than typical grid processes and ensure the quantification of the methane associated with biochar is conservative. **(Grain Ecosystem)**

    RESPONSE: The intent of the adjustment factor, as previously stated, is to avoid unnecessarily penalizing projects by accounting for emissions that are not reasonably attributable to biochar production on a proportional basis when other products are being generated. If biochar is being produced in a process that is separate from the electricity generation process, then methane emissions from biochar should be considered independent of those emissions from the electricity generation process. However, in the event that biochar and electricity generation result from a related process, it is reasonable to proportionally allocate the associated methane emissions.

27. **COMMENT:** We would like the Reserve to consider that there are scenarios where feedstock transport doesn't need to be included in project quantification, since it will be the same between baseline and project. For instance, if the biomass is already being transported to another location to be stockpiled, or if it would have been transported to the landfill anyway, then could emissions in the project scenario be excluded? **(Grain Ecosystem)**

    RESPONSE: The Reserve agrees there may be situations where feedstock transportation emissions may be equal to or lower than business as usual emissions. However, the effort to substantiate the baseline transportation of feedstocks would be challenging and difficult to verify in most cases, with little expected benefit to the project since waste biomass is typically not shipped long distances. Nevertheless, we will continue to monitor project conditions over time and may consider updating this guidance in the future.

28. **COMMENT:** We also recommend that the proposed protocol provide additional guidance related to biochar producers that utilize electric vehicles to transport feedstock and biochar. While relatively uncommon due to present low vehicle availability, many biochar producers have investigated this approach and will likely do so in the future due to the ability to reduce emissions and thereby increase carbon removal credit revenue. **(U.S. Biochar Initiative)**

    RESPONSE: Although the protocol currently accounts for emissions associated with other modes, you are correct that additional guidance would be required to account for emissions associated with electric vehicles. While the Reserve acknowledges the eventuality of more widespread transportation via electric vehicles, the appropriate guidance for accounting for emissions from electric vehicles is unclear at the moment. As a result, the addition of such guidance will be reserved for a future update to the protocol and Biochar CRT Calculation Tool.

29. **COMMENT:** We suggest adding clarification that if the project is generating its own electricity for use on-site/for the production equipment, it does not need to be metered or accounted for. Such as, the first sentence of the section [about auxiliary energy emissions] could state: "use of grid electricity." **(Grain Ecosystem)**

    RESPONSE: The Reserve agrees in part with the suggested clarification, with an important distinction. Emissions from electricity generated onsite that is used as an auxiliary energy source does not need to be accounted for if the electricity is co-produced as an integrated part of the thermochemical conversion process used to produce biochar. However, emissions from electricity not co-produced, i.e., in an independent process not derived from the thermochemical conversion process, but simply being generated at the same site as the biochar production process, must be accounted for. This clarification has been added to the protocol. Please note that electricity generated and used onsite as a part of the biochar production process may also be included in the calculation of the adjustment factor, as discussed in Comment #22.

30. **COMMENT:** Can you clarify when proof is required for Thermochemical Conversion processes that do not recover or combust methane, and what proof is sufficient? For instance, the theory of using air curtain technology is that all gases are recombusted. Is that theory sufficient on its own or is emissions testing data required? If emissions testing data is required, is that based on the specific equipment make/model, or can the testing be completed on that process type generally?

    Furthermore, for some technologies this may be considered proprietary information, is there a scenario where a project/technology specific emission factor can be used when it is not published in the tool? **(Grain Ecosystem)**

    RESPONSE: The protocol has been updated to clarify that the burden of proof is that a process does recover or combust methane. Certain technologies will already be recognized as such in the Biochar CRT Calculation Tool and will have an emissions factor of zero assigned to them. For technologies not already recognized in this way in the tool, its inclusion in the tool with an emissions factor of zero would require approval from the Reserve and a subsequent update to the tool. Theoretical recovery or combustion would not be sufficient alone. Evidence supporting the assignment of an emissions factor of zero may include a combination of production technology characterization, manufacturer documentation of testing results, and/or peer reviewed studies. The project developer would also need to show that the production technology employed by the project matches the conditions described by the manufacturer/study and verified as such.

    For technologies considered proprietary for which an emissions factor of zero is proposed, some information may be redacted or not posted publicly. However, for transparency purposes, certain information fundamental to the approval of an emissions factor would be required to be publicly available.

31. **COMMENT:** Please clarify in Equation 5.8 if $M_{b,TC}$ is the mass of biochar on a dry or wet weight basis. **(Grain Ecosystem)**

    RESPONSE: The mass of biochar is to be reported on a dry basis.

32. **COMMENT:** Does biochar mixing or bagging need to be included in biochar processing emissions? **(Grain Ecosystem)**

    RESPONSE: Mixing or bagging is expected to result in de minimis emissions relative to other biochar processing and overall project emissions and is therefore not required to be included.

33. **COMMENT:** We believe it should be clarified that the term $\left(\boldsymbol{M_{hist,EU}} \times \frac{\boldsymbol{t_{days,RP}}}{\boldsymbol{365}}\right)$ is in Equation 5.11 is only for projects that have been historically operating prior to start date and the term definition should not say "for the reporting period" (as the historical portion did not have a reporting period). **(Grain Ecosystem)**

    RESPONSE: Although projects with no historical production required to be accounted for under the protocol would have a value of zero for the variable $M_{hist,EU}$, clarification has been added to prevent any unnecessary effort on the part of the project developer.

6.2 Chain of Custody Tracking

34. **COMMENT:** Regarding tracking the mass of biochar, we would encourage the Reserve to add guidance regarding the variation in moisture content of the biochar. The mass of biochar will change based on the moisture content and will be adjusted for safe handling. Although sometimes moisture is added directly by the equipment at the end of biochar production, in other cases it may be weighed first and then moisture added manually before being bagged. If biochar is being stored outdoors and rained upon this could also change the moisture content, similarly with open air transportation which would cause the starting mass not to match the final mass at its destination. **(Grain Ecosystem)**

    RESPONSE: Further guidance has been added to Section 6.3.1 (Sample Design and Collection) to indicate how moisture content is to be determined. The evaluation of moisture content is to be performed by the biochar producer either at the time moisture is added to biochar via reporting from water meters at the point of application (most conservative since it doesn't account for any evaporation between application and time biochar is weighed) or when biochar is sampled at the time biochar is weighed. In the latter case, the mass of a sample of biochar is to be taken at the same time as the total mass of the biochar from which it is drawn is taken. The sample is to be weighed after being drawn, dried, and then reweighed. Since the mass of biochar will vary over shorter time scales by the amount of water it contains (as opposed to $H:C_{org}$ or organic C content, which will stay relatively static over time scales relevant to project monitoring during a given reporting period), measuring biochar for both total mass and moisture content at the same time ensures the total mass is modified appropriately for credit quantification purposes to reflect the amount of water it contains.

35. **COMMENT:** Under the proposed protocol, chain of custody tracking requirements applied to intermediaries (e.g., biochar brokers, manufacturers of biochar-containing products, retailers, etc.) are substantially less burdensome than tracking requirements applied to biochar producers who sell directly to end users. We believe this approach provides an incentive for biochar producers to sell biochar to intermediaries rather than directly to end users, which, in some circumstances, will lead to higher prices for biochar to end users, potentially limiting growth in biochar sales and biochar production in the U.S. and Canada. Further, this approach unfairly disadvantages small biochar producers, few of whom work

with intermediaries.

We recommend applying the same chain of custody tracking requirements to all biochar sellers / distributors, regardless of whether they are also biochar producers. A simple approach to creating consistency would be to require all biochar sellers use sales contracts that require end-users to adhere to the positive end-use list or to prohibit the use of biochar in non-carbon preserving applications. **(U.S. Biochar Initiative)**

RESPONSE: The reference to intermediaries as a phase of the project in Table 6.1 is intended to only be in reference to entities that merely take temporary custody of the biochar and whose possession does not provide reasonable assurances about the end use of the biochar, such as a trucking company or a storage facility. For such entities, relatively simple chain of custody tracking information is required. This is as opposed to other intermediaries referred to in the protocol that do provide reasonable assurances about the ultimate end use of biochar, such as a mixer that incorporates biochar into a specific product that has a well-defined end use or a retailer that markets biochar for specific applications. For those entities, more extensive chain of custody tracking information is required to provide information pertinent to eligibility, credit quantification and verification purposes. Clarifications have been added to the protocol to make this distinction between these types of entities clear.

6.3 Biochar Sampling and Testing

36. **COMMENT:** We are concerned that the retention sampling requirements are onerous and could create significant barriers to implementation, in service of minimal improvements in accuracy. 6 subsamples per day will add a very large administrative and procedural burden to facilities, especially considering they will have to retain a minimum of 30 samples at a time. Additionally, if sites are operating on a “batch” basis (vs continuously) they would need to gather 6 subsamples in a short period of time, adding complication while not necessarily capturing more of the temporal variability. **(Grain Ecosystem)**

RESPONSE: The Reserve understands the concerns expressed around the effort associated with retention sampling and has made some adjustments to the overall sampling requirements to improve flexibility for project developers while achieving the same overall purpose. These improvements include allowing project developers to design their sampling scheme in ways that better match the biochar production process(es) and cycle(s) employed by their project while ensuring samples are temporally and spatially representative of the biochar being produced each day; extending both the time frame over which retention samples are selected for testing and the length of time that test results from any sample may be used for calculating the quantification parameter values; and allowing the exclusion of biochar from project reporting for situations when testing of certain samples appears to be anomalous and not representative of production conditions otherwise present before or after such samples were drawn. Furthermore, while samples have to be drawn each day that biochar is produced under a project, only a small portion of samples will actually be tested. The remainder simply need to be maintained for archival purposes, tested on an as needed basis, and then may be discarded once verification and credit issuance for the relevant reporting period is completed. However, please keep in mind that the retention sampling requirements have been set up as they are to ensure the reliability and representativeness of data reported for quantification purposes.

Additionally, there appears to be a misunderstanding about the number of samples required. The protocol states that a minimum of 10 samples is required to determine the eligibility of the biochar and the values to be applied for the quantification parameters. The reference to 30 samples was merely to indicate that the Z-value of 1.96 could be used rather than the t-value if at least that many samples were used to determine quantification parameter values. That reference has been removed to avoid confusion.

37. **COMMENT:** "Under the proposed protocol, values for $H:C_{org}$, DM_b, and OC_b used in carbon credit calculations are each based on the conservative end of the 95% confidence interval limit. While we appreciate the desire to be conservative in estimating carbon removal credits under this proposed protocol, we believe this approach is excessively conservative. Further, using 95% confidence intervals for each metric assigns heavy weight to outliers, some of which could be analytical in nature and not representative of actual materials. The presence of individual outlier samples could thus create significant economic impacts to project developers, many of whom might then choose to collect many additional samples, at significant cost in labor and analytical fees, to overcome the effects of individual outlier samples.

    We recommend that a less conservative approach be used that could incorporate some of the following:
    - Use median or mean values for each metric. Median or mean values, when based on 10+ samples, provide the best estimate for actual material properties. We believe that the most accurate estimate for carbon removal credits should be preferred over conservative estimates.
    - If 95% confidence intervals must be used, we recommend using 95% confidence intervals for calculated removal credits rather than for each of these three individual values, the product of which is included in carbon removal credit calculations. That is, we recommend requiring calculation of carbon removal credits associated with individual samples which have been analyzed for $H:C_{org}$, DM_b, and OC_b. We believe this approach more accurately generates a conservative estimate without applying conservative values three times through the calculation.
    - Provide a pathway for “re-analysis” of outlier values, particularly if a 95% confidence interval approach is used." **(U.S. Biochar Initiative)**

    RESPONSE: The Reserve appreciates the concern expressed by the comment with respect to the challenges related to variability in biochar quality and laboratory results. We considered modifying the statistical confidence assessment to be based on the calculated gross carbon removals (i.e., prior to application of a permanence factor). However, the decoupling of sampling for organic carbon content and dry matter content—as is the case with the included sampling guidance—prevents the ability to do so since those two parameters are not resulting from the same sampling process. While we understand the preference for accuracy over conservatism, the use of the confidence interval is intended to specifically address broader carbon market concerns about over-crediting of projects.

    To address the concern of outliers, the Reserve is allowing for biochar represented by any outlier test results to be removed from project accounting, as long as such biochar can be clearly distinguished from other project biochar so that it is not included in the total biochar being reported for credit quantification. Furthermore, project developers have the option to have samples re-analyzed by a laboratory if they believe the test results may be faulty, though that option is not explicitly stated in the protocol.

38. **COMMENT:** We would appreciate if the Reserve could add additional guidance for cases where the project is using a heterogenous feedstock. For instance, municipal solid waste can have a wide variety within its composition, plus food service or expired food may contain varying individual components. Is additional mixing required in these scenarios? Similarly, is less mixing required in cases where the feedstock is homogenous? **(Grain Ecosystem)**

    RESPONSE: The protocol is not intended to provide any specific requirement with respect to how much biochar is mixed prior to sampling. However, additional mixing may be required, depending on the production process employed by the project and the sampling design established by the project developer. The intent of the updated sampling guidance (as referenced in the Comment #36) is to provide flexibility that allows project developers to design a sampling scheme that aligns with the biochar production process used under the project, as long as the biochar sampled is representative of the biochar produced over both time and space.

39. **COMMENT:** Can initial sampling occur during the 9-month set up period, or only after the start date? **(Grain Ecosystem)**

    RESPONSE: All sampling must occur during the crediting period since the biochar sampled must be representative of the biochar being produced and serving as the basis for credit issuance under the project. Section 6.3 has been updated to clarify this.

40. **COMMENT:** Regarding mixing for sampling, does biochar need to be mixed mechanically (with emissions potentially included) or does hand mixing or tumbling suffice? **(Grain Ecosystem)**

    RESPONSE: There is no specific method for mixing required to be used by projects. As discussed in response to Comment #36, the intent of sampling guidance in the protocol is to provide flexibility for project developers to use a sampling design that works well with their production process. This includes how biochar may be mixed prior to sampling. Emissions associated with mixing are not required to be accounted for since they are expected to be de minimis.

41. **COMMENT:** Table 6.3 – Sampling approach – please clarify that daily samples for 10 samples means 10 days worth of samples. Is there a max amount of samples that can be considered for the initial parameter (the Protocol mentions 30 as well)? **(Grain Ecosystem)**

    RESPONSE: Clarification has been added to the protocol to indicate that 10 samples means samples representing 10 days of production. There is no maximum amount of samples—the protocol leaves it to the project developer to determine the level of statistical accuracy they wish to achieve, with lower levels of accuracy resulting in fewer credits recognized for the project.

42. **COMMENT:** Table 6.3 – Timing of sampling – “Sampling must be performed from the first day of biochar production under the project and during the reporting period for which the associated laboratory analysis results are applicable.” Please clarify if the intent of this statement is just that the first initial sample needs to be taken at the start date of the project and at each first date of a reporting period. **(Grain Ecosystem)**

    RESPONSE: The protocol has been adjusted to clarify the intent: Initial parameter sampling is required to establish contaminant levels and the values used for quantification metrics, but

is not required for each reporting period. If production conditions (e.g., feedstocks mix, production temperature) and biochar quality remain relatively stable, projects only have to perform retention sampling. Table 6.3 has been clarified to make it clear that initial parameter sampling is only required from first day of biochar production under the project and during any reporting period for which new initial parameter sampling lab results are first applicable.

43. **COMMENT:** Table 6.4 –How long do samples need to be kept for after the monthly dates are chosen? **(Grain Ecosystem)**

    RESPONSE: Retention samples must be retained until verification has been completed and credits have been issued for the reporting period during which the samples are drawn. Table 6.4 has been updated to indicate this.

44. **COMMENT:** Table 6.4 – Sample handling - if list is given at the end of the month than samples cannot be sent within 5 days of collection, so the Initial Parameter Sampling guidelines are not applicable. **(Grain Ecosystem)**

    RESPONSE: Thank you for highlighting this unintended inconsistency in requirements. The sample handling guidance for both Initial Parameter Sampling and Retention Sampling has been updated and the time limit for submission for laboratory testing has been removed.

45. **COMMENT:** Under the proposed protocol, project developers are subject to fairly burdensome sampling requirements and logistics including collecting and analyzing at least 10 samples for initial parameter sampling and then collecting and retaining samples periodically for retention sampling. While such sampling requirements may be feasible and economical for large scale biochar producers, this is unlikely to be the case for smaller scale biochar producers which represent a significant component of the existing biochar industry in the U.S and Canada. While small scale producers could become an increasingly small component of total production, small-scale mobile production units (e.g., air curtain incinerators) represent an important waste management tool that pairs well with agricultural waste management, forestry waste management, and fire-risk reduction thinning projects as an alternative to open pile burning.

    We recommend significantly simplifying sampling requirements, and particularly those associated with retention sampling hold times. **(U.S. Biochar Initiative)**

    RESPONSE: The Reserve has modified the sampling requirements in the protocol to increase flexibility so that project developers may better align their sampling design with the biochar production process employed under the project. However, we also recognize that current sampling requirements may be challenging for smaller scale producers to meet. In light of that, we will be monitoring how sampling under projects proceeds and make adjustments to the protocol to improve feasibility while still achieving the overall intended purpose and rigor.

46. **COMMENT:** Under the proposed protocol, all analytical analyses must be completed by an accredited laboratory. While we support this goal in concept, there are, at present, very few laboratories in the U.S. and Canada analyze biochar samples, and those that do are primarily soil analysis laboratories, few of which are typically certified under those certifications included in the proposed protocol. We recommend loosening laboratory accreditation requirements. **(U.S. Biochar Initiative)**

RESPONSE: The Reserve recognizes a general lack of laboratories currently conducting biochar testing that are accredited to ISO/DIN standards. Therefore, the protocol has been modified to include an alternative similar to that outlined in the USDA Natural Resources Conservation Service Conservation Practice Standard 336 (Soil Carbon Amendment), whereby state-approved accreditation for performance and proficiency is sufficient for laboratories to be eligible to perform analyses of biochar under the protocol.

Eligible Biochar Feedstocks List

47. **COMMENT:** For forestry-based feedstocks, what about waste invasive species (woody biomass or not) that are not normally cleared/collected, would they be eligible? If yes, would they need to be considered as purpose-grown since the harvest emissions would need to be included? **(Grain Ecosystem)**

    RESPONSE: Invasive species that are not normally cleared would not be eligible since the carbon they contain would remain sequestered in the biomass of the vegetation in the absence of the project. If invasive species were being cleared as a part of normal management activities and were either combusted or left to decompose in the baseline, then it would be an eligible feedstock.

48. **COMMENT:** For urban waste, the biomass component of municipal solid waste is eligible, but what if the MSW feedstock has a non-biomass/biogenic component (such as plastic), is it still eligible? **(Grain Ecosystem)**

    RESPONSE: Any biochar produced from municipal solid waste would have to meet the requirements of the protocol, including contaminant composition limits related to end uses, as well as other environmental safeguards such as PCB testing requirements. Furthermore, the project developer would have to ensure the project complies with all relevant regulatory limits, including air pollution standards.

49. **COMMENT:** The feedstocks eligibility list states for agricultural harvest residues: "Documentation that no more than 30% of residues have been removed from the feedstock site. Retention of significant residue amounts is required to maintain soil organic carbon and productivity of the site."

    This requirement as stated with no exceptions possible for additional data qualifying for higher percentage of residue removal could dramatically limit the sustainable use of crop residue biomass for CDR and in some cases could endanger the economics of utilizing these residues at all. This is not to say soil organic carbon and productivity should not be maintained or improved. This is in fact often the primary goal of applying biochar to soil as CAR will be well acquainted with this research. With scientific estimates on the appropriate percentage of crop residue removal to be sustainable varying widely from 30% to 70% residue removal (typically concerned with biofuels, i.e., without reapplication of the biomass to the soil in any form) (https://doi.org/10.1111/gcbb.12774, https://doi.org/10.1002/agj2.20724), currently existing methodologies have set significantly higher percentage residue removal maximums in the absence of additional supporting data of sustainable use (50% for Verra VCS and 70% for Puro.earth).

    Given the massive implication of this value to the potential of both biochar CDR scaling and

building soil health, and the scientific complexity around what is sustainable for a particular situation (practices, history, land, climate, etc.) we propose both:

a. That a higher maximum residue removal percentage be set explicitly for biomass that is returned as biochar to the same soil it was taken from with appropriate proof of this, and
b. That exceptions should be made above 30% residue removal when there is additional scientific data provided or when a robust MRV and adaptation plan to ensure soil health is maintained is provided. **(Climate Robotics)**

RESPONSE: The Reserve realizes the standard we have set for the use of agricultural residues is conservative. However, the references provided in the comment suggest that, from a conservativeness perspective, requiring that no more than 30% of residual biomass is removed is appropriate since removal of greater amounts can lead to unsustainable conditions. Nevertheless, in recognition of the diversity of conditions and needs related to crop production, the Reserve has incorporated, by reference, the removal limits identified by Table S10 from Karan et al. (2023).[2] Additionally, exceptions are allowed when biochar is returned to the same lands where agricultural residues were removed in amounts that ensure the amount of organic carbon removed in excess of the applicable removal limit is returned in the form of organic carbon in biochar. Other exceptions will be examined further (e.g., recognition of third-party sustainable biomass certifications) and included, as appropriate, in a future update to the Eligible Biochar Feedstocks List.

50. **COMMENT:** Note that for references to NRCS Code 336, this document currently states: "Do not apply amendments: Produced from crop residues that could otherwise provide soil protection and improve soil health (e.g., stover or straw)." Until this code is explicitly clarified in relation to biochar production of crop residue, we suggest this is clarified in the protocol. **(Climate Robotics)**

    RESPONSE: While NRCS Code 336 is referenced in the Eligible Biochar End Uses List, it is cited only with respect to contaminant limits applicable in jurisdictions where legal limits are otherwise not specified. The requirements under NRCS Code 336 are otherwise in no way applicable to projects under the Reserve's protocol, including with respect to eligible feedstock sources.

Eligible Biochar End Uses List

51. **COMMENT:** Is use as an animal feed additive eligible for any type of animals? For ruminants, is there data that demonstrates that there is no change to the carbon structure of the biochar in the rumen? **(Grain Ecosystem)**

    RESPONSE: It is the Reserve's understanding that the organic carbon in biochar may indeed be affected when passing through the digestive tracks of animals, especially as $H:C_{org}$ ratios increase. Therefore, the animal feed additive end use is being removed from the Eligible Biochar End Uses List until we can consider this further and potentially include an adjustment to the P_{EU} (permanence factor) value for biochar going to such end uses.

[2] Karan, S. K., Woolf, D., Azzi, E. S., Sundberg, C., & Wood, S. A. (2023). Potential for biochar carbon sequestration from crop residues: A global spatially explicit assessment. *GCB Bioenergy*, *15*(12), 1424-1436, DOI: 10.1111/gcbb.13102.

52. **COMMENT:** For construction/engineered materials, are transportation emissions "Included?" Please clarify under what conditions it needs to be included. **(Grain Ecosystem)**

    RESPONSE: The question mark was unintentionally included. Transportation emissions for construction/engineered materials are to be included in project emissions calculations at this time.

53. **COMMENT:** The proposed protocol uses a positive list for biochar end uses, which includes many end-uses for biochar. While this approach may be viable, we are concerned that, with the rapid growth in the biochar industry and end-uses, that such an approach will create an impediment to creative, carbon preserving end uses. An alternative approach would be to create a negative list, that clearly defines non-carbon preserving end uses as not eligible under this proposed protocol. Such uses are generally confined to those uses where biochar is combusted or thermally destroyed such as when "biochar" is used as biocoal or as charcoal. **(U.S. Biochar Initiative)**

    RESPONSE: We realize the industry is changing rapidly and, for that specific reason, are maintaining the positive list outside of the protocol—so it can be updated more frequently than we otherwise might update the protocol. New end uses can be proposed for inclusion on the list. However, Reserve staff need the opportunity to review any potential new end uses to ensure they will meet the intent and requirements of any end use as outlined in the protocol, including ensuring the long-term persistence of the organic carbon in the biochar and meeting any environmental safeguards. Since there are multiple factors that must be considered, the Reserve will make determinations around eligible end uses rather than placing that burden on verification bodies.

54. **COMMENT:** Under the eligible biochar end use list attachment, biochar derived from municipal solid waste is ineligible to be used in agricultural end-uses. While we understand the intent of this provision is to limit the potential for heavy metal and other potential contaminants, we recommend removing this provision and instead indicating that project developers should consult relevant regulatory bodies for guidance.

    Currently, biosolids are widely used as agricultural soil amendments subject to significant regulatory requirements related to contaminant concentrations and loading rates (i.e., mass of contaminant applied per unit area) for heavy metals and organic contaminants. Pyrolysis of biosolids can dramatically reduce organic pollutant concentrations; heavy metals are generally unaffected by the pyrolysis process and are retained in the final biochar, albeit at higher concentrations than the feedstock biosolids. While this material clearly has the potential for creating heavy metals contamination in agricultural end-uses, low biochar application rates likely pose little or no risk. We believe that determination of acceptable heavy metals loading rates should be left to environmental and agricultural regulatory agencies. **(U.S. Biochar Initiative)**

    RESPONSE: The intent of the prohibition on municipal solid waste from being the feedstock source for biochar applied to agricultural end uses was not intended to include biosolids. This has been clarified in the end use list. Furthermore, the Eligible Biochar Feedstocks List already identifies biosolids and municipal solid waste as different types of feedstocks.