Biochar Characterization Standard Meeting Minutes

Meeting Title:	WG1 and WG2 First Conference Call
Date:	Dec 9 and Dec 15 2010
Location:	Conference call

Attendees:

Name	Organization
Keith Driver	Leading Carbon – CA
Alison Lennie	Leading Carbon – CA
Ian Kuwahara	Leading Carbon - CA
Joseph Pignatello	WG1 - US
Johannes Lehmann	WG1 – US
Jason Aramburu	WG1 – US
Sunguo Wang	WG1 – CA
Kim Magrini	WG1 - US
Hugh McLaughlin	WG1 - CA
Rene Pigeon	WG1 – CA
Rogerio Traballi (couldn't speak on call)	WG1 - BR
Marta Camps	WG2 – NZ
Stephen Joseph	WG2 – AU
Lukas Van Zwieten	WG2 - AU
Amran Salleh	WG2 - MY
Saran Sohi	WG2 – UK
Guitong Li	WG2 - CN
Balwant Singh	WG2 - AU
Yoshiyuki Shinogi ?	WG2 - JP

Agenda: -

1. Introductions - Each working group member should be prepared to provide a 1 min intro to themselves.
2. Roles and Responsibilities - Outline of how meetings will be run, how input will be sought, how information can be shared.
3. Outline of Draft Standard - Run through the draft standard, focusing on the high-level issues: sections (included/excluded), key topics for discussion, and sources of additional information.
    a. Format
    b. Content
4. Key Information Required - Discussion of sources of information that can be used to supplement the draft.
5. Next Steps - Create action items based on discussion in-time for the next meeting.

The following provides a summary of the issues discussed on each of the working group calls.

WG1 – Meeting December 9th2010 – 7am (GMT -7h)

Disclaimer – The final draft should be reviewed by a lawyer to ensure that proper legal language is used to disclaim liabilities arising out of the use or potential misuse of information provided in this standard. The IBI should not be exposed to risks or liabilities arising from this standard and should therefore take proper precautions to protect itself from this. Further legal advice is important on this matter. Should compare to other standards with respect to liability approach (for further reference & justification).
Biochar for soil and growth media applications.

Onus to test and report – there is too much to test and report for product and process characteristics. Manufacturers do not have enough resources and there is little value in so much testing. Focus of characterization should be on testing and reporting biochar content, not indicating or prescribing uses and applications. However, may be beneficial to label class system as "suitable for use as…" to indicate properties and recommended applications.

Class labels Class I– The title for Class I is not accurate. It should be "Soil Remediation or Absorption " rather than "Activated Carbon" as the latter is not accurate nor would Biochars be used much for water or air treatment the way activated carbons are because chars have leachable organics. Biochars are not suitable for drinking water. Not only do they absorb compounds, they contain leachable compounds and they promote the growth of micro-organisms which also help degrade toxic compounds. May change class requirements to focus on absorptive properties for water, air and soil detoxification, but not for human consumption.

Class II may be marketed for yield improvement and toxin capture & stabilization.

Class labels Class IV – To label this class "Restricted…" is not open enough to the wide variety of possible products that would fall into this class and gives a bad impression for the type of products that would fall into this category. "Speciality Products" or something similar would be more apt. Not all applications are for soil, and not all are final products. Some Biochars are simply an 'intermediary' and are added to other substances (ie. Cement, asphalt, etc.) to make a different end product, therefore not specifically used as an addition to soil, but focusing on carbon sequestration only; acting as soil without being soil.

Would this non-soil biochar be beyond the scope of the characterization standard? Could it bring down the name of biochar to something less than acceptable to the larger biochar community?

Perhaps the characterization standard should indicate the full spectrum of biochar use possibilities, and identify a more limited range within the spectrum which the characterization standard will address? (e.g. "Biochar can be used for everything from crop production to binding agents in concrete and asphalt, this quantification standard will specify the characteristics and qualities required for the beneficial use of biochars in (life science

applications of) soil and growth media applications only.") Should recognise that of-flabel uses exist, but they will require external validation beyond the scope of this standard.

Mixing with soils – this standard is only concerned with the Biochar fractions of mixtures with compost, fertilizers etc. However no one can control how biochar is actually used, just how its use is recommended.

Grades – Different grades of Biochar should be considered in each class. Avoid overlapping grading schemes with certifications schemes.

Feedstock issues – The feedstock is paramount when considering the quality and suitability for Biochars.

MSW - MSW will be very difficult to incorporate as biomass and non-biomass fractions can be very difficult to characterize. Rubber / plastics / fossil carbon / petros / metals should not be part of Biochar. If they are incorporated into a Biochar, they must be labeled as a 'dilutant/diluent', 'contaminant', or something similar and the percentage of real Biochar (i.e. biochar as the pyrolised component versus total amount of material in the bag) should be marked on the product. MSW typically would have to be upgraded to be incorporated into Biochars, meaning sorted by biological / non-biological fractions. How would MSW need to be sorted? What would be allowed as feedstocks & diluents?

Should there be a percentage biochar limitation on the biochar fraction vs. other materials/diluents included with biochar? (e.g. high % biochar ensures more certainty of feedstock type and therefore materials source)

BIOchar would suggest a biological feedstock origin.

The intent of Carbon sequestration through biochar production (since pyrolysis prevents decomposition, burning etc.) would limit biochar to sources which will degrade without pyrolysis intervention, AND to sources that have removed carbon from the atmosphere (e.g. plants pull CO2 out & then that C is locked in biochar; v.s. fossil C that won't degrade in a landfill being pyrolysed for biochar production – where is the sequestration?)

New Class for MSW – It would be useful to have a class for products which are suitable for agricultural purposes and soil improvements, but which do not sequester any carbon. This would be for products which are derived from feedstocks that have very low or no biological feedstock. These may not be considered Biochars by definition but would be very similar products and should be treated in the standard somehow.
Mixing vs Coproducing – Mixing chars, composts, fertilizers and soils is different than co-producing different feedstocks in one charring process. This standard should be concerned with co-produced feedstocks, but also acknowledge mixing after production and how it can impact the product. Care must be taken, this is not an LCA label, rather a product / materials label, and cannot regulate how products are mixed or used after production. End uses may be prescribed, but are not mandated or monitored.

End Use – Fundamentally, if there is little or no soil amendment or soil function improvement potential in a Biochar, it is probably better to simply burn the feedstock completely to retrieve all the energy rather than produce a Biochar.

Are sequestration benefits additional to the definition/identification of biochar within the standard? How would >100 years sequestration/stabilization be identified?

Transportation – The footprint of a Biochar depends heavily on the distance in which it is moved, from collection / harvest to production to application. Considerations should be given to this, however an LCA is should not be required of each product. This is beyond the scope of a biochar characterization standard, however it plays in to the carbon sequestration and carbon neutrality of biochar.

Perhaps transportation and other sustainability issues could be added into the standard over time & with future revisions/updates.

Reference standards – The ASTM, ISO and EN fuel standards shown are inappropriate (fuel style testing relies upon the combustion of the material, not observing efficacy at 'normal biochar' temperatures, and not measuring fixed carbon in the same way. Biochar is not combusted like coal is & therefore materials behaviour and characterization is different.). Perhaps modified ASTM standards could be used, or New standards should be developed or similar standards could be adapted from fertilizer, composting and liming standards. A McShields standard is in development for this purpose. Biochar must be assessed without full sample combustion.

Terminology: use labile vs mobile & stable vs recalcitrant vs resident.
Process requirements – Section 5.3 (process requirements) are very difficult and almost valueless for regulating, reporting and should not be included in the standard. Highest temperature achieved during pyrolysis might be useful, but would not be a perfect measure, nor indicative of biochar quality. Process temperature reporting limits producer participation (e.g. small production with stoves, backyard biochar, developing nations…). Process temperature could be an optional characteristic for producers to report on bag labels, not part of the mandatory reporting requirements. Same can be said for residence time, as it varies for batch vs continuous, and for all feedstocks and process temperatures. The Characterization Standard is for biochar performance only, not how it was made or how it should be used.
Soil Properties – The list should be split and organized based on the function or the purpose of the test. Some properties should be required for reporting, but not required within specified limits as limits would provide no value. pH, liming and ash are deal breakers, O:C, N:C give sequestration value/carbon content, Electrical conductivity – not useful, TDS is useful, surface area is not useful, but it is commonly used in activated carbons. Properties/qualities label needs to enable buyers etc. to select between biochars.

Cannot rank as most to least desirable, as pH, nutrients, etc. are all variable, depending on soils receiving biochar, and the intended biochar use.

How often would testing be needed? What is a reliable production method that creates consistent biochar quality? Requirements for identifying reliable, consistent processes, which won't require continuous testing. When the pyrolysis process is inconsistent, every batch will need to be tested. The greatest risk of biochar production is char heterogeneity.

Sub groups in WGs – Sub-groups within the working groups could be created to help expedite feedback. The subgroups should be based on areas of expertise as different people have differing areas of expertise.

WG2 – Meeting December 15th2010 – 9pm (GMT -7h)

Question of whether characterisation classes should be prescriptive (i.e. use/application-specific) or more descriptive.

Class I Products – Class I products may already be covered by an activated carbon standard.

Class Relevance – Class I is a very small portion of the market. Ranking the classes by importance or relevance in the future market would make agricultural Biochars much more important and they should therefore be Class I. Classes would therefore be ranked by market relevance rather than feedstock quality or applicability.

Compost Catalyst – There should be a separate class or distinction made for Biochar products that catalyze compost and is very important.

Class II– Class II should be expanded and include more subgroups, it is a very broad range and will be the most popular product. This class should be named something like "Soil Function Improver". Class II needs more details, and should leave uses open-ended instead of providing limitations to uses/applications. "Soil health" is too ambiguous, use "soil functions"instead.

Definition of Biochar – the ash to carbon ratio should be covered and should have limits, either max ash ratio or minimum carbon ratio (max crystalline Si content or min C content). (ashes cannot be considered biochar)

Definition of limits – Time and temperature are related and cannot be defined or limited independently as they interact. A 150C char in 24 hours can be similar to a 1 hour char at a higher temperature. It is not necessarily useful to define pyrolysis conditions, however requirements should be made such that pyrolysis is complete into the core of all chars and that uncharred material does not remain in products, especially of large particle size.

Definition of MSW – the definition should include the term "organic material" rather than "organic matter". Organic material should be subdived into 'primary' (or non-transformed

biomass) which denotes directly from living material (wood chips etc) and 'secondary' (transformed biomass) which denotes derived from living material (sludge, manure, etc). 'Organic diluents' can include fossil and petroleum derived products, 'inorganic diluents' would include clays and soils. Would there be inadmissible materials (i.e. metals as inorganic diluents)?

What percentage of a bag of biochar must be biochar vs. diluents? Proportion of biochar to "charred other things".

Carbon credits should represent only % carbon from recently living (primary and secondary) biomass.

Challenge of separating feedstock from 'other stuff' especially great in manure management practices, where soil will be collected during field and/or pen manure collection, and proportions of soil to feedstock will be nearly impossible to measure. Soil may be seen as a significant source of contamination. In such cases, it is easier to assess total carbon content, however carbon type will vary with feedstock (e.g. chicken manure has ~10% $CaCO_3$ (calcium carbonate) content).

Standard should enable determination whether "other" materials are harmful to biochar production, or are acceptable diluents.

Soil Functions – Soil fertility or health should be referred to as 'soil functions' and 'soil properties'

Liming potential – there should be standards for liming materials already & should be followed for char characterization. Alkalinity should be included in the Biochar's assessment.

Fertilizer standard – Refer to fertilizer draft standards.

Feedstock – Feedstock to pyrolysis is key to the definition. Mixing Biochar with compost isn't part of this standard.

Sustainability - Sustainability concerns are separate from this standard. A counter argument was raised noting that there should at least be recommendations or endorsement of sustainable practices in a standard from IBI, even if it simply refers to a separate sustainability document because it is very important that Biochars are produced sustainably. It was noted that biofuel standards have already addressed sustainability in their standards and might be a good place to look for guidance on treating the sustainability issue. The standard may identify and establish boundaries related to sustainability. i.e. recommending that biochar be sourced from sustainable sources (e.g. FSC certified forests etc.) without going into detail about the specificity. Minimum material standards will not necessarily include sustainability.

Request that biochar not be lumped with "dirty biochar" production using primary rainforest timber. i.e. some sort of sustainability or feedstock source limitations may be required.

Process Requirements – These requirements might not be very useful however composting standards do provide certain limits and requirements to processing compost for the sake of ensuring safety (adequate removal of pathogens). The compost standards may be a good place to look for guidance for minimum requirements on time / temp for chars.

Processes – Is gasification and hydrothermal conversion even considered part of this standard? Should pyrolysis be the only accepted method to produce a Biochar?

Air quality – Biochars should be created in a process that meets national air quality standards, but not be an individual to each nation. (i.e. indicate in a sentence in the standard that biochar production must meet national air quality standards of the nation where the biochar is being produced, without actually listing national air quality standards, or making any producer adhere to standards designed for another country.) Perhaps a de minimis standard should be set for the process.

Reporting – Reporting is not such an important issue, and manufacturers who create good Biochars will naturally want to report the quality and competitive advantages their products have over others. (The details of production will vary between producers to such a large extent that standardization and/or reporting will not result in useful reporting values)

Carbon tests – the ISO and ASTM fuel tests are not applicable to Biochars. Requested that standardization move away from fuel tests, and seek alternative assessment approaches, as biochar is not burned & is instead kept at 'normal' temperatures. Indicated the activated charcoal standard may be of some use. Labile carbon test must be more effective than that of the ASTM.

'Fixed Carbon' – remove 'fixed carbon' from the definition of recalcitrant carbon. Use "STABLE" Carbon instead. Try to avoide multiple names for the same thing. Stabilized C becomes SEQUESTERED C once permanently in soil.
Quality grades – Gold, Silver, Good, Bad, best grades could be included as recommendations, however caution should be taken so that recommendations do not contradict national regulations or regional specificities to sustainability as there is a large degree of variability on criteria from country to country.

Referenced documents – any documents referenced in subsequent versions should be available to WG members or at least should be described to familiarize WG members with these standards. McSchields materials, "The Biochar Revolution", Roundtable on Sustainable Biofuels