

Standardized Product Definition and Product Testing Guidelines for Biochar That Is Used in Soil (aka IBI Biochar Standards)

Summary of IBI Responses to Comments Received During the 30-Day Public Comment Period and Informational Webinars on Proposed Policy Revisions to the *IBI Biochar Standards V2.0*

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This document provides a comprehensive summary of:

1. IBI responses to public comments received during the 30-day open comment period (8 December 2013 – 8 January 2014) on the first version of proposed policy revisions to the IBI Biochar Standards (available for review here [http://www.biochar-international.org/sites/default/files/Public Comment IBI Biochar Standards V2.0.pdf](http://www.biochar-international.org/sites/default/files/Public%20Comment%20IBI%20Biochar%20Standards%20V2.0.pdf)); and
2. IBI responses to public comments received during and after two informational webinars hosted by IBI on the proposed policy revisions on 17 and 25 March 2014 (PDFs of the slides and videos of the webinars are available for viewing under “March 2014 Update” by clicking here <http://www.biochar-international.org/characterizationstandard>).

The comments and responses to the 30-day public comment period and the information webinars are summarized in Tables 1. and 2., respectively, on the following pages. If you have any questions or would like further information please email us at standards@biochar-international.org.

Table 1. Comments received during 30-day public comment period from Dec 2013 – Jan 2014 and IBI responses. The table: 1) categorizes comments by proposed policy revision; 2) provides the frequency of each comment; 3) states whether the comment is in agreement or disagreement with the proposed revision; 4) summarizes the comment; and 5) provides an IBI response. The first column also provides a tally of responses in agreement or disagreement with the proposed change. Seventy-five total responses were received. Note that not all people who responded submitted comments on every item.

Proposed policy revision	Comment number	Frequency	Commenter agrees or disagrees w/ proposed revision	Comment summary	IBI response
Biochar weathering restrictions 75 total responses during public comment period: 51 agree 24 disagree	1.1	8	disagree	Weathering is a beneficial conditioning process that improves the suitability of biochar for soil, and weathering is an ongoing process that occurs even in packaged materials exposed to ambient air. For these reasons it should not be considered under the IBI Biochar Standards.	IBI agrees that in most cases weathering can improve biochar's suitability for soils by leaching salts and lowering pH, for example. However, from the perspective of a certifying body, IBI's concern is focused on assuring a product that is consistent with the information reported on the label (or at least +/- some percentage) for any given parameter that is tested for and reported; the reported analyses should accurately reflect the physicochemical properties of the biochar material. Nonetheless, because of issues raised, IBI intends to include this in a new 'best management practice' section, rather than a requirement that must be monitored and tested.
	1.2	6	disagree	There is a lack of science to make this policy change at this stage, or to demonstrate that weathering creates safety concerns.	Biochar science around weathering processes is indeed scarce. However, the proposed change is focused on assurances around product specifications, rather than safety. The IBI Biochar Standards form the backbone of the IBI Biochar Certification Program which mandates reporting of physicochemical properties in the required IBI Biochar Standards tests. As such, IBI seeks to provide consumers with confidence that reported properties on the label are consistent with the product. Weathering may alter the product properties.
	1.3	4	disagree	This policy change is too restrictive and would create serious practicality concerns because of uncertainty around weathering processes	Weathering does change biochar's properties, often for the better. From the perspective of the certifying body, IBI seeks to provide assurances to consumers that a product's properties are consistent with what is reported on the product label. We would like to address this in a manner that is not onerous to producers. The inclusion of a BMP section that addresses weathering is one way to approach this. In cases where weathering is regularly used as a form of post-processing to improve biochar quality, testing should occur after the weathering treatment.
	1.4	2	disagree	The sampling protocol should address weathering concerns	Sampling protocols (also proposed to change in Version 2.0 of the IBI Biochar Standards) are intended to address intra- not inter-batch variability. Batches that are differentially weathered will likely produce different test results for some properties. IBI does agree that perhaps there is a need to focus solely on properties affected by weathering, rather than all properties. We are seeking expert guidance on which properties merit closer attention <i>vis a vis</i> weathering.

Proposed policy revision	Comment number	Frequency	Commenter agrees or disagrees w/ proposed revision	Comment summary	IBI response
	1.5	4	disagree (1 agree)	Exposure to moisture and/or air reduces combustion hazard.	IBI disagrees with this statement. It has been found that some high-activity, pyrophoric biochars that are exposed to air are sometimes more flammable when dampened rather than thoroughly quenched. The original intent of the restrictions around weathering was focused on product uniformity (see response to Comment 1.2). IBI may consider including some guidance on this issue in a new BMP section.
	1.6	2	disagree (1 agree)	Product quality in the beginning should be considered.	IBI interprets this comment as stating that testing of biochar should happen prior to weathering. See IBI response to comment 1.1
	1.7	1	disagree	Weathering effects are minimal.	While this may be true in some cases, in other cases--for example, when biochar is exposed to heavy precipitation and temperature fluctuations--the weathering processes may significantly alter some of the biochar properties from its pre-weathered state.
	1.8	1	disagree	Biochar producers who do not cover their biochar demonstrate that their biochar is a low value product	IBI disagrees with this comment. There are many reasons why biochar may be exposed to weathering in the open air.
	1.9	1	disagree	Simply labeling the biochar product as "weathered" or "unweathered" will sufficiently address weathering concerns.	IBI disagrees with this point because insufficient information would be provided to the consumer with a simple weathered/unweathered claim, given the significant differences in weathering – and thus product impacts – that are inherently possible. Perhaps, however, there is an opportunity to focus just on those properties known to be affected by weathering, as suggested in 1.4.
	1.10	2	agree	The IBI Biochar Standards should maintain high expectations.	IBI agrees with this point.
	1.11	1	agree	If weathering alters biochar carbon stability, it should be addressed.	Weathering should not affect biochar recalcitrance. The stable carbon portion of the biochar is resistant to weathering which confers its long-term persistence in the soil.
	1.12	1	agree	Weathering stored outdoors has a high air emission impact.	IBI disagrees with this comment. Most weathering impacts will relate to leaching of elements, rather than volatilization of pollutants.
	1.13	1	agree	When biochar structure is damaged due to weathering the benefits of the material decrease.	It is unlikely that weathering will damage the physical structure of biochar in a negative manner.

Proposed policy revision	Comment number	Frequency	Commenter agrees or disagrees w/ proposed revision	Comment summary	IBI response
Biochar post-processing testing requirements 75 total responses during public comment period: 61 agree 14 disagree	2.1	4	disagree	This requirement places too much testing onus on producers that use different post-processing treatments to produce custom formulations of biochar.	IBI understands that this requirement will create new testing requirements for biochar producers that create multiple biochars using different post-processing treatments. However, this provision is intended to maintain accuracy in reporting of physicochemical properties of the final product for end use. When post-processing substantively changes the biochar material, IBI believes that testing is warranted to provide assurances on product uniformity <i>vis a vis</i> labeling requirements. IBI would like to reiterate, however, that the proposal is not to require re-testing after post-processing, but rather specifies that testing should occur only after certain forms of post-processing are completed, to reflect the properties of the final product.
	2.2	3	disagree	This requirement is a way for IBI to get at trade secrets.	The statement is incorrect. IBI's intent is solely focused on providing assurances to end consumers around product uniformity and safety <i>vis a vis</i> labeling requirements. There is no requirement that producers report any specifics of post-processing treatments. Rather, the requirement simply specifies that testing should occur after post-processing is completed.
	2.3	3	disagree	The post-processing treatments referred to as particle size segregation or crushing, milling, or grinding do not change the physicochemical properties of biochar in a significant way.	Crushing, milling, or grinding will change the physical characteristics of the biochar, though perhaps not the chemical characteristics. IBI agrees that since particle size distribution is the only test characteristic likely to change with these forms of post-processing, any re-testing requirements should be confined to those parameters likely to be affected by these forms of post-processing. IBI would like to reiterate, however, that the proposal is not to require re-testing after post-processing, but rather specifies that testing should occur only after certain forms of post-processing are completed, to reflect the properties of the final product.
	2.4	2	disagree	Not enough information is provided on how post-processing affects biochar classification.	Certain post-processing activities are known to create significant changes in the physicochemical properties of the biochar material. For example, acid washing may significantly lower the ash content. Post-processing activities are generally conducted by biochar producers with the intent to alter the biochar. This is precisely why IBI proposed this change: so that the properties of the material as reported on the label reflect what is being marketed to the consumer for end use.
	2.5	1	disagree	Biological activation as a post-processing treatment is not precise enough. For example, mixing with compost is a form of bioactivation.	This is a valid point. IBI has refined the language around biological activation and other forms of post-processing in the amended revision is posted for review and voting by IBI membership.
	2.6	1	disagree	This requirement creates too many testing requirements. The testing should only occur on final product to be marketed.	IBI interprets this comment as a misconception on the part of the commenter. The proposal is not to require re-testing after post-processing, but rather specifies that testing should occur only after certain forms of post-processing are completed, to reflect the properties of the final product.

Proposed policy revision	Comment number	Frequency	Commenter agrees or disagrees w/ proposed revision	Comment summary	IBI response
	2.7	3	agree	Post-processing is part of the production process and testing should occur on the biochar material to be sold	IBI agrees with this point. This is the primary reason this change is proposed.
	2.8	2	agree	It is important for biochar producers to be transparent about post-processing steps	There is no requirement in the proposed change that the biochar producer report the post-processing treatment being used. Rather, the proposal specifies that testing should occur only after certain forms of post-processing are completed, to reflect the physicochemical properties of the final product to be marketed.
	2.9	1	agree	Additives should be tested separately to keep it simple	IBI disagrees with this comment. The purpose of the IBI Biochar Standards is to test and report the properties of a biochar material to be marketed or utilized as a soil amendment, and not to test other materials that may be added to biochar, since that could encompass an infinite set of additives. However, to the extent that a biochar is post-processed in a manner that affects the final biochar product, IBI feels it is important to test that final product to ensure that the product label and physicochemical characteristics are properly reported.
	2.10	1	agree	Assuming this would include post processing with the goal to speed up the weathering process	There are many reasons why a producer may conduct post processing activities, artificial weathering being one of them. IBI does not require information regarding the reasons for post-processing. Rather, the proposal specifies that testing should occur only after certain forms of post-processing are completed, to reflect the physicochemical properties of the final product to be marketed.
	2.11	1	agree	Commenter agrees with characterization but is opposed to certification	IBI believes strongly that testing and certification is important in this pre-regulatory atmosphere to establish appropriate biochar industry infrastructure and ensure product certainty and safety for use as intended. Additionally, IBI biochar certification is entirely voluntary.
	2.12	1	agree	Suggest that weathering be included as a form of post-processing	IBI will include "intentional weathering" as a form of post-processing and indicate when testing should occur and what properties may need to be re-tested; however, it should be noted that weathering and its impacts can vary significantly, and consistency of product is an IBI Biochar Certification Program requirement.
	2.13	1	agree	This is important from a safety perspective because crushing assists with quench	It is the responsibility of the biochar producer to follow practices that ensure product safety, from production through to end use.
Biomass flyash prohibitions 75 total responses during public comment period: 48 agree 27 disagree	3.1	17	disagree	Robust testing standards should sufficiently capture any concerns about toxicants, and the standards should remain technology neutral	IBI agrees with both components of this comment: the analytical tests should provide information on any toxicants present in the biochar, and the intent of the IBI Biochar Standards is to remain technology neutral. However, IBI's concern with this material centers around uncertainties in product consistency, including operator controls over process conditions and resulting changes in product from one batch to another. It is well known that variations in heat treatment temperature can lead to formation of toxicants, and unless production is maintained in a controlled environment, consistency of product cannot be assured.

Proposed policy revision	Comment number	Frequency	Commenter agrees or disagrees w/ proposed revision	Comment summary	IBI response
	3.2	8	disagree	High carbon wood ash is an important source of biochar material at low cost for the growing biochar industry	IBI's concern with this material centers around uncertainties in product consistency, including operator controls over process conditions and resulting changes in product from one batch to another. It is well known that variations in heat treatment temperature can lead to formation of toxicants, and unless production is maintained in a controlled environment, consistency of product cannot be assured.
	3.3	2	disagree	Instead of excluding the technology, raise the minimum C content to 30% to exclude most flyash materials, or establish a maximum permissible ash content	Currently the minimum C content allowable in the Standards is 10%. The IBI Biochar Standards were initially conceived to permit a wide range of both C and ash contents to accommodate a range of different feedstocks. Some feedstocks such as poultry litter are known to have a high ash and low C content, yet IBI believes that they should not be excluded from the IBI Biochar Standards because they do not meet ash or C thresholds. Additionally, the ash and carbon content is required to be reported as part of the IBI Biochar Standards, and is thus a known quantity.
	3.4	2	disagree	Let the consumer decide if they want to use material derived from biomass flyash	IBI's concern with this material centers around uncertainties in product consistency, including operator controls over process conditions and resulting changes in product from one batch to another. It is well known that variations in heat treatment temperature can lead to formation of toxicants, and unless production is maintained in a controlled environment, consistency of product cannot be assured.
	3.5	1	disagree	The "material change" in temperature requirement i.e. +/-10% change, is flawed because it's too hard to control in any thermochemical process	IBI disagrees that process temperature cannot be monitored to observe deviations of +/-10%. It is common practice to use thermocouples to monitor real-time temperatures in thermochemical conversion processes. This provision was put in place early on in the development of the IBI Biochar Standards after receiving input from an expert panel, including biochar producers.
	3.6	1	disagree	Biochar manufacturers operating gasification and pyrolysis units do not have control over process conditions	IBI disagrees with this point. Biochar manufacturers utilizing their own equipment to produce a consistent product should have full control over and fully monitor the processing conditions during biochar production.
	3.7	1	disagree	If unknown toxicants in biomass flyash are not currently covered by the Standards, the Standards should evolve to address those rather than placing a ban on biomass flyash	IBI's concern with this material centers around uncertainties in product consistency, including operator controls over process conditions and resulting changes in product from one batch to another. It is well known that variations in heat treatment temperature can lead to formation of toxicants, and unless production is maintained in a controlled environment, consistency of product cannot be assured.
	3.8	1	disagree	Banning a biochar material based on high temperature is unreasonable	IBI's concern with this material centers around uncertainties in product consistency, including operator controls over process conditions and resulting changes in product from one batch to another. It is well known that variations in heat treatment temperature can lead to formation of toxicants, and unless production is maintained in a controlled environment, consistency of product cannot be assured.

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	3.9	1	disagree	Accumulation of toxicants applies well to ash, not sifted char	If in fact that is the case, it is not possible to determine the presence or absence of toxicants in all batches without further evidence on how the high carbon portion of the biomass flyash i.e., the biochar portion, is sifted or segregated from the ash. At present, there is insufficient knowledge to guarantee consistency of product from one batch to the next to dismiss concerns around accumulation of metals and other toxicants and their potential presence in the high carbon portion of the biomass flyash. IBI's concern with this material centers around uncertainties in product consistency, including operator controls over process conditions and resulting changes in product from one batch to another. It is well known that variations in heat treatment temperature can lead to formation of toxicants, and unless production is maintained in a controlled environment, consistency of product cannot be assured.
	3.10	1	disagree	IBI is assuming that no operator can control the physicochemical properties which is unreasonable	That is not the case. In fact, we expect that biochar manufacturers have full control over their operations. It is in instances where a biomass power plant operator is providing material to third parties to sell as biochar that we have concern that the third party will not have control and/or knowledge regarding process conditions and potential changes in process conditions from one batch to another, over a 12-month (IBI Biochar Certification Program) period. IBI's concern is that production must be maintained in a controlled environment to ensure consistency of product.
	3.11	1	disagree	Flyash is different from bottom ash which may be a good biochar material	IBI agrees that there is may be a material difference between bottom- and flyash. We have taken this into consideration when formulating our amended proposed policy revision to the IBI Biochar Standards under the broader issue of the use of high carbon biomass ash as a biochar material.
	3.12	1	disagree	Consider using biomass flyash biochar only for non-food production purposes	The IBI Biochar Standards do not dictate and cannot predict in which soils any particular biochar may be used or applied. Further, there would still be concern around accumulation of toxicants in soils used to produce non-food crops that are later converted to food crops.
	3.13	1	disagree	The sources cited by IBI relate to fully ashed materials, not biochar	The peer reviewed literature focuses on the properties of biomass flyash, not some fraction thereof. IBI's concern with this material centers around uncertainties in product consistency, including operator controls over process conditions and resulting changes in product from one batch to another. It is well known that variations in heat treatment temperature can lead to formation of toxicants, and unless production is maintained in a controlled environment, consistency of product cannot be assured.
	3.14	1	agree	Flyash is known to contain heavy metals	This is one of the primary reasons for proposing specific controls on biomass flyash (and bottom ash) used as a biochar material under the IBI Biochar Standards. The requirements proposed under the amended policy revision are related to the need to demonstrate operational control over thermochemical processing conditions to assure consistency of product, and the frequency of frequent sampling and testing of biomass ash for presence of toxicants.

Proposed policy revision	Comment number	Frequency	Commenter agrees or disagrees w/ proposed revision	Comment summary	IBI response
Biochar sampling procedures	4.1	2	disagree	It is too soon for industry standards to be rolled out	IBI disagrees with this comment. We believe strongly that biochar testing and certification are an essential component of building a biochar industry with the appropriate infrastructure to ensure certainty and safety for end-users and the marketplace.
74 total responses during public comment period: 65 agree 9 disagree					
	4.2	1	disagree	The proposed sampling recommendations won't work because it is based on trust	The IBI Biochar Standards, and the accompanying IBI Biochar Certification Program, are voluntary self-certifying programs and are thus based on the integrity of the entity submitting materials for certification. While IBI will conduct some limited audits, we do not have the capacity to conduct site visits to ensure that all operations are following the required sampling protocols, for example. However, there are legal statements that must be signed by biochar producers as part of the Certification Program, and these are legally binding agreements.
	4.3	1	disagree	The existing sampling protocol derived by the US Composting Council is sufficient	We disagree with this point. From the producer's perspective, the compost sampling protocols are far too complex. The proposed sampling protocols for biochar draw from the compost sampling protocols but simplify them and make them relevant to the biochar context.
	4.4	3	agree	Develop a separate decision tree for when PAH, PCB, PCDD/F needs to be tested, so that small producers don't suffer high costs of paying for those tests	The comment suggests that IBI develop mechanisms to lower cost barriers to participation for small producers. We agree that maintaining access to the certification program is important for all producers. With respect to sampling, though, at this stage it is important that all producers follow the same sampling protocols to ensure that testing results are representative of the material to be sold. As biochar science improves, IBI may consider developing a decision tree for the more expensive parameters to be tested. At present, if a product passes the toxicant tests, re-testing of these parameters is only required every 3 years, rather than annually, assuming all other processing conditions remain the same. This is intended to address costs while maintaining safety of products.
	4.5	2	agree	established procedures for sampling compost, soil and other materials do not apply to biochar, and are too complex	IBI agrees that the USCC compost sampling procedures are complex, and the proposed changes are intended to simplify the procedures specifically for biochar producers. Still, there are components of established compost and soil sampling protocols that are very useful and relevant to biochar, and the proposed biochar sampling procedure draws heavily from these scientifically validated methods.
	4.6	1	agree	The standards should be applied to and ONLY to commercially produced biochar. Biochar made by not	Characterizing biochar, whether for commercial or non-commercial purposes, is important to ensure that it is, indeed, biochar and that it is safe for use in soils, regardless of where or how it is produced or utilized.

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				for profit home and village style needs much less red tape.	
	4.8	1	agree	Requiring special containers and temperature controls for the organic pollutants is too extreme	It is standard industry practice to package materials to be analyzed for PAHs, PCBs and other reactive organic pollutants in glass or Teflon containers since they are less likely to introduce any artificial chemicals to the material, and to keep the samples at low temperatures on ice to minimize volatilization. IBI follows a precautionary approach that recommends use of these packaging and shipping instructions for organic pollutants. Additionally, most testing labs provide these containers to their customers as part of the testing process.
	4.7	1	agree	Container and storage conditions do not matter because biochar is an adsorbent and thus any toxicants will stay in the biochar	While it may be true that biochar strongly adsorbs these chemicals, IBI follows a precautionary approach. The burden to biochar producers is minimal relative to the added assurances of accurate test results for the biochar material. See response to comment 4.6.
	4.9	1	agree	Check with land grant universities to get information on recommended sampling procedures	IBI drew heavily from sampling procedures developed by extension agencies within several land grant universities as well as established commercial analytical labs.
	4.10	1	agree	Biochar is a more homogenous material than compost	IBI agrees that individual biochar products may be more homogenous than composts, and this was a driving impetus for simplifying the biochar sampling protocols.
	4.11	1	agree	The proposed sampling protocol could be rendered even simpler	While we agree in simplification where possible, we believe the current proposed sampling procedure strikes a balance between ease of use and scientific rigor.
	4.12	1	agree	These proposed sampling protocols should be recommended, not required	It is important that all producers follow the same sampling protocols to ensure that testing results are representative of the material to be sold. For this reason, IBI is requiring these sampling protocols, pending final approval of the changes.

Table 2. Comments received during informational webinars in March 2014 and IBI responses. The table: 1) categorizes comments by proposed policy revision; 2) summarizes the comments; and 3) provides an IBI response.

Proposed policy revision	Comment number	Comment summary	IBI response
Biochar weathering restrictions	1.1	Clarify how IBI defines “significant” weathering.	In the amended proposed policy revisions IBI clarifies that “significant” weathering “is deemed to occur when biochar has been stored outdoors uncovered and has experienced any precipitation events.”
Biochar post-processing testing requirements	2.1	The addition of microbes may alter the H/Corg ratio test result and artificially eliminate a biochar from consideration if H/Corg rises above 0.7. For this reason, biochar sampling and testing should occur before any form of biological activation post-processing.	IBI agrees with this comment. We amended the proposed policy revisions to specify that testing shall occur before any form of biological activation.
Biomass flyash provisions	3.1	Biomass energy production configurations exist that can produce high carbon ash products with >65% C; and low PAH, PCDD/Fs, and metals, consistently. More frequent testing based on volumes being produced may be a way to handle concerns around consistency. Also, the creation of renewable biomass energy coupled with a main (not by-) product of biochar is both positive and holistic and IBI should be embracing this notion in a sustainable systems concept.	Based on this comment and other similar ones received during the review period, IBI has amended its initial proposed revision (that would have banned high carbon biomass flyash under the IBI Biochar Standards) to allow for the use of the material with specific documentation, sampling and testing requirements.
	3.2	If flyash is marketed as biochar, issues could arise around public perception and consumer rejection and alienation of such a flyash biochar product.	IBI agrees that there are valid concerns around the use of biomass flyash (or bottom ash) as a biochar material due to possible contamination with organic pollutants or metals, and inconsistency in material properties. For this reason, we have proposed specific documentation, sampling and testing requirements for any high carbon biomass ash from bioenergy facilities for consideration under the IBI Biochar Standards.
	3.3	If biomass ash is allowed as a biochar under the IBI Biochar Standards it may result in the displacement of small-scale producers of high quality biochar by large-scale industrial bioenergy facilities making low quality biochar.	Biochar materials from bioenergy facilities need not be of lower quality than those from small-scale pyrolysis plants. Large industrial facilities may have numerous control points throughout the production process and may thus have capabilities to monitor production parameters closely. IBI is also deliberately technology-neutral in the IBI Biochar Standards, and seeks to test the characteristics of the end product, ensuring that all products meet minimal standards to show that they are safe for use as a soil amendment, and possess the necessary qualities to be defined as biochar.
	3.4	Bioenergy facilities have a negative climate impact because they burn wood and the trees are not replaced for at least 20 years which results in a pulse of CO ₂ to the atmosphere. Thus, by allowing use of biomass ash as a biochar, IBI will be offsetting any gains from biochar C sequestration with losses via biomass combustion.	While we agree that understanding the sustainability impacts of biochar feedstocks and production systems is very important, the IBI Biochar Standards address biochar characterization and safety, and do not address sustainability or lifecycle analysis. IBI seeks in the future to develop a biochar sustainability program that would include life cycle analyses of diverse biochar systems including bioenergy generation.

Proposed policy revision	Comment number	Comment summary	IBI response
	3.5	IBI should consider collaborating internationally with the biomass energy sector to gather data on high C ash characteristics from various combustion technologies with the goals of 1) making connections to the bioenergy sector and 2) informing the biomass energy sector about biochar characteristics and opportunities	IBI agrees that international collaboration with our stakeholders is beneficial and positive, and we seek to further these opportunities as we are able, and encourage the biomass energy sector to collaborate with the biochar community and IBI.
Biochar sampling procedures	4.1	The proposed sampling protocol may be onerous for continuous production units with a large capacity.	As proposed, composite samples should be comprised of at least 15 random subsamples for biochar batches up to 10 metric tons, and for each increase in 10 metric 10 tons an additional 15 subsamples should be collected. IBI believes that batches of biochar greater than 10 metric tons could contain large within-batch variability and that increased numbers of subsamples are merited to address this heterogeneity. We also clarify that the subsamples are used to make one single composite sample—there is not a requirement that the subsamples be composited and tested separately.
General comments	5.1	Provide information on how policy revisions are brought forward for consideration in revisions of the IBI Biochar Standards.	Since the inception of the idea by IBI stakeholders that standards are beneficial to the growth and development of a safe and sustainable industry, IBI has led an open, transparent, inclusive, and fully documented process that led to the publishing of Version 1.0 of the IBI Biochar Standards in May 2012, including publicly seeking input from all stakeholders regarding the standards and opportunities for improving them. The gathering of input from our stakeholders, including from researchers and producers, led us to these and other proposed policy revisions now under consideration. IBI included a new section on the revisions process in the IBI Biochar Standards Version 1.1 published in April 2013. In summary, proposed revisions are based on further development in the fields of biochar science and technology, regulatory changes, and feedback from the public, particularly users of the IBI Biochar Standards. In the pending proposed policy revisions, IBI collected information from users of the IBI Biochar Standards to propose several revisions which were initially shared with an expert panel for feedback. Based on expert feedback the revisions were amended and circulated for a 30-day public comment period, per the process outlined in Section 7.1 of Version 1.1.