Compiled Comments Submitted to International Biochar Initiative at BiocharGuidelineIBI@gmail.com during Biochar Guideline comment period from January 10, 2012 to February 10, 2012

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Tom Miles

Section 2 Terms and definitions

1. There is often confusion about what temperature is used in carbonization. IS it average, peak or a temperature maintained over time. Heat Treat Temperature (HTT) is used by carbon scientists to identify the temperature. (Antal, M.J. and Gronli. 2003. The Art, Science, and Technology of Charcoal Production. Ind. Eng. Chem. Res. 2003, 42, 1619-1640) is the temperatures used to correlate H:Corg in Appendix 5 HTT?

Section 3

2. Destruction of hazardous materials. Carbonization has been promoted as a method of destroying hazardous materials. IF feedstocks contain hazardous

materials that are destroyed during carbonization why shouldn't the resulting char be considered as biochar?

3. Most biochar producers will be unfamiliar with MSDS. It would be useful in an appendix to include or link to sample charcoal and biochar MSDS documents from the US and other countries.

4. It should be pointed out that the MSDS will identify toxic or hazardous characteristics of biochars. For example, rice husk char can be classified as hazardous under OSHA regulations (29 CFR 1910.1200), and by WHMIS in Canada. This is in part due to the carbon and also due to crystalline silica content. As long as it is declared in the MSDS and handled accordingly it can be used sold and used beneficially. More than 30,000 tons per year of rice husk char are produced sold in this way in the US each year. This issue must be further explored for chars produced from different feedstocks and processes.

5. This section seems to be focused on the US and Canda. Regulations and practices from the EU and Asian countries should also be included.

Section 4 Biochar Material Test Categories and Characteristics

6. Test Category B – Basic Toxin Reporting: Required for all biochars. At more than $1000 per sample It is beyond the financial capabilities of many small producers to adequately characterize their products. Dioxins, Furans, PHA and PCB regulations are not clear even in the US. This is a topic that should be studied by scientists using chars from different feedstocks before implementing these guidelines. IBI should lead in coordinating research and interpretation in this area.

7. Requiring producers to test all these categories has been said to make the users develop a database of biochar characteristics. IBI sh9uld figure out how member countries can offset the high cost of analysis and determine critical biochar qualities rather than make the producers pay for it.

8. Test Category C – Supplemental Biochar Toxin Testing. PCB's would seem to be appropriately put in Category C with Dioxins and Furnas since they are often tested by the same specialized laboratories. Table A3.1 (Appendix 3) is confusing and should be detailed in groups by country.

9. Test Category D – Advanced Analysis and Soil Enhancement Properties. Has IBI Checked to see if the referenced test mothods are commonly used by soil laboratories? In various counties? We hear from US labs and researchers that there is a lot of confusion over methods for char. A system that is coordinated with round robin testing like those used by American Association of Plant and Food Control Officials, (AAPFCO) http://www.aapfco.org/ and thei "Models of Uniformity. Test should also be coordinated with the the Mulch and Soil Council

(http://mulchandsoilcouncil.org/) that has a certification program. How will IBI keep track of guidelines in member countries?

10. What comments have IBI received that are specific to Europe, Australia or Asia compared with North America withregards to material testing?

Section 5 Special Instructions

11. IBI appears to want to make the producer responsible for the se of the biochar. The producer should provide at a minimum information about the materials but ultimately it is the user who is responsible for how they use the material.

Appendix 4 Determining a Material Change in Feedstock

12. What does it matter what feedstock is used if the important qualities are in the end product? IBI does not identify what important characteristics may cause differences in chars from different feedstocks. Information is not presented in this section about why a 10% change matters and what impact it can have on biochar use or performance. This requirement should be scrapped until an argument can be made for including it.

Many thanks for your diligent work. We still have a long way to go toward a useful set of characteristics.

Kind regards,

Tom

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Leonard Bull

I have only a very few comments and suggestions, none serious or concerning.

This is one of if not the very best draft of such a document that I have EVER seen. I have served on several National Academy of Science Committees and have reviewed many documents of this nature, but this is absolutely outstanding.

This document lays out UP FRONT what is going to be needed to "play the game". That is CRITICAL, and I hope that these standards will be BRUTALLY enforced.

Again, a pleasure to read! Great work!

Thanks!

LEN

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Frank Strie

Hello Kelpie Wilson,
Thank you for the presentation yesterday. It was a good combination of information presentation and addressing questions.
There are some issues about the testing procedure that are, may I call it, simplistic or unrealistic.
By producing char by separately handling softwood or hardwood species and even other organic matter separately in time can only apply to large scale, specialised Sawmills and or monoculture growers.
In reality, compost firms, ecologically responsible forest managers and mixed fam forest managers would have a blend of softwood and woody weeds and roadside, power line and rail track nuisance vegetation.
There needs to be a better way of testing procedure, the way it came across yesterday was unrealistic and distant from reality.

Frank Shields

Suggest,

Size distribution per ASTM 2862. This will report a broader range in the upper fraction down to a size that can create dust and mix in well alongside of soil particles. This without the expensive specialized equipment required by ASTM D5158

The earthworm test should be an EC50 or LC50 type test if the intent is to blanket toxins. An avoidance test just determine which of two medias the earthworms like

better. Tests like LC50 and/or EC50 are expensive for the info we will get because most likely toxicity noted will be diluted or will degrade in a short time.

Same with germination inhibition. Because we compare biochar to another media (positive control) . That other media could be any of many mixes. And again will likely be diluted out or improved in a short time.

PAH are again expensive and not worth the cost for everyone to do. Same with Furan and Dioxins.

I suggest the list of metals be done with every batch. Because they are inexpensive and uses common lab equipment found in most labs. Also are important to know the amount og metals being added to ag soil so accumulated rates can be determined. Like the EPA 503 rule for biosolids and used for compost.

When getting into advanced soil enhancement properties I suggest methods be left to the typical plant available extractions used in that region. Not so sure Total K is the same as available K.

Just suggestions

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Erich Knight

Dear IBI Guideline effort;

Have you seen this approach? I don't have access to the study , but though ya'll should see it.

Biochar Recalcitrance Indexing

An Index-Based Approach to Assessing Recalcitrance and Soil Carbon Sequestration Potential of Engineered Black Carbons (Biochars)
The ability of engineered black carbons (or biochars) to resist abiotic and, or biotic degradation (herein referred to as recalcitrance) is crucial to their successful deployment as a soil carbon sequestration strategy. A new recalcitrance index, the R50, for assessing biochar quality for carbon sequestration is proposed. The R50 is based on the relative thermal stability of a given biochar to that of graphite and was developed and evaluated with a variety of biochars (n = 59), and soot-like black

carbons. Comparison of R50, with biochar physicochemical properties and biochar-C mineralization revealed the existence of a quantifiable relationship between R50 and biochar recalcitrance. As presented here, the R50 is immediately applicable to pre-land application screening of biochars into Class A (R50 ≥ 0.70), Class B (0.50 ≤ R50 < 0.70) or Class C (R50 < 0.50) recalcitrance/carbon sequestration classes. Class A and Class C biochars would have carbon sequestration potential comparable to soot/graphite and uncharred plant biomass, respectively, whereas Class B biochars would have intermediate carbon sequestration potential. We believe that the coupling of the R50, to an index-based degradation, and an economic model could provide a suitable framework in which to comprehensively assess soil carbon sequestration in biochars.
http://pubs.acs.org/doi/abs/10.1021/es2040398

My 2 cents;
I would be happy with just a label covering.... Fixed Carbon%,..., VM%,...Surface Area.... Ph,... Ash%,.... minerals, and provenance.
with C-credits come, then maybe I'll need the R50- Factor,
Erich

Christian Roy

To IBI Committee Members:

I am sending the comments below following the IBI invitation to submit their comments about the last version of the Biochar Guidelines document. According to its web site, comments are welcome until February 10, 2012.

Qualification and definition of biochar was discussed at the Canada Biochar Workshop that was held in Montreal last week. Professor Lehmann was one of the speakers. Audience was composed of more than 120 university researchers and industry and government representatives. Professor Donald Smith from McGill University was the Chairperson for this NSERC-supported Workshop.

Although I was not officially mandated to talk on behalf of the panel, I wish to express some concerns which were heard during the Workshop:

· All efforts should be made by the scientific community to build-up a strong, impeccable public image of biochar. What happened to the ethanol sector is a lesson (corn-derived ethanol against food).

· Many participants stressed that perception of presence of even a small % of contaminants in biochar can be a public image killer. Even the allowed 2% fossil fuel content in biochar can affect the public image.

· In general the definition of what is biochar is not restrictive enough. Inclusion of a large variety of source materials and processes may not be a wise choice. Even MSW-green derived materials is a source of concern at this early stage of the biochar industry.

· Several participants mentioned that a higher pyrolysis temperature (low residual biochar volatile matter content) contribute to a better quality biochar, which is opposite to what others found. Consequently, rejecting the V.M. (proximate analysis test) is perhaps premature at this stage.

I will personally vote against the Guidelines as they stand today because the standards are not high enough. If the community is to build a strong biochar industry, better to only include lignocellulosics materials such as wood and agricultural resources, which are natural feedstocks. Pyrolysis is also the best way to produce good quality biochar and I am skeptical about including a large variety of different thermal processes. Finally, the absence of any sort of quality certification for biochar is annoying to me.

I hope this will contribute to the standardization on-going efforts.

Christian Roy
Pyrovac Inc.

Nancy Holm

I watched the webinar and I think the changes you made in the guidelines improve them quite a bit. Two comments I had are:
1. I think the producers need to be required to put the all of the information on the label (it could foldout like those on some bottles of herbicides, etc.) and not just have a website to refer to because then a person could not look at that information at the store and would need to go home (unless have an IPhone) and read about the product and then return to purchase it.

2. I think it is good that you are requiring testing for PAHs and dioxin and furan, though those tests are expensive. You may get some arguments from smaller operators about the cost but those tests with ensure a safe product. I know some companies now producing biochar and selling it claim to have no PAHs but I do not think they have done the extensive tests necessary to look at low concentrations. So it will be important that you keep the requirement that you will only certify products that can show they were tested with the correct methods and precision to detect low levels by professonial chemists.

Sheng Mao Yang

Dear,

I am afraid that I have no opportunity to attend tomorrow's webinar, so I SUBMIT my comments and opinio as follows.Thanks.

P3 line6 the trem of “current best practice”is not good because there is no standard on the best practices evaluating

P6 line7 the concept of BIOCHAR should be more detailed, that is a soild material should read as a porous active soild material;

P10 line19 and 33 balanced against cost should include the energy cost in producing biochar

P17 line13 The manufacturer should reads as manufacturers

General comments: The concept of BIOCHAR should clear and definite that the total ash must be limited and the content of organic carbon must reach the baseline, otherwise the biochar with less OC can not use in soils.

Your sincerely

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Paul Rasmussen

Dear Kelpie,

I listened with interest to the Webinar on Biochar standard specification.

I have some comments that I hope you will find helpful and a couple of questions that may reflect limits in my understanding of the thermochemistry of biochar production.

About five years ago I worked in R&D management and one of the key projects was an Australia-wide biosolids study to better understand the physico-chemical properties that had positive and negative biological effects. As you may be aware,

biosolids reuse is well-established in Australian agricultural practice. The key finding from the study was that the biggest culprit for negative effects were metals (particularly cadmium) and that the predominant soil amendment benefit was pH correction. Lessons learnt from this work and work since have informed State-based EPA and you would probably not be surprised to hear that the safe levels established for biosolids will have to be met by Biochars. What was used to develop the metals suite in the standard?

I took the point about a sampling regime based on USDA methods for compost; however, I wonder whether chars are not more dense and therefore methods used for biosolids or contaminated soil are not more relevant. Regardless of the way in which the sampling is done, there are probably more important issues in respect to testing.

The fact that testing could be triggered with a material change in feedstock will have to be defined very carefully to avoid extensive testing and associated costs. A definition of "materiality" as it relates to production in two senses may be important, in the first sense a broad useable classification for material feedstocks and in the second sense, a threshold level of change in feedstock that warrants testing (eg 5%, 10%, 20%).

I can understand why compound like furan and dioxin need to be tested but a couple of questions come to mind: will the testing be accurate at the standard specification limits; will the cost be prohibitive; and what standardisation will there be in the testing (eg standard assay that is accredited across all analytical providers). I presume toxicants like cyanide, DDT and other organo-pesticides are destroyed in the making of biochar?

I am not sure about the different levels of testing for processed and unprocessed feedstock. Human nature would tend to favour a product with a high level of testing whatever the inputs, so while trying to define an unprocessed feedstock may be tricky and ultimately exclude much into the processed category, it may be a moot point anyway. For producers and consumers I would imagine that a standard based on a single level of agreed testing may work best. If there is to be a differentiation of testing, then perhaps an alternative view is to forget about trying to justify differences on the input side and focus on the use side, tailoring the testing as fit for purpose. This has certainly been more successful for reuse of water, biosolids and waste soil in the Australian environment where the context of use (eg pine plantation vs fresh vegetable crops for human consumption) determines the testing requirement.

In the broader sense, has an established practice like HACCP been considered?

Hope this might be helpful,

Regards,

Paul.
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Joseph Pignatello

Dear Webinar moderators,

During the webinar of Jan 19, I asked whether the producer must declare the deliberately-added "diluent" content in the Feedstock Composition entry of the label. The gist of the response by one of the moderators was no, because it is difficult to define intentional, and it was felt that the C declaration is sufficient information for the consumer.

This presents an ambiguity, however. As implied by the Draft's sample label (83% poultry manure and 17% wood chip bedding), there is a requirement that the producer list the feedstock components with their percentages. If, in a hypothetical case, deliberate diluent had been added, these numbers are ambiguous and possibly misleading. Do they represent percent based on biomass content? Or on total mass content including the diluents? If the former, the consumer would be misled into believing the feedstock consists entirely of the biomass components. If the amount of deliberate diluent was unknown (it's not easy to see how that could be unless it was intentionally unknown), then no such percentages for the biomass components can be assigned.

I suggest the Feedstock Composition be based on the total mass of feedstock. That is the only thing that makes sense. This means that the deliberate diluent content be acknowledged either explicitly or implicitly (i.e., letting the consumer add up the numbers and subtract from 100). In the interests of full disclosure I suggest that the percent deliberate diluent be listed, perhaps called "inert ingredients." After all, in the United States and many other countries, percent "inert ingredients" is required for agrichemicals and most other consumer products.

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Nando Breiter

Dear Kelpie, Shiva, and all others involved.

Thanks for the excellent presentation last night. You summed up a complex discussion in a succinct, clear way. Well done.

I have a follow up comment to my question "Why the focus on stability over soil fertility?"

I'm assuming 2 things here. First that if a biochar sample does not pass a required testing procedure that is designated as Pass/Fail, it will not be certified as "biochar" by the standards process under consideration. Second, "low temperature" biochars would fail the H:C ratio test.

Placing a Pass/Fail criteria on the H:C ratio, rather than simply reporting it (or grading it at different levels), seems like a bad idea to me. Here's why.

First, it places a relatively strong value on stability over soil fertility. This seems out of congruence with the fact that at this point in time, and indeed for the foreseeable future, stability has little, if any economic value, especially worldwide. While it may be true that not all values we espouse are well correlated with economic value, IBI is proposing a testing regime and standard that would operate within the economic sphere. Hence congruence is essential if the standard is to be well accepted as relevant.

What will biochar producers do with the chars that don't pass the H:C ratio limit set and are deemed too "unstable" to be certified as biochar by the IBI, but are economically viable because they enhance soil fertility? Suggest to the IBI that they develop another standard for them? Take them to a different standards body? Tell the client that the IBI standard is irrelevant to the market because it is too narrowly focused on an abstract ideal of carbon sequestration? All these options are bad, both for biochar and for the standard itself.

Second, even if we assume that stability will soon have financial value, perhaps in certain specific countries or regions, that does not mean that stability will have financial or even moral value for all consumers of biochar. In the end analysis, many may only value biochar, sufficiently to purchase it, only against its ability to increase

productivity at the bottom line. The question then arises "Why am I paying to certify for stability?"

The Costa Rica coffee growers association might get together and decide that they should create a bio-standard that additionally certifies that the coffee was grown in Costa Rica. As a consumer, I might care if the coffee I buy is certified "Bio", but "Certified Grown in Costa Rica"? When the Costa Rica coffee growers association tries to corner the market with their certification process, and consumers don't care, they risk that it will backfire on them. At best, the exercise will turn out to be irrelevant.

Add to this the fact that realizing the economic value of the carbon stability certified in the standard will have an additional cost. The biochar certificate alone won't be enough. I don't think this biochar standard, within the limited scope proposed, should expect that it will be worthwhile for all biochar consumers to assume the additional costs of carbon market certification to realize the economic value of this metric of "carbon stability". Simply put, the standard says that "stability" is absolutely essential - we've certified it, and the farmer that looks into this aspect asks "Why isn't this enough?! It's certified for stability, but now I find out that it's worth nothing. I have to go to another agency and pay them as well to get any carbon credits for my biochar."

Third, stability may be a parameter we can test within the limited scope of the proposed standard, but it may have relatively low importance, if any, in comparison to other factors that would have to be taken into account for carbon market certification of an entire biochar scenario. The proposed testing regime blows the importance of stability out of proportion with a Pass/Fail criteria.

To illustrate, suppose we cut a standing hardwood forest for feedstock, char it inefficiently using a primitive pit method and get only a 7% conversion efficiency, do not use the excess energy, and do not flare the offgases, we might easily attain a "Pass" on the H:C ratio within the proposed testing procedures, but the overall environmental effect would be negative. As the example illustrates, the AGW impact would be much more dependent on the context of the entire process than the stability of the char in soil.

In the final analysis, we will always incur a "carbon debt" to the environment producing biochar, emitting more GHGs up front than would have "naturally" occurred, even under optimal conditions. Both the amount of emitted GHGs, and how the emitted GHGs are accounted for in a carbon market certification scheme, including the baseline scenario, all have a significant impact on the overall carbon balance of a project, easily more than the H:C ratio in the char.

It should also be noted that pyrolysis processes that produce more "stable" chars as characterized by the H:C ratio emit more CO2 up front, incurring more of an initial "carbon debt" that will take longer to overcome by the stabilized char. Emitting less

CO2 up front in a given biochar production scenario may be preferable. If we imagine that we could suddenly expand biochar production capacity to multi-gigatonne scales, the amount of CO2 this production emits up front to the atmosphere would have a very significant impact, accelerating global warming if the projects were not also designed to reduce emissions elsewhere.

It seems naive for the standard to posit that stability is of utmost importance while ignoring other essential aspects of carbon accounting as if they don't count. It leaves the standard wide open to criticism. Either we should address the entire scope and complexity of carbon accounting in the standard, or if we can't do that at this point, we should stay out of it.

Fourth, if stability is of paramount importance to a consumer of char, then the last place the char should be stored is in top soil! Put it down an abandoned mineshaft or dump it in the deep ocean where it will not be exposed to oxygen. For that to occur in the real world, stability has to somehow have economic value. Specifying that biochar must be placed in soil to be certified as such, and yet making stability of paramount Pass/Fail importance, is, for lack of a better term, schizophrenic. If biochar must be placed in soil, this rather strongly suggests that soil fertility is of paramount importance in the real world where the certification scheme will operate, where folks need to invest time and lots of money to make a biochar project happen, at a scale that would be worth carrying the expense of the proposed certification scheme.

The standard does not give an overall Pass/Fail to a criteria of "Soil Fertility Improvement" because we know that it cannot. Such an improvement is completely dependent on context: existing soil conditions, crop, climate, the local market, how skillfully the project is implemented, etc.

In the same way, whether a particular biochar project has a positive or negative effect on climate is completely dependent on the context of the entire project, and indeed is much more complex to judge than a single simple parameter of the char itself can ascertain. If the H:C ratio is interesting to know, report a value or assign it a level if you want. But giving it a Pass/Fail significance would be similar to naively giving a single criteria related to soil fertility, such as N content, a Pass/Fail significance.

It would certainly be convenient if we could simplify the AGW impact of biochar to a single, easy to test parameter in the char itself, but unfortunately, it's not that simple, by a long shot. The standard should not pretend that it is. Doing so would incur a credibility risk.

I hope these comments are helpful.

Kind regards,
Nando

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John Bonitz

Dear Kelpie,

Thanks for the great webinar today! You folks have put in an amazing amount of care and thought into these guidelines, I can see!

One small item for improvement did jump out at me:

We need to fix the use of the word 'toxin' in this document. In most all places (I imagine) we are probably meaning 'toxic' not 'toxin'. And the plural is toxics. See discussion of the difference here:
http://greensighted.blogspot.com/2009/09/toxic-vs-toxin.html

Here is my own mnemonic device: Toxins are created inside the body (or in another organism like venom in a snake). Toxics are external threats, if you will.

Thanks again for all the awesome effort at public input!

John

Hailong Wang

Hi Kelpie,

The seminar was excellent. Many thanks.

I am a bit worried about including dioxin and furan as essential test as requested. I understand analysis of each sample would cost a few thousand dollars. It could be a major cost for a medium sized producer.

Have we got enough information for us to justify to include these items for analysis?

I have experience in land application of biosolids. During a period, concerns about dioxin in biochar were raised. It took a few years and huge amount of funding to

allow the USEPA to decide that dioxin is not a major concern in biosolids and should not be regulated.

Many thanks.
Cheers
Hailong

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Hugh McLaughlin

Hello IBI,

I just sat through the webinar - and came away appalled. It is apparent that IBI has little interest in getting the science right and places a huge emphasis on appearances. I will be concise, since I have little confidence that IBI has the backbone to admit it has erred and correct things. Furthermore, I have spend a significant amount of time on the IBI characterization task force to date - and achieved little.

Specifically, referring to pages in the Jan 10th, 2012 draft:

Page 13: Table 1: If you are going to propose "The Use of H:Corg to Indicate C Stability", then it should not be a cutoff, it should be a correlation. If the science of biochar is not to the point that it can relate measured properties to carbon sequestration impact, then it should get out of the business of validating it by providing a trivial criterion of H:Corg<0.7. It might as well say: Material must be black in color - such a test contains the same information. Also, what about blending biochars to meet the criterion - just mill in some high carbon flyash and you can probably get torrefied sawdust to pass the cutoff.

Page 13: Table 1: Total Nitrogen by the Dumas method. The literature is clear that virtually all nitrogen remaining in biochar is aromatic nitrogen, bound in the graphitic backbone and not biologically available - this goes for poultry litter biochars too. As such, the reported nitrogen means nothing to the plant - ever.

Page 13: Table 1: I recommend you add TDS - to define how much of the ash is soluble and going to flush out of the soil over time, but not before it inhibits the plant growth due to brackish groundwater. Salt is a lot cheaper than good biochar - might as well bulk it up (see brining poultry and hams - this is not a new concept).

Page 14: Table 2: Cite specific analytical methods, not EPA hearsay. When one digs down into Appendix 3, one finds that most of the references are not appropriate to biochar (EPA 503 sewerage solids biosolids is not biochar - and god help us if we can't tell the difference). I get the impression that no one at IBI has actually checked these citations - http://www.ephc.gov.au/sites/default/files/ASC_NEPMSch_O1_Investigation_Levels_199912.pdf - does not work. None of the citations provide anything beyond a number - no background analytical method, no ability to determine if the method is appropriate to biochar and how it is used.

Page 14: Table 2: We are dealing with PAH's and Chlorinated Furans and Dioxins - right? The example label, page 22, goes back to "Furan" and "Dioxin" - then reports them as a level and notes that they "pass". This is a classic case of "How long since you stopped beating your wife - please indicate yes or no if it is over two weeks". I asked this question on the webinar and was told that the IBI is being very specific - if you are going to talk the talk, walk the walk. IBI has spend a fortune on this exercise - and having this level of "oh, you know what I mean" is wrong.

Page 14: Table 2: So - who's idea was it to assume that biochar intrinsically contains PAH's, Chlorinated Furans, Chlorinated Dioxins, a liberal dose of PCB's? I asked in the webinar if the IBI was going to provide literature references that cite this concern - and Kelpie said that it was easy to find them - just look. Well, I hate to tell you, but I have and evidence is well short of convincing. See, for example, http://grassrootsintelligence.blogspot.com/2009/11/biochar-pah-issue.html. Someone has sold IBI on the concept the biochar is dirty until proven clean - and for an adsorbing material (ala activated carbon), the opposite is typically true: Biochars reduce the level of toxics in the soil around them - read the literature. Why IBI is hanging a scarlet letter on biochar when it comes to toxicity is insane. It is like putting a label on bananas that says; "The LD50 of this banana is below the level that causes most cancers in humans". Really building up the confidence in the eyes of the consumer.

Page 16: Table 4: Finally, and optional for all biochars, is a nitrogen test that measures bio-available nitrogen - why the change from Table 1? Then for P&K the citation is an "in press" work of a presumable non-standard method. Similar to Appendix 5, where "(data from Sevilla and Fuertes (on hydrothermal carbonation chars), 2009ab; Camps et al., unpubl.; Enders et al., unpubl) are used to establish a criterion that every biochar must have. Somehow the criteria of a standardized test is up for interpretation.

Page 16: Table 4: Porosity and Surface Area: ASTM D 6556-10 Standard Test Method for
Carbon Black – Total and External Surface Area by Nitrogen Adsorption. Carbon Black is a fossil fuel based additive to improve the wear properties of tires, Black carbon is a term used in the soil literature fro graphitic carbon - they are not the same. It is amazing that when an actual certified test, ASTM D 6556-10 is called out - it is a test certified for the wrong material. The closest thing to biochar, especially good biochars, is activated carbon. The appropriate ASTM tests for porosity and adsorption capacity are D5742 and D7385. Why - because I am a char expert and I know what I am talking about. If IBI is confident about the specific analytical recommendations of others in this characterization exercise, then stick with what you have got. If you have not done your due diligence and are just hanging something out there to impress people - then you have a big problem and will cause a lot of harm.

In closing, characterization is science - and I am not sure IBI has searched out the science. They have collated a broad cross section of concerns, without any real priority on separating wheat from chaff. Everyone should be congratulated that the exercise gives every appearance of providing solid guidance - except it does not. This is an unfortunate legacy, which will likely cause lasting harm to the "potential of biochar".

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PS: How is it that mobile matter (aka volatile carbon) and resident matter (aka recalcitrant) does not merit consideration in evaluating the characteristics of biochar? Has the science of biochar not progressed that far or are we just afraid to admit what we have learned.

Addendum:

I finally found the EPA analytical techniques in the References in Section 7. Neither 8275 or 8290 is appropriate for predicting bio-availability of chlorinated compounds in adsorbing substances such as biochar. These methods basically displace any toxics from the biochar by very aggressive thermal and chemical methods. Such methods do not represent credible pathways for biochar in the soil - from a risk assessment perspective. As such, IBI is advocating that every single biochar be tested for toxics that are highly unlikely to be present and reported at a level that is not representative of the actual behavior of these toxics, in the unlikely event that they are present, in the soil. This is like a page out of the Biofuelswatch playbook - use flawed logic and bad science to fabricate erroneous conclusions and mislead the public.

Hugh McLaughlin, PhD, PE

Michael Theroux

Please find attached, our comments on the draft biochar standards. We thank you for the opportunity to provide input and for your organization's efforts.

Michael Theroux

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JDMT, Inc

February 8, 2012

International Biochar Initiative
Via email: BiocharGuidelineIBI@gmail.com

SUBJECT: Stakeholder Comment to Draft Guidelines for Specifications of Biochars for Use in Soils (IBI-STD-0)

We appreciate the opportunity to provide stakeholder comment on the current draft Revision Number 7, "Guidelines for Specifications of Biochars for Use in Soils," developed by the International Biochar Initiative (IBI). We recognize that the Biochar Guidelines are designed to support an international biochar certification program, and for use as a starting point and general reference for national, regional and local product standards development efforts.

The Biochar Guidelines are clearly intended as a "work in progress", to be updated as new information becomes available over time. We see our own submission of comments similarly, as the beginning of our long-term engagement with the IBI for betterment of a collective understanding of biochar science.

Our comments are referenced to section, page and line for ease of correlation.

§1, pg.6, line 10
This initial statement on Biochar will by its prominent placement become the de facto definition. As such, it seems reasonable to here add " as an effective method of carbon sequestration, "

§2, pg.7, line 21
Do full animal carcasses fall within "processed biological material"? This would be contrary to most waste management standards. Clarification or statement of reasons is needed.

It is noteworthy that animal carcasses are not a listed type of potential feedstock, either processed or unprocessed, in Appendix 4, Tables A4.1 and A4.2).

§2, pg.8, line 33
It does not follow that potential bio-accumulative toxins in animal tissues would constitute reason to consider these materials as "processed", any more that the same condition of toxicity accumulation in raw plant-sourced biomass would relegate this to being "processed material."

§3, pg.9, line 22
"MSW", or municipal solid waste, is a categorical description related to source as much as constituent. To exclude "MSW containing hazardous materials or wastes " (clarify as " or hazardous waste ") negates the potential to segregate those contaminants below the 2% maxima. *All* waste may indeed contain hazardous contaminants, and all contaminants may constitute a hazard, at sufficient concentrations. Substitute performance criteria rather than

broad prescriptive constraints; we suggest: "MSW may contain contaminants considered hazardous even below the 2% maxima; statistically valid testing for assurance of non-toxic nature may be necessary to qualify MSW-sourced materials as appropriate biochar feedstock."

Considering the following recommendation that the final biochar product be accompanied by a material safety data sheet (MSDS, pg.10), and further, the requisite Test Category C for supplemental toxin reporting (pg.11) this testing might be considered a broad and basic part of biochar certification, sufficient to encompass MSW-sourced biomass to biochar conversion.

§4, ppg.10-16
This section on Biochar Material Test Categories and Characteristics is particularly well developed, referenced and detailed.

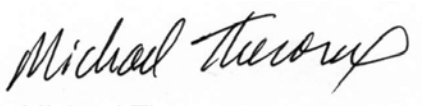
§5, pg.17, lines 15-18
Biochar characteristics vary widely, as do soil conditions that a particular biochar might improve: for example, some soils and planting regimes will require an amendment with a much lower pH than others. Adding a "characteristics" category addressing suggested usage would seem appropriate here.

§6, pg.18, lines 2-10
Statistical characterization is expensive, yet may be necessary where variability of potential contaminant levels and constituents is either to be expected, or has been proven. A corollary is seen in assessment of other thermal conversion ash and residues where sub-toxic amounts of contaminants in feedstock can result in spiking hazardous levels in the product. If periodic testing identifies an incidence of toxicity, all subsequent residual must be assumed to also be hazardous unless statistically proven non-hazardous. Inclusion of a "statistical assessment, where necessary" criteria would simplify future implementation.

Thank for the opportunity to provide comments to your draft "Guidelines for Specifications of Biochars for Use in Soils." Please contact me at mtheroux@jdmt.net or (530) 613-1712 if you have any questions.

Sincerely,

JDMT, Inc



Michael Theroux
Vice President

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