

Council on Sustainable Biomass Production

A comprehensive standard and national certification
program for sustainable production of cellulosic
biomass and bioenergy

Final NRCS Grant Report
NRCS Agreement: #69-3A75-10-178

9/22/2010 to 12/31/2012

Deliverables:

- 1) Develop and promote a voluntary standard and corresponding verification mechanism for the sustainable production of biomass and bioenergy.
- 2) Promote production of energy from biomass produced with low lifecycle carbon emissions.
- 3) Develop and maintain a credible third-party certification program in which growers achieve and are recognized in the market for environmental, social, and economic sustainability.
- 4) Ensure the standard is feasible, auditable, clearly linked to demonstrating the sustainability of biomass production and not overly costly to meet.
- 5) Convey the value of certified sustainable biomass and bioenergy to potential program participants and potential consumers of certified product.
- 6) Provide recommendations for adaptation of NRCS tools and protocols to provide value added benefits for sustainable biomass production and support biomass growers in conservation planning.
- 7) Attend at least one NRCS CIG Showcase or comparable NRCS event during the period of the project agreement.
- 8) Semi-annual performance progress report and a final report documenting project results.
- 9) Fact sheet describing the new technology or approach.

Submitted: January 31, 2012

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Final Report
September 2010 – December 2012

Executive Summary

The Council on Sustainable Biomass Production (CSBP) has been working diligently since 2007 to develop and release the Standard for Sustainable Production of Agricultural Biomass (the Standard). This effort has been significantly assisted with the Conservation Innovation Grant (CIG) provided by NRCS in September, 2010. The CSBP has completed the objectives of the NRCS grant #69-3A75-10-178. The CSBP released the Standard on June 12, 2012 and has since been working to complete the supporting documentation and publicize the Standard. As detailed in the following full report and attachments, the CSBP has achieved the objectives and deliverables defined in the CIG.

The objective of the CSBP has been to break new ground in three important respects: 1) Develop the first sustainability standard and certification program for second generation bioenergy; 2) Create a precedent and model for development of a sustainability standard for an industry while it is still being developed in order to establish it on a sustainable platform as it goes to scale; and, 3) Identify how to adapt existing NRCS planning and assessment protocols and tools for biomass production in a manner that supports an integrated approach to sustainable biomass production.

The deliverables under the CIG included:

- Develop and promote a voluntary standard and corresponding verification mechanisms for the sustainable production of biomass and bioenergy.
- Promote production of energy from biomass produced with low lifecycle carbon emissions.
- Develop and maintain a credible third-party certification program in which growers achieve and are recognized in the market for environmental, social and economic sustainability.
- Ensure the standard is feasible, auditable, clearly linked to demonstrating the sustainability of biomass production and not overly costly to meet.
- Convey the value of certified sustainable biomass and bioenergy to potential program participants and potential consumers of certified product.
- Provide recommendations for adaptation of NRCS tools and protocols to provide value added benefits for sustainable biomass production and support biomass growers in conservation planning.
- Attend at least one NRCS CIG Showcase or comparable NRCS event during the period of the project agreement.
- Semi-annual performance progress report and a final report documenting project results.
- Fact sheet describing the new technology or approach.

As described below the CSBP achieved each of the deliverables over the past 25 months. As detailed in the appendices, the CIG contributed significantly towards understanding the

feasibility of sustainability standards, how existing NRCS programs might be used to demonstrate sustainability, market demand for sustainably produced cellulosic biomass and carbon accounting. All of the project funds were spent as anticipated. Most of this work was groundbreaking, including the June 12, 2012 release of the CSBP Standard for the Sustainable Production of Agricultural Biomass.

The CSBP has also experienced some hard realities:

1. The market for agriculture cellulosic biomass has not developed as quickly as many expected five years ago – part of this is due to the slow development of cellulosic refinery technology and part is due to new technology to extract natural gas.
2. Corporate support for CSBP has waned as a result of both the slow development of cellulosic refinery technology and the poor economy generally.
3. Although the market for forest biomass in the form of pellets is strong, achieving consensus on forestry issues with a multi-stakeholder group has taken longer than we would have hoped – the CSBP has yet to agree on a forest biomass standard.

The fact is the CIG allowed for research, field testing and discussion which will advance the sustainable production of cellulosic biomass in the United States. Our recommendation is to make all of the documents contained in this report part of the public record so that organizations and efforts committed to expanding the practice of sustainable biomass production can benefit.

Final Report

Meridian Institute and Heissenbuttel Natural Resource Consulting (HNRC) facilitated the formation the Council on Sustainable Biomass Production (CSBP) to develop a comprehensive standard and national third party certification program for sustainable production of cellulosic biomass, including dedicated fuel crops, crop residues, and native vegetation, and conversion into biofuel and biopower. A diverse multi-stakeholder group, CSBP members included leading biomass growers, national environmental organizations, industry representatives from the full value chain (energy companies, feedstock developers, cellulosic refineries), and academic institutions.¹ CSBP has also regularly engaged in its deliberations staff from Dept. of Agriculture (ARS, NRCS, and USFS), and the Dept. of Energy. CSBP is developing principles, criteria, indicators, and implementation guidance to address integrated resource management planning, water quality and quantity, soil conservation, biological diversity/wildlife habitat, greenhouse gases, and socioeconomic wellbeing.

In advance of widespread production, the diverse members of the CSBP are aligned around the goal of ensuring that cellulosic biomass, and its conversion into bioenergy, contributes to environmental sustainability, sustainable land use patterns, and sustainable rural development. At the critical juncture in early 2010, having developed a provisional standard for sustainable production of agricultural biomass, CSBP sought the support of NRCS to enable it to directly engage a diversity of growers in additional scoping and several rounds of field testing to establish an effective and widely-adopted standard. If successful, this standard will play a critical role in channeling the development of biomass and bioenergy production on a sustainable course. In the absence of a widely-adopted sustainability standard, significantly increased biomass production in the U.S. is much more likely to cause environmental and social harm. Experience shows that absent a strong sustainability platform, new agricultural products can lead to a backlash, which in this case would undermine both sustainable rural development and the domestic production of biomass-based energy.

Agriculture, forestry, and energy production and use all can have significant impacts on our resources and environment. Developing more sustainable production methods in each of these sectors is a priority for each sector and associated stakeholder organizations represented in CSBP.

The last several years have seen dramatic increases in interest in the potential for agriculture and forestry to address energy supply, energy security and environmental challenges associated with biomass-based energy. Potential benefits, including greater domestic energy security, reduction in greenhouse gas emissions, and support for rural and agricultural development, have focused industry, policymakers, and the environmental and scientific communities on the development of biomass-based energy.

¹ Members when GIG application submitted: ArborGen LLC, Association of Fish & Wildlife Agencies, Ceres, Inc., Chevron Corporation, Ducks Unlimited, Duke Energy, DuPont Danisco Cellulosic Ethanol LLC, Environmental Defense Fund, Mendel Biotechnology, Inc., Monona Farms, National Wildlife Federation, Natural Resources Defense Council, NatureServe, Prairie Lands Bio-Products, Inc., Show Me Energy Cooperative, Texas Agrilife Research & Extension, Texas A&M University, The Nature Conservancy, Theodore Roosevelt Conservation Partnership, Union of Concerned Scientists, Verenum Corporation, Weyerhaeuser Company, ZeaChem, Inc.

In light of these opportunities, and the significant anticipated demand for biomass, biomass growers, energy producers, germplasm providers, academics, agencies and the agricultural, forestry, and environmental communities joined together in 2007 to consider how to encourage adoption of *sustainable* methods of biomass and bioenergy production. After considerable deliberation, the group agreed to give the time and energy necessary to build consensus on sustainable practices, set the emerging industry on a course of continuous improvement, and avoid disputes over large-scale growing and harvesting of energy crops that will serve as feedstock for bioenergy facilities. The Council on Sustainable Biomass Production was established to develop a voluntary standard to provide guidance to cellulosic biomass producers and bioenergy companies on sustainable production methods for biomass-based bioenergy in the U.S. CSBP is managed by the Meridian Institute in collaboration with Heissenbuttel Natural Resource Consulting.

After three years of intense activity by CSBP members and comprehensive public review of draft proposals (generating hundreds of comments and suggestions), in 2010 CSBP was in the position to begin field testing of a provisional standard for agricultural production of cellulosic biomass, consider how to address biomass from forestry operations, develop protocols for downstream users of sustainably produced biomass and generate market demand for the CSBP standards throughout the value chain. This was the reason for seeking the NRCS CIG.

CSBP, through the CIG, sought to break new ground in three important respects: 1) Develop the first sustainability standard and certification program for second generation bioenergy; 2) Create a precedent and model for development of a sustainability standard for an industry while it is still being developed in order to establish it on a sustainable platform as it goes to scale; and, 3) Identify how to adapt existing NRCS planning and assessment protocols and tools for biomass production in a manner that supports an integrated approach to sustainable biomass production.

In securing the CIG the CSBP agreed to the following deliverables:

1. Develop and promote a voluntary standard and corresponding verification mechanisms for the sustainable production of biomass and bioenergy.

On June 12, 2012, the CSBP publicly launched the Standard (see Appendix A). The Standard was developed and written for agricultural biomass including interplanting and short rotation woody crops planted on agriculture land. The Standard provides a means by which a biomass producer may voluntarily evaluate their operation based on three principles of sustainability: environmental sustainability, social sustainability, and economic sustainability. The scope and content of the Standard was thoroughly discussed by the CSBP membership in work groups and as an entire council guided by field testing. Guidance for the implementation of the Standard has also been developed and is shown in Appendix B.

The Standard is written to be verified by third-party independent auditors. Auditors may be accredited by the American National Accreditation Board (ANAB) (www.anab.org) or Accreditation Services International (ASI), a member of ISEAL (www.accreditation-services.com). Until CSBP can work with these organizations to develop auditor qualifications specific to the CSBP standard, auditors accredited by either of these

organizations to perform agriculture or forestry audits may issue certificates of compliance with both the Standard and the Chain of Custody (Appendix C).

2. Promote production of energy from biomass produced with low lifecycle carbon emissions.

The Standard emphasizes thorough carbon accounting practice from planting and establishment to harvesting, processing, and transportation. The CSBP's unique approach to greenhouse gas (GHG) emissions requires that biomass producer provide sufficient data to bioenergy producers so that they may complete a thorough lifecycle analysis of their energy yields.

The Standard uses an innovative approach to integrate land use air emissions data from the Daily Century Model (DAYCENT) developed by the National Renewable Energy Lab (NREL) for agricultural practices into the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation Model (GREET) for bioenergy production developed by Argonne National Labs. The CSBP GHG modeling tool utilizes existing, scientifically-vetted, GHG models to yield a full lifecycle pathway for many bioenergy pathways. The CSBP tool was researched and developed by Life Cycle Associates (See Appendix D). This approach creates flexibility for biomass producers as they can monitor and track their carbon intensity.

These first, pioneering steps to help agricultural producers account for their greenhouse gas footprints, provide the foundation for research and for the next step forward, a standard for sustainable bioenergy production with low carbon lifecycle requirements

3. Develop and maintain a credible third-party certification program in which growers achieve and are recognized in the market for environmental, social and economic sustainability.

The Standard's three main sustainability tenants are environmental (Principle 1 – Principle 5), social (Principle 6 – Principle 7), and economic (Principle 8). The CSBP contracted, through competitive bid, Astronaut Brand Studio (Astronaut) to aid in the launch and marketing of the program. Astronaut has developed a marketing strategy and promotional materials (See Appendix E) to highlight the Standard and educate potential users. Consistent with the recommendations from the Astronaut, the CSBP remodeled its website before the release of the Standard.

The development of the Standard with the broad membership of the CSBP, including industry leaders, government agencies, academics, and environmental groups, ensures the adherence to the most rigorous scientific knowledge.

4. Ensure the standard is feasible, auditable, clearly linked to demonstrating the sustainability of biomass production and not overly costly to meet.

Antares Group Incorporated (Antares) and Scientific Certification System (SCS), and Growing Excellence were contracted to field test the Standard. Antares and SCS developed a template for growers and auditors to use as they evaluate whether lands qualify for

certification. The first round of field testing showed that growers largely understood and were compliant with the provisional Standard's soil and water sustainability measures. However, growers had a difficult time understanding or having the technical expertise to comply with the biological diversity and greenhouse gas measures. The second round of testing identified pathways for producers to comply with and meet the objectives of the Standard in a feasible and cost effective manner.

The findings from the field testing of Antares and SCS (See Appendix F) have been integrated into the Standard. The field testing from Growing Excellence was focused on forest biomass and their findings (See Appendix G) were used during the discussions that led to the exclusion of forest biomass at this time.

The Standard, with support from Guidance (See Appendix A), is designed to be user-friendly and provide assistance to potential users.

5. Convey the value of certified sustainable biomass and bioenergy to potential program participants and potential consumers of certified product.

The marketing strategy and promotional materials developed by Astronaut focus on conveying the value of certified sustainable biomass. Promotional tools include public outreach and support by CSPB members to potential participants, political organizations, and environmental non-profits. As a voluntary standard, participation in the program requires an economic incentive. The CSBP incorporates existing standards and policies into the market strategy. Appendix H shows a California regulation recognizing the CSBP as a sustainability standard.

6. Provide recommendations for adaptation of NRCS tools and protocols to provide value added benefits for sustainable biomass production and support biomass growers in conservation planning.

Maurer-Stutz Inc. (MSI) was contracted to review the available NRCS tools and protocols to provide value added benefits and support for participants as they comply with the Standard. The recommendations from the final report (See Appendix I) have been incorporated into the Guidance section of the Standard.

7. Attend at least one NRCS CIG Showcase or comparable NRCS event during the period of the project agreement.

John Heissenbittel, CSBP Executive Director participated in the NRCS CIG Showcase conducted in Washington, DC on July 18-19, 2011. Heissenbittel participated on two different panels, one to provide an overview of findings to date under the CIG and on another to provide details of the CSBP standard. During the period of the grant, Heissenbittel and other members of the CSBP have given numerous presentations, always giving considerable credit to the NRCS grant. Some examples include a DOE hosted webinar for businesses involved in cellulosic energy, a webinar organized by the United Kingdom government

exploring options for meeting their sustainability requirements and a presentation to NA 2050 a group of state officials looking for sustainability solutions.

8. Semi-annual performance progress report and a final report documenting project results.

Semi-annual performance progress reports have been submitted per the timeline outlined in the grant. Additional copies of the progress reports are available upon request. This document is the final report.

9. Fact sheet describing the new technology or approach.

A fact sheet has been produced as part of the promotional materials as prescribed by Astronaut (See Appendix J). The fact sheet serves as an overview of the Standard indicating the CSBP's approach to promoting sustainability within biomass production.

The multi-stakeholder Council on Sustainable Biomass Production has provided final oversight, evaluation and agreement on the CSBP agricultural standard (Appendix A). Appendices A and D – I have been reviewed and discussed by the CSBP. Appendices B, C and J are still under development.

As described above the CSBP achieved each of the deliverables over the past 25 months. As detailed in the appendices, the CIG contributed significantly towards understanding the feasibility of sustainability standards, how existing NRCS programs might be used to demonstrate sustainability, market demand for sustainably produced cellulosic biomass and carbon accounting. All of the project funds were spent as anticipated. Most of this work was groundbreaking, including the June 12, 2012 release of the CSBP Standard for the Sustainable Production of Agricultural Biomass.

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The fact is the CIG allowed for research, field testing and discussion which will advance the sustainable production of cellulosic biomass in the United States. Our recommendation is to share all of the documents contained in this report so that organizations and efforts committed to expanding the practice of sustainable biomass production can benefit.

All of those participating on the CSBP wish to express our gratitude for the CIG provided by NRCS. It has served to advance the sustainable production of biomass in the United States.

Appendix A

Standard for Sustainable Production of Agricultural Biomass
Version 1.0

COUNCIL ON SUSTAINABLE
BIOMASS PRODUCTION



**STANDARD
FOR SUSTAINABLE PRODUCTION OF AGRICULTURAL BIOMASS**

June 6, 2012

Version 1.0



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1 PRINCIPLES IN BRIEF

CSBP expects that growers will consider how best to meet environmental, economic, and social objectives by selecting feedstocks and production systems that optimize the balance between improving yields, reducing inputs, limiting footprints, supporting biodiversity, and maintaining long-term site productivity based on local conditions.

Maximizing production on lands dedicated to producing biomass and having additional lands with other primary end uses provide supplementary biomass can help address the multiple demands for land resources in a more sustainable way. Optimizing agricultural productivity (e.g., selecting feedstocks that balance interdependent goals of maximizing yields and minimizing input requirements based on local conditions) while limiting impacts to the environment can create profitable and more sustainable agricultural systems, and help minimize the footprint required to support the growth of a large-scale industry of low-carbon bioenergy.

The following principles express the key elements of sustainable biomass production and serve as the framework for the Criteria and Indicators of the standard.

1 INTEGRATED RESOURCE MANAGEMENT PLANNING

The preparation of and adherence to a complete management plan is considered the foundation for fulfillment of the standard and essential to ensuring that a grower can deliver on the multiple requirements for sustainable production and areas for continuous improvement.

PRINCIPLE: Biomass production is based on an integrated resource management plan that is completed, implemented, monitored, and updated to address the environmental risks associated with current and future production, appropriate to the scale and intensity of the operation.

2 SOIL

This principle recognizes that soil stability is vital, and that soil fertility and organic matter are critical to the sustainable production of food, feed, fiber, and fuel.

PRINCIPLE: Biomass production maintains or improves soil quality by minimizing erosion, maintaining or enhancing soil carbon and nutrients at appropriate levels, and promoting healthy biological systems and chemical and physical properties.

3 BIOLOGICAL DIVERSITY

The conservation of biological diversity is a critical component of sustainability at the field/stand level as well as at the landscape level. This Principle articulates the expectation that growers will deploy management systems in their operations that maintain or enhance biodiversity.

PRINCIPLE: Biomass production contributes to the maintenance or enhancement of biological diversity, in particular native plants and wildlife.

4 WATER

This Principle recognizes the vulnerability of both the available water supply and the quality of available water. Biomass production should not contribute to the depletion of ground or surface water supplies. When irrigation is necessary, the most efficient irrigation technology appropriate to the circumstance should be used.

PRINCIPLE: Biomass and bioenergy production maintains or improves surface water, groundwater, and aquatic ecosystems.

5 AIR QUALITY AND EMISSIONS

One fundamental objective of biomass-based bioenergy systems is to mitigate greenhouse gas (GHG) emissions, providing a low-carbon energy alternative to fossil fuels. This Principle embraces full life cycle assessment (LCA) as the primary tool for ensuring substantive reduction in GHG emissions.

PRINCIPLE: Emissions are estimated via a consistent approach to life cycle assessment.

6 SOCIO-ECONOMIC WELL-BEING

CSBP embraces a tripartite vision of sustainability, focusing on practices and products that are environmentally, socially, and economically sound. This Principle speaks to the need for sustainable distribution of socio-economic benefits to the various participants in biomass and bioenergy production systems. A sustainable commercial model benefits from the support of wealth creation in local communities.

PRINCIPLE: Biomass and bioenergy production takes place within a framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders (including land owners, farm workers, suppliers, biorefiners, and the local community), ensures compliance or improves upon all applicable federal and state labor and human rights laws, and provides for decent working conditions and terms of employment.

7 LEGALITY

Compliance with all legal requirements by a grower is a minimum expectation for the standard.

PRINCIPLE: Biomass production complies with applicable federal, state, and local laws, statutes, and regulations.

8 TRANSPARENCY

The interactions of a participant with stakeholders must be conducted in a transparent manner while protecting commercially sensitive information and maintaining intellectual property.

PRINCIPLE: The process of certified biomass production is transparent.

9 CONTINUOUS IMPROVEMENT

CSBP is committed to a process of continued assessment of the usefulness of the standard's practices to ensure the desired sustainability outcomes. The standard will be updated periodically, incorporating scientific results that reveal better practices that are commercially viable. Growers are also expected to continuously improve performance as guided by annual certification audits and adherence to IRMP.

PRINCIPLE: Biomass and bioenergy producers continuously improve practices and outcomes based on the best available science and appropriate grower development benchmarks.

2 PRINCIPLES, CRITERIA, AND INDICATORS FOR BIOMASS PRODUCTION

1 PRINCIPLE 1 - INTEGRATED RESOURCE MANAGEMENT PLANNING (IRMP)

Biomass production is based on an integrated resource management plan (IRMP) that is completed, implemented, monitored, and updated to address the environmental risks associated with current and future production, appropriate to the scale and intensity of the operation.

1.1 ASSESSMENT

Participants use a complete assessment or conduct an initial assessment to support informed decisions regarding resource goals and land management options during the development and implementation for the IRMP.

1.1.1 BASELINE INFORMATION

At a minimum, Participants compile and evaluate baseline information on existing conditions within the biomass crop production area proposed for certification.

IMPLEMENTATION: Assessments involve gathering key information regarding the Participants' operational and planning effects on soil, biodiversity, and water. Typically this information includes crop production, soils, natural vegetation cover, rare species and communities, existing wildlife habitats and aquatic ecosystems, and past and current land and water conservation activities. This information will pertain to the area proposed for certification and should consider the larger planning landscape that provides context for the area of interest.

Through the IRMP assessment Participants evaluate risks to the environment from their existing operation and changes in operational scope or intensity. If environmental safeguards cannot be demonstrated, additional planning is needed and more in-depth assessments are required. In addition to changing scope or intensity, if the Participants' operations have inadequate conservation safeguards for high ecological values, then these higher environmental risks must be addressed in IRMP objectives and planning. Participants who demonstrate Good Agricultural Practices (GAP) and conservation safeguards may avoid conducting detailed environmental assessments of baseline conditions.

For further Indicators and implementation guidance regarding assessment, see the following:

- 2.1.1 Soil Productivity and Conservation Planning
- 3.1.1 Vegetation Types and Wildlife Habitat Planning
- 3.1.4 Control of Non-Crop Invasive Species
- 3.2.1 Invasiveness
- 3.2.2 Crop Spread
- 4.1 Water Quality
- 4.2 Water Quantity
- 4.3 Aquatic Ecosystems
- 9.2.3 Good Agricultural Practices (GAP)

1.2 OBJECTIVES

The IRMP includes objectives specific to the biomass production area that address each of the CSBP Standard Principles.

1.2.1 ESTABLISH OBJECTIVES

Based upon the initial assessment and/or subsequent IRMP reviews, Participants identify their priorities and describe management objectives or options for the biomass production area proposed for certification. Participants address landscape factors within the IRMP.

IMPLEMENTATION: All applicable certification Criteria and Indicators of the CSBP Standard are addressed for the biomass production area and the scale and intensity of the operation. The Participants' objectives are established after considering the unresolved significant issues and opportunities for improvement as determined by the self-assessment or auditing process. Certification Indicators provide a structure to evaluate management practices, identify potential conflicts, optimize achievement of management objectives, and explore opportunities to avoid, minimize, or mitigate environmental impacts during this phase.

1.3 OPERATIONS PLAN

Using baseline information to develop IRMP objectives, Participants develop and implement an Operations Plan to achieve the IRMP objectives.

1.3.1 OPERATIONS PLANNING

Participants develop specific management actions, including corrective action and land-based action plans for each biomass production area, soil type, and vegetation cover type within the area proposed for certification.

IMPLEMENTATION: Depending upon the scope of the plan, management actions may be described for a larger planning landscape. At a minimum, the Operations Plan includes a timeline for implementation and monitoring to ensure management objectives are accomplished.

1.3.2 MONITORING AND REVIEW

Participants continually monitor specific management practices in order to ensure that management objectives are being met. Operations Plans are comprehensively reviewed by Participants at least every five years and updated as needed.

IMPLEMENTATION: Participants annually monitor specific management practices utilized in the operation and document, at the appropriate property and management unit level, the effectiveness of those practices identified. Annually Participants address areas of non-conformity within the timetables specified. Every five years Participants demonstrate a comprehensive review process identifying sustainable production achievements and areas for improvement in the operation. Based on the results of monitoring and other available information, Participants identify changing conditions and modify the Operations Plan and/or IRMP to address these changing conditions. Participants monitor and document the results of implementation over time. The Operations Plan identifies relevant crop and natural resource measures and other indicators, including those used in the standard to assess achievement of certification Criteria. Participants use those measures to identify improvement opportunities and to adjust the management plan accordingly.

2 PRINCIPLE 2 – SOIL

Biomass production maintains or improves soil quality by minimizing erosion, maintaining or enhancing soil carbon and nutrients at appropriate levels, and promoting healthy biological systems and chemical and physical properties.

2.1 MAINTAIN OR IMPROVE SOIL HEALTH

Minimize erosion and maintain soil carbon and nutrients at appropriate levels, as well as the overall physical, chemical, and biological properties of the soil.

2.1.1 SOIL PRODUCTIVITY AND CONSERVATION PLANNING

Participants assess and monitor nutrient levels of the soil or plants, and soil capabilities to maintain and improve soil health, appropriate to the scale and intensity of the management unit.

IMPLEMENTATION: Soil assessments are conducted at the appropriate property and management unit proposed and include the use of data from soils maps where available. Soils are tested periodically for organic matter, nitrogen, phosphorus, and other nutrients relevant to local resource concerns. Management decisions are based on soil capabilities in the selection of appropriate species or crops, expected yields, and erosion control. Nutrients are managed to reduce loss off site to air and water.

2.1.2 RESIDUE REMOVAL

The use of agricultural residues is not at the expense of long-term soil productivity, stability, health, and organic matter content. Participants retain biomass materials required for erosion control and soil fertility.

IMPLEMENTATION: Participants demonstrate conservation measures to mitigate soil erosion and conserve long-term soil fertility.

2.1.3 COMPACTION

Participants identify soils vulnerable to compaction and use appropriate techniques to reduce compaction if necessary and to maintain site productivity.

IMPLEMENTATION: Participants demonstrate knowledge of the factors that contribute to soil compaction and demonstrate the use of Good Agricultural Practices (GAP) that minimize soil compaction and maintain soil structure.

2.1.4 IN-FIELD OR ON-FARM TRAVEL

Participants limit, as appropriate to maintain soil structure and water quality, field travel zones or paths as needed to meet IRMP objectives.

IMPLEMENTATION: Temporary field travel zones or travel paths should be used when practical and consistent with IRMP objectives. If rutting, erosion, or compaction occurs, temporary travel zones and paths should be closed or rehabilitated.

2.1.5 EROSION

Participants use practices that minimize erosion on biomass acres.

IMPLEMENTATION: Biomass operations demonstrate by applying USDA “conservation practices,” “conservation systems,” or other effective soil conservation practices that erosion control objectives are met or by obtaining a score less than or equal to T, or equivalent, for the current Revised Universal Soil Loss Equations.

2.1.6 SOIL CARBON

Participants maintain or improve soil carbon levels for the biomass production area.

IMPLEMENTATION: Participants periodically evaluate soils for organic matter.

3 PRINCIPLE 3 – BIOLOGICAL DIVERSITY

Biomass production contributes to the maintenance or enhancement of biological diversity, in particular native plants and wildlife.

3.1 BIODIVERSITY

Ensure that biomass production systems support native biodiversity both on-site and at an eco-regional level.

3.1.1 VEGETATION TYPES AND WILDLIFE HABITAT PLANNING

To support effective operations planning, Participants assess rare, threatened, and endangered species and communities (RTEESC), vegetation cover types, and important wildlife species (IWS) on biomass production areas, on associated incidental areas owned or controlled by the Participants, and, where credible data are available, across the landscape.

IMPLEMENTATION: Specifications for assessments are dependent upon the operational risk to the environment. The assessment is conducted prior to the commencement of site-disturbing operations and is appropriate to the scale of the area proposed for certification and intensity of the operation. The prior condition of vegetation and location of known RTEESC and IWS are considered in the assessment and incorporated into the IRMP. Participants consult with an appropriate state fish and wildlife agency, conservation organizations, biomass consumers, or expert professionals¹ to develop conservation actions to conserve all known RTEESC on biomass production areas, associated incidental areas owned or controlled by the Participants, and where credible data are available, across the landscape. The assessment includes, but is not limited to:

- Information on known occurrences of RTEESC and IWS, and their associated habitats;
- Identification of the presence of invasive species within the operational unit as well as potential threats in the local landscape;
- Review of potential impacts from biomass crop production on RTEESC, IWS, and invasive species at the appropriate property, stand, site, or landscape level.

Findings of the assessment and the developed conservation actions are documented and incorporated into IRMP.

3.1.2 IMPORTANT WILDLIFE SPECIES AND THEIR HABITATS

Participants develop and implement practices that contribute to the conservation of IWS, native vegetation, and native wildlife.

IMPLEMENTATION: Practices to be adopted into the Operations Plan are appropriate to the scale of the operation and effect on the resource. The Operations Plan conserves, where practical, habitat of IWS to maintain biological diversity. Participants utilize diversity of feedstock within a stand as appropriate to provide structural habitat that supports biodiversity objectives as indicated in the IRMP.

For primary biomass production areas, harvesting during IWS and native wildlife nesting, calving, fawning, and brood-rearing seasons is minimized to the greatest extent possible. Participants retain sufficient vegetative cover for IWS and other native wildlife inhabiting their biomass fields (e.g. leaving stubble on the field, leaving strips of unharvested biomass, and/or other effective practices). Disruptive operations (e.g. mowing, disking, and harvesting) are timed to minimize impacts on IWS, especially during critical reproduction and migratory periods.

3.1.3 RARE, THREATENED, AND ENDANGERED WILDLIFE, COMMUNITIES, AND BIODIVERSITY

Participants develop and implement practices to conserve RTEESC and biodiversity appropriate to the scale and intensity of the operation.

IMPLEMENTATION: Participants protect those RTEESC species that are state or federally listed under an endangered species law. For all other known RTEESC species, conservation actions are considered and integrated into the Operations Plan. The IRMP includes mapping, cataloging, and monitoring of known RTEESC, as well as the design and adoption of specific conservation actions consistent with the conservation objectives identified in the IRMP.

¹ May be employees of the Participants

Participants cooperate and allow an inventory of lands where there could be a lack of information and a need for surveys and other information gathering for RTEESC.

3.1.4 CONTROL OF NON-CROP INVASIVE SPECIES

Participants recognize the risks associated with non-crop invasive species and adopt conservation practices related to control of non-crop invasive species (e.g. those not intentionally planted) on biomass production acres. If invasive species are observed, Participants include in the IRMP a strategy to manage and minimize spread.

IMPLEMENTATION: Participants demonstrate participation in state or local invasive assessment programs, quarantine, cooperative extension programs' continuous education programs, national association of conservation districts, or native plant societies. Participants implement strategies as identified in IRMP.

3.2 SPECIES AND CULTIVARS

Participants adhere to appropriate conservation practices, crop developer recommendations, and federally-mandated requirements, where applicable, for species or cultivars being deployed.

3.2.1 INVASIVENESS

Participants avoid introduction or production of an energy crop that is invasive in the target region and that may disrupt biodiversity on an eco-regional scale. Participants do not utilize species that are known to be invasive or are potentially invasive in the relevant eco-region. Prior to planting, an assessment is completed by a suitable 3rd party (e.g., crop developer, academic scientist, government agency).

IMPLEMENTATION: The following decision methodology will be used to determine whether a species is invasive in the target region.

A feedstock crop would be "known to be invasive" in the target region if it appears on a list for that target region compiled by a scientifically credible national, state, or county authority, and would therefore not be eligible for certification.

- A feedstock crop will not require assessment for invasiveness if the crop has been grown at a reasonable scale for similar purposes in the target region and not been found to be invasive.
- If the crop is not "known to be invasive" in the target eco-region and has not previously been grown in the target region or is a variety that includes characteristics beyond the known range of the species, then it will be evaluated to determine if it is "potentially invasive" in the target region. If the results of the assessment determine that the crop is not potentially invasive, it is eligible for certification.
- If the results of the assessment determine that the crop is potentially invasive, additional protocols, still to be determined, will be required to determine whether the feedstock is eligible for certification in target region. This will include evaluating the crop for invasiveness using carefully controlled field trials in the target region.

3.2.2 CROP SPREAD

Participants include, in the IRMP, protocols for the biomass crop prior to cultivation that include, where applicable:

- Adoption of conservation practices that limit potential for the spread of the crop, including:
 - Harvest, transportation, equipment cleaning, and storage protocols (e.g. steps to limit seed dispersal during transport).
 - Chemical or cultural control methods to ensure crop removal at the conclusion of production.
- Conservation practices or chemical, cultural, or physical control methods for removal of plants or pests that represent a significant risk of establishment outside the production system.
- Assistance to owners or managers of neighboring properties to respond if spread occurs.

IMPLEMENTATION: Where adoption of conservation practices do not prevent the establishment of a crop or its problematic genetic material outside the production area, control methods taken by the responsible party fail to remediate the invasion of plants or problematic genetic material within two growing seasons, and the invasion is considered problematic to the neighboring landowner/leaseholder or to the integrity of natural ecosystems, CSBP certification will be revoked.

3.3 LAND CONVERSION

Promote the conservation of native ecosystems of lands important to conservation objectives as defined by local, state, and federal agencies.

3.3.1 DOCUMENTATION OF VEGETATION CATEGORY

Participants have documented the vegetation category as of December 19, 2007, of all lands in each contiguous ownership/leasehold where they are seeking certification.

IMPLEMENTATION: Participants identify cover as of December 19, 2007 in their IRMP and document production history and vegetative cover since that date. Documentation includes the acreage of biomass crops, non-biomass crops, and non-croplands under the Participants' control. Special attention is required when agricultural operations have cleared non-crop vegetation after December 19, 2007.

3.3.2 LANDS ELIGIBLE FOR CONVERSION

Participants utilize lands for biomass production that maintain or enhance biodiversity.

IMPLEMENTATION: For agricultural lands², Participants do not produce raw materials or convert land areas designated by law³ or by the relevant competent authority for nature protection purposes⁴, wetlands, peatlands, untilled prairies, native sod, natural savannah, native natural grasslands, or lands where there is no clearly visible indication of human activities and the ecological processes are not significantly disturbed. Participant may source biomass from other unmanaged native vegetation tracts, provided that the management does not endanger⁵ the structure or functioning of these ecosystems.

3.4 PEST MANAGEMENT

Participants use an integrated pest management approach to effectively control outbreaks of pests, diseases, fire, and introduction of invasive plants while protecting human health and the environment.

3.4.1 CONTROL AGENTS

When applicable, Participants utilize control agents such as biological agents or pesticides to minimize damage to the biomass crop. When pesticides are used, Participants use the most effective pesticide necessary to achieve biomass management plans considering biological and environmental impacts. In all cases, the application of control agents will be completed in accordance with approved protocols and in compliance with applicable federal and/or state laws.

IMPLEMENTATION: Participants document the use of control agents in operations and the application practices.

4 PRINCIPLE 4 – WATER

Biomass and bioenergy production maintains or improves surface water, groundwater, and aquatic ecosystems.

4.1 WATER QUALITY

Maintain or improve surface and ground water quality.

4.1.1 WATER QUALITY MANAGEMENT PLANNING

Participants comply with a water management plan that addresses impacts to water quality or comply with an existing plan meeting these objectives (including pollution prevention, control and mitigation, and fertilizer, pesticides, biosolids, and waste water disposal treatments).

IMPLEMENTATION: The IRMP addresses water quality risk and the management practice to avoid water contamination. In cases where Participants do not apply manure, Participants have an up-to-date IRMP that addresses nutrient management planning and pesticide application (runoff and drift control) for their entire operation. In cases where Participants apply manure, an up-to-date comprehensive nutrient management plan is also required. The plan should be based on university extension recommendations unless conditions on site differ significantly from the assumptions on which extension recommendations are based.

4.1.2 EROSION AND SEDIMENT AND RUNOFF CONTROL

Participants adopt conservation practices and tillage systems related to erosion control.

IMPLEMENTATION: Participants demonstrate the use of practices suggested in USDA Conservation Practices, suggestions in the farm USDA Conservation Plan for erosion control or comparable federal or state conservation agencies recommendations.

4.1.3 USE OF WASTEWATER FOR IRRIGATION

Participants test wastewater (or receive documentation of testing conducted by provider) and treat wastewater as needed before using it for irrigation.

IMPLEMENTATION:

² See the Glossary for the definition of Agricultural Lands.

³ Any identified lands with G1-3 and S1-S2 ecosystems, critical habitat for G1-3 & S1-S2 species, or lands having threatened and endangered species. See Glossary for the definition of Endangered Species Act.

⁴ Includes but is not limited to lands serving as critical corridors for wildlife, and S3 species and ecosystems.

⁵ The structure and ecological functioning of unmanaged native vegetation should not be altered or threatened by managerial activities such as use of genetically modified organisms, agrochemicals, or soil movements for land intensification. Natural vegetation types may only be used for biomass acres if their general ecological characteristics are not changed.

- Wastewater may be applied for irrigation, consistent with nutrient management planning.
- Wastewater must be tested before application. Participants secure documentation of testing by the water provider or have the wastewater tested themselves.
- Animal wastewater is tested for nitrogen, phosphorus, and total suspended solids.
- Wastewater from municipal sources are tested for nitrogen, nitrate, phosphorus, and total suspended solids.
- Wastewater from industrial sources undergo a complete chemical profile, to include metals, ions, organics, and volatiles.

4.1.4 TRACE ELEMENTS IN BIOSOLIDS

Participants apply only biosolids that have been screened for heavy metal contaminants.

IMPLEMENTATION: Participants document biosolid application on operations and maintain records from testing.

4.1.5 NITROGEN

Participants preserve nitrogen on site for plant uptake through plant tissue indicators or judicious soil sampling. Potential nitrogen runoff is dealt with in conjunction with Indicator 2.1.1 Soil Productivity and Conservation Planning and 4.1.1 Water Quality Management Planning, to avoid ground and surface water contamination.

IMPLEMENTATION: Through periodic soil sampling, applied research, accurate yield monitoring, and following prescriptive soil sample recommendations, plant tissue testing, or color metric analysis, Participants demonstrate a working knowledge of nutrient uptake from their production. Coupled with conservation practices modeled and deployed through the USDA “conservation practices” or “conservation systems,” Participants demonstrate the ability to impact plant utilization while avoiding water pollution.

4.1.6 PHOSPHORUS

Participants preserve phosphorus on site for plant uptake through plant tissue indicators or judicious soil sampling. Potential phosphorus runoff is dealt with in conjunction with Indicator 2.1.1 Soil Productivity and Conservation Planning and 4.1.1 Water Quality Management Planning, to avoid ground and surface water contamination.

IMPLEMENTATION: Through periodic soil sampling, applied research, accurate yield monitoring, and following prescriptive soil sample recommendations, plant tissue testing, or color metric analysis, Participants demonstrate a working knowledge of nutrient uptake from their production. Coupled with conservation practices modeled and deployed through the USDA “conservation practices” or “conservation systems,” Participants demonstrate the ability to impact plant utilization while avoiding water pollution.

4.1.7 PESTICIDE MANAGEMENT

Participants adopt pest and disease management methods that effectively control outbreaks of pests, diseases, fire, and introduction of invasive plants while not harming human health or the environment.

IMPLEMENTATION: Integrated Pest Management (IPM) is used when practical. Regardless of the use of an IPM, pest management methods include:

- where possible, the use of least-toxic and narrow-spectrum pesticides to achieve management objectives;
- application of pesticides in compliance with label requirements;
- application of pesticides in accordance with conservation practices;
- provision of equipment and training to employees and contractors for the safe application, storage of pesticides, and response to hazardous spills; and
- if biological control agents are used, they are applied by trained workers using proper equipment.

Pest Management methods will be documented, monitored, and strictly controlled in accordance with state and national laws and internationally-accepted scientific protocols.

4.1.8 PESTICIDE USE

Participants identify sources of concern and mitigate potential pesticide impacts.

IMPLEMENTATION: The identified areas of concern are protected with erosion control measures and correct timing of chemical applications.

4.1.9 WASTE DISPOSAL

Participants dispose of agricultural chemicals, containers, and liquid or solid non-organic wastes, including fuel and oil, off-site and in compliance with federal and state laws in a manner that is not harmful to the environment.

IMPLEMENTATION: Participants document waste disposal methods and activities on their property.

4.2 WATER QUANTITY

Irrigation practices do not deplete the quantity of surface or ground water.

4.2.1 IRRIGATION PLAN

Participants provide annual documentation of compliance with and updates to a water management plan that ensures efficient use of water in irrigation practices.

IMPLEMENTATION: Irrigation plans must include a strategy to maximize efficiency in irrigation systems and reduce water use where possible, the re-use of treated wastewater where possible, the adoption of conservation practices related to water management, and conform to local or regional water allotment plan(s).

4.2.2 LEGAL COMPLIANCE

Participants use, for irrigation only, water for which they held legally valid use rights before commencement of biomass production or rights that have been subsequently acquired through legal means.

IMPLEMENTATION: Participants identify the water authority that has oversight of the irrigation rights on the lands under their biomass production. Participants provide evidence of annual compliance with the rules of the water body.

4.2.3 PREVENTING DEPLETION

In areas where the local water authority determines that ground or surface water is being depleted faster than it is being naturally replenished, Participants acquire existing water rights for any new irrigation, rather than securing new water rights from the local water authority, that would increase ground or surface water depletion rates.

IMPLEMENTATION: Participants provide a copy of their irrigation permits and provide evidence of compliance in areas where depleted water supplies are identified, where applicable, by state designations or local designations, and new irrigation in areas with depleted water supplies can only be done if it is offset by a reduction elsewhere in the irrigation district, unless the irrigation is just done for perennial crop establishment purposes for one or two years.

4.2.4 USE RIGHTS

Participants demonstrate compliance with local water laws.

IMPLEMENTATION: Participants provide documentation of compliance with local water laws as prescribed by the local water board, irrigation district or similar.

4.2.5 IRRIGATION/SALINITY

Participants demonstrate that the salinity of soil is within acceptable parameters for the crop produced.

IMPLEMENTATION: If soil salinity exceeds acceptable parameters, Participants take action to bring soil salinity into acceptable parameters.

4.2.6 MAXIMUM WATER USE PER ACRE

Participants measure water use in a fashion that allows calculation of acre-feet of water applied per acre of cropland and ensures that water use per acre of cropland is consistent with the water use rates of the most efficient irrigation technology available in the area for the same or similar crops.

IMPLEMENTATION: Where specific circumstances warrant the use of other irrigation methods, Participants provide satisfactory documentation of the rationale and demonstrate that water is being used in the most efficient manner reasonable given the circumstances. In their assessment of the appropriateness of alternative irrigation methods, auditors may consider groundwater levels, soil type, topography, existing permits, water source, use of recycled water, use of irrigation to deliver fertilizers or pesticides, and other relevant factors.

Water recycled within an operation should only be counted as being applied once

4.3 AQUATIC ECOSYSTEMS

Preserve or enhance the functions and services of aquatic ecosystems.

4.3.1 AQUATIC ECOSYSTEM MANAGEMENT PLAN

Participants comply with an IRMP that address the potential impacts of operation on aquatic ecosystem health within the watershed.

IMPLEMENTATION: Participants identify and map the watershed that the Participants' biomass acres drain into wetlands, blue-line streams, riparian zones, and streamside conservation zones. If the watershed is impaired, Participants, at a minimum, identify the watershed's current impediment and prescribed operational limitations.

4.3.2 STREAM FLOW

Participants adopt conservation practices considered sufficient to avoid negative impact on local stream flows and stream channel morphology, flood storage and conveyance capacity, and in-stream habitat conservation practices.

IMPLEMENTATION: If the watershed is impaired or impacted by the Participants' operations, Participants provide management practices and desired future conditions.

4.3.3 STREAM TEMPERATURE

Participants adopt conservation practices considered sufficient to avoid negative impact on local stream temperature.

IMPLEMENTATION: Participants describe and demonstrate operational limitations or conservation practices for biomass acres on temperature impacted streams.

4.3.4 HYPOXIA

Participants do not contribute to increasing the risk of hypoxia in downstream environments.

IMPLEMENTATION: Participants describe and demonstrate operational limitations and conservation practices for biomass acres that minimize hypoxia if the watershed is impaired for nitrate.

4.3.5 WETLANDS

Participants prevent negative impact on local wetlands through adoption of relevant conservation and appropriate management practices.

IMPLEMENTATION: Participants do not directly impact or make changes to hydrology that result in the drainage, filling, or degradation of any wetland that is not considered "prior converted" or drained prior to passage of the 1985 Food Security Act's "Swampbuster" provision.

5 PRINCIPLE 5 – AIR QUALITY AND EMISSIONS

Emissions are estimated via a consistent approach to life cycle assessment.

5.1 AIR QUALITY AND EMISSIONS

Participants provide data⁶ needed for the biofuel or biopower producer to conduct a life cycle assessment (LCA) that accurately reflects emissions from the production and pre-conversion processing of biomass on the acres under consideration for certification.

5.1.1 YIELD DATA

Participants provide accurate and complete yield data on the farm production.

IMPLEMENTATION: Yield will be reported on an as delivered basis (yield in weight and percent moisture) or as stated on contract documents between Participants and their consumers.

5.1.2 PRODUCTION INPUTS

Participants provide accurate information regarding fertilizer, pesticides, and fuel utilized in biomass production.

IMPLEMENTATION: Participants provide the amount and type of nutrient amendments and the chemistry (product name and active ingredient per unit of production) of pesticides applied to their biomass production acres.

5.1.3 PLANTING AND TILLAGE

Participants provide accurate, planting methods, and tillage practices.

IMPLEMENTATION: Participants provide the name or type or equipment and the number of passes for each tillage fertilization, spraying, or planting tools take during the establishment of their biomass acres. Participants provide an estimated fuel usage for each equipment choice for each operation (gallons per acre or gallons per hour).

⁶ All data required in the Indicators under Criterion 5.1 are necessary for the CSBP GHG modeling tool developed for biomass consumers to calculate their aggregate GHG impacts. Participants may only provide the input data for the consumers or may provide their own GHG emissions factor by utilizing the CSBP Producer GHG modeling tool subject to audit review.

5.1.4 SOIL CARBON AND ORGANIC MATTER

Participants provide accurate data related to emissions resulting from soil carbon depletion or organic matter test results.

IMPLEMENTATION: Participants provide documentation of the soil organic matter as determined on the latest soil tests taken from their biomass production acres or by applied research.

5.1.5 HARVESTING, COLLECTION, HANDLING, PROCESSING, AND STORAGE

Participants provide accurate harvesting, collection, handling, processing, and storage of biomass practices.

IMPLEMENTATION: Participants provide the name or type of equipment and the number of trips or machine hours as appropriate for each on farm collection, harvesting, road siding, stacking, pre-processing, or processing tool takes during the harvesting of their biomass acres.

5.1.6 TRANSPORTATION

Participants provide accurate transportation data for biomass production.

IMPLEMENTATION: Participants provide the name or type of transportation equipment and the number of trips or miles of each known event associated with the biomass acres or production or the delivery of the biomass while under the care custody or control of the Participant.

6 PRINCIPLE 6 – SOCIOECONOMIC WELLBEING

Biomass and bioenergy production takes place within a framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders (including land owners, farm workers, suppliers, biorefiners, and the local community), ensures compliance or improves upon all applicable federal and state labor and human rights laws, and provides for decent working conditions and terms of employment.

6.1 COMPLIANCE WITH LABOR LAWS

Ensure that human rights and labor laws are respected in biomass production fields for both employees and contractor employees.

6.1.1 FAIR LABOR STANDARDS ACT

Participants demonstrate employee protection that is compliant with or exceeds the Fair Labor Standards Act (FLSA) and all other federal and state labor laws.

IMPLEMENTATION: Participants demonstrate employee protection concerning minimum wage and overtime pay; health, retirement, and leave benefits; equal opportunity hiring; safety and health in the workplace; fair youth employment; and union rights, among others, unless state law requires greater employee protection. Participants' contracts with contractors or contracting agencies require they abide by or exceed the employee protection requirements stipulated in the FLSA and all other applicable federal and state labor laws.

6.2 FAIR TREATMENT OF WORKERS

All workers and contractors shall receive fair treatment.

6.2.1 GRIEVANCE PROCEDURES

Participants with 10 or more full-time employees, including seasonal workers, have a management policy that provides a mechanism for employees to raise concerns, safety issues, or grievances without fear of termination or any other reprisal, and inform workers of the policy at the time of hire or adoption of the policy.

IMPLEMENTATION: Participants demonstrate a system for the operation that provides a platform for employee grievances without fear of reprisal. Participants' contracts with contractors or contracting agencies require comparable grievance procedures.

6.2.2 EMPLOYMENT CONTRACT

Participants provide workers with a written agreement describing the terms of hire.

IMPLEMENTATION: Participants demonstrate a written agreement (e.g. employment contract) regarding hiring, firing, working hours, and vacation time. Participants demonstrate compliance with local, state, and federal labor contract laws. Participants' contracts with contractors or contracting agencies require written agreements describing terms of hire.

6.2.3 WORKPLACE IMPROVEMENTS

Participants provide opportunities for employees to make suggestions for workplace improvements.

IMPLEMENTATION: Participants demonstrate a system to provide an opportunity for employee suggestions and a sample of suggestions in the previous year.

6.2.4 FREEDOM OF ASSOCIATION

Participants respect the right of workers to associate freely in the workplace and, if desired, organize among themselves to negotiate working conditions.

IMPLEMENTATION: Verified through private interviews employers and/or employees, or written policies and procedures.

6.3 ENVIRONMENT, HEALTH, AND SAFETY

Participants ensure that biomass production activities are conducted in a manner that protects the health and safety of employees.

6.3.1 COMPLIANCE WITH LAWS AND REGULATIONS

Participants maintain and provide documentation of compliance with federal, state, and local occupational health and safety laws and regulations.

IMPLEMENTATION: Participants demonstrate compliance with OSHA and applicable federal, state, or local laws or regulations. Participants' contracts with contractors or contracting agencies require compliance with OSHA and applicable federal and state health and safety laws.

6.3.2 TRAINING

Participants and Participants' contracting agencies maintain and provide documentation that employees are trained for health and safety in the workplace.

IMPLEMENTATION:

- All employees, including seasonal employees, receive health and safety information, in a language they understand.
- All full-time employees receive health and safety training and get updated training at least every 5 years.
- All employees using potentially dangerous chemicals and machinery have received appropriate training.
- Supervisors are trained in emergency procedures and all provided information about who to contact in case of emergency and location of emergency kits.
- Participants' contracts with contractors or contracting agencies require comparable training and documentation for workplace safety training.

6.3.3 HAZARDOUS MATERIALS PROTECTION

Participants and Participants' contracting agencies provide, and employees use, adequate protective clothing, appropriate safety equipment, and filtered air respirator systems and/or positive pressure cabs for workers handling highly toxic chemicals.

IMPLEMENTATION: Participants document the purchase of Hazardous Materials Protection for employees or identify the location of the equipment on the premises evidence of worker education. Participants' contracts with contractors or contracting agencies require comparable protective equipment and clothing for the use of hazardous materials.

6.3.4 ACCIDENTS AND INJURIES

Participants and Participants' contracting agencies are prepared to handle injuries and chemical spills.

IMPLEMENTATION:

- Employees have access to well-stocked first aid kit at each work site.
- Employees are trained in emergency response procedures.
- Appropriate to the size of operation, procedures, materials, and training to address spills of hazardous materials are maintained.

6.3.5 SANITATION

Participants or Participants' contracting agencies provide clean drinking water and sanitary services.

IMPLEMENTATION: Participants provide records that document employee access to sanitation devices and clean drinking water for employees. Participants' contracts with contractors or contracting agencies have assurances to provide workers with clean drinking water and access to sanitation.

6.3.6 INSURANCE AGAINST WORKPLACE INJURY

Participants and Participants' contracting agencies provide workers compensation for all full-time employees.

IMPLEMENTATION: Participants provide evidence of insurance policies documenting the purchase of insurance products to cover workplace injury situations. Participants' contracts with contractors or contracting agencies require the purchase of workman's compensation insurance.

7 PRINCIPLE 7 - LEGALITY

Biomass production complies with applicable federal, state, and local laws, statutes, and regulations.

7.1 KNOWLEDGE OF LAWS

Participants and employees are knowledgeable about and comply with laws, statutes, and regulations applicable to their operation.

7.1.1 KNOWLEDGE OF LAWS

Participants, employees, and relevant contractors are able to demonstrate working-level awareness and knowledge of the laws, statutes, and regulations that apply to their ownership/leasehold and operation.

IMPLEMENTATION: Verified through interviews.

7.1.2 ENSURING COMPLIANCE

Program or processes to ensure compliance with applicable laws, ordinances, and regulations are in place.

IMPLEMENTATION: Participants provide evidence of any pending litigation or action by a local, state, or federal regulatory agency against the operation.

8 TRANSPARENCY

The process of certified biomass production is transparent.

8.1 PUBLIC ACCESS

Make results of certification audits and general information related to producing sustainable biomass available to the public.

8.1.1 PUBLIC TRANSPARENCY

Participants provide a publicly available summary of the audit findings.

IMPLEMENTATION: Participants promote transparency by allowing the Council to release summary certification audit reports that provide non-proprietary data to the public upon request. (CSBP will not require public disclosure of proprietary information or information protected by intellectual property laws.)

9 CONTINUOUS IMPROVEMENT

Biomass and bioenergy producers continuously improve practices and outcomes based on the best available science and appropriate grower development benchmarks.

9.1 COMPLIANCE

Comply with all changes made to the standard over time.

9.1.1 PARTICIPANT COMPLIANCE

Participants comply with changes to the standard within the specified compliance period.

IMPLEMENTATION: Participants demonstrate compliance with non-conformity with the standard.

9.2 REVIEW AND IMPROVEMENTS

The CSBP Standard and Participants demonstrate efforts to improve the environmental outcomes, agricultural practices, environmental approaches and social outcomes to the operation.

9.2.1 STANDARD REVIEW

Participants participate in periodic reviews of the CSBP Standard.

IMPLEMENTATION: Participants provide feedback and engage in periodic review of the CSBP Standard.

9.2.2 IMPROVE PERFORMANCE

Participants demonstrate efforts to improve environmental performance based upon monitoring programs and actions to address any non-conformances identified during certification audits.

IMPLEMENTATION: Participants comply with the time table of the IRMP and addresses non-conformity issues within the time frame specified.

9.2.3 GOOD AGRICULTURAL PRACTICES (GAP)

Participants demonstrate adoption of good agriculture practices through the use of “Best Agriculture Practices” and Integrated Pest Management to improve performance to the operation.

IMPLEMENTATION: Examples of areas Participants can demonstrate use of Good Agricultural Practices:

- Chemical, nutrient or manure application, on farm storage practices and disposal of hazardous waste materials.
- Integrated pest and disease management
- Usage of agriculture chemicals and germplasm according to Federal, State and Local Law and other Treaty Obligations
- Other techniques and practices as the well-vetted science and practice of sustainable biomass production evolves

3 GLOSSARY

Agriculture: all facilities and equipment engaged in growing crops and raising animals.

Agricultural Lands: lands defined as “Existing Agricultural Land” in regulations implementing the Renewable Fuel Standard provisions of the Energy Independence and Security Act of 2007, 75 Fed. Reg. 14670, 14864-14865, § 80.1401. Specifically, existing agricultural land is cropland, pastureland, and land enrolled in the Conservation Reserve Program (administered by the U.S. Department of Agriculture’s Farm Service Agency) that was cleared or cultivated prior to December 19, 2007, and that, on December 19, 2007, was: (1) Nonforested; and (2) Actively managed as agricultural land or fallow, as evidenced by records which must be traceable to the land in question.

Records to demonstrate eligibility include: (1) Records of sales of planted crops, crop residue, or livestock, or records of purchases for land treatments such as fertilizer, weed control, or seeding; (2) a written management plan for agricultural purposes; (3) documented participation in an agricultural management program administered by a Federal, state, or local government agency; or (4) documented management in accordance with a certification program for agricultural products.

Aquatic ecosystems: a basic ecological unit composed of living and non-living elements interacting in an aqueous environment.

Assessment: a written evaluation to determine baseline conditions for establishing a structured approach to improving the performance regarding this Standard. The initial assessment involves both the Participant and the independent auditor.

Audit: an independent evaluation of the Participants’ operation against the CSBP Standard; a systematic and independent process of obtaining evidence and evaluation to determine the extent that CSBP Standard Indicators and Criteria are fulfilled.

Auditor: the person, an employee of a certification body, conducting the audit of the Participants’ operation.

Bioenergy: energy produced from biomass (electricity; liquid, solid, and gaseous fuels; and heat).

Biofuel: Biomass converted to liquid or gaseous fuels such as ethanol, methanol, methane, and hydrogen.

Biological diversity (biodiversity): the variety and abundance of life forms, processes, functions, and structures of plants, animals, and other living organisms, including the relative complexity of species, communities, gene pools, and ecosystems at spatial scales that range from local through regional to global.

Biomass: organic matter intended for conversion into bioenergy or other bioproducts, including dedicated fuel crops, crop residues, purpose-grown wood, and native vegetation.

Biomass Production Area: a unit of land managed for the removal and harvest of biomass energy crops. There are two distinct groups of biomass production areas:

1) **Primary Biomass Production Area:** a unit of land managed for the growth and harvest of a crop which has a primary end use for or economic driver from biomass energy (e.g. *Miscanthus* sp., switchgrass, short rotation woody crops).

2) **Secondary Biomass Production Area:** a unit of land managed for the growth and harvest of a crop which has a primary end use or economic driver that is not biomass energy (e.g. corn stover).

The CSBP Standard addresses all management and operations practices on primary biomass production areas and the additional activities, management, and practices on secondary biomass production areas incurred because of the growth and harvest of relevant biomass energy product.

Biopower: the use of biomass to generate electricity; system technologies include direct-firing, co-firing, gasification, pyrolysis, and anaerobic digestion. (National Renewable Energy Laboratory)

Biorefinery: a facility that integrates biomass conversion processes and equipment to produce fuels, power, and chemicals from biomass.

Conservation Action: are measures designed to minimize and mitigate the effects of land management actions- to ensure that species will be conserved and to contribute to their recovery. These actions may take many forms, including, but not limited to, preservation of existing habitat; enhancement or restoration of degraded or a former habitat; establishment of buffer areas around existing habitats; modifications of land use practices, and restrictions on access. The appropriateness of an individual action is determined on a case by case basis, and is based upon the needs of the species and type of impacts anticipated.

Conservation Practice: an agricultural management practice that have been determined by the Natural Resource Conservation Service as an effective method to address resource concerns, either alone or in combination with other practices. Conservation practices are not equivalent to “best management practices.” In many cases, there are multiple conservation practice options that growers might consider for development of a resource conservation system to address a resource concern.

Certification Body (CB): an independent third-party- auditing firm that provides independent assessments of the Participant's operations regarding the compliance to this Standard.

Corrective Action: action in response to non-conformities raised by the certification body's auditor.

Criteria: the organizational category of the standard characterized by a set of related Indicators by which biomass production can be determined or assessed. (e.g. Criteria 1.1 "Assessment" has only one Indicator "1.1.1 Baseline Information").

Critical Habitat: the habitat necessary for the sustenance of a population within a specific locale.

Eco-region: a relatively large unit of land or water containing a distinct assemblage of natural communities sharing a large majority of species, dynamics, and environmental conditions. (www.wwf.org)

Ecosystem services and resources: goods and services that are traditionally viewed as free benefits to society, or "public goods," including wildlife habitat and diversity, water filtration, carbon storage, and scenic landscapes.

Endangered Species Act: federally mandated requirements for the protection and recovery of imperiled species and ecosystems. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future. Globally threatened species are species designated as critically endangered (G1), endangered (G2), or vulnerable (G3). State-listed threatened species are species designated as critically endangered (S1), endangered (S2), or vulnerable (S3). (See www.natureserve.org for additional details).

Environment, Health and Safety (EHS): broad set of regulations or procedures to ensure acceptable working conditions.

Fair Labor Standards Act (FLSA): establishes minimum wage, overtime pay, recordkeeping, and youth employment standards affecting employees in the private sector and in Federal, State, and local governments.

Forestland: lands generally undeveloped land covering a minimum area of one (1) acre upon which the primary vegetative species are trees, including land that formerly had such tree cover and that will be regenerated and tree plantations. Tree covered areas in intensive agricultural crop production settings, such as fruit orchards or tree-covered areas in urban settings such as city parks, are not considered forestlands.

Greenhouse gas (GHG) emissions: releases of gases that trap heat in the atmosphere, contributing to climate change. These gases include carbon dioxide (CO₂), methane, and

chlorofluorocarbons (CFSs). Greenhouse gases (GHGs) are often measured in equivalents to carbon dioxide (CO₂-e) as CO₂ is the most prevalent GHG.

Good Agricultural Practices: Good Agriculture Practices or GAP refers to an evolving set of principles and technical recommendations to address human health, environmental protection, and the improvement of workplace conditions. In the absence of well-vetted science and well established production practices for biomass crops; Participants draw from the techniques developed over time to provide sustainable pathways for their biomass operations. Sustainable agricultural can be obtained through Good Agriculture Practices and specific methodologies, such as **integrated pest management, integrated fertilizer management, conservation agriculture** and worker/family health and safety protocols.

The GAP recognized by the FAO (<http://www.fao.org/prods/gap/>) rely on four principles:

- Economically and efficiently produce sufficient energy crops, safe production techniques and using environmentally sound principles;
- Sustain and enhance **natural resources**;
- Maintain viable farming enterprises and contribute to **sustainable livelihoods**;
- Meet cultural and social demands of society.

Group certification: an arrangement by which biomass production units owned or managed by a number of distinct legal entities (group members) may be evaluated and subsequently certified within the scope of a single certificate.

Hypoxia: the condition in water bodies in which dissolved oxygen falls below the level necessary to sustain most animal life.

Important Wildlife Species (IWS): includes any species or community identified in state conservation plans (State Wildlife Action Plan or others) or identified as economically important or significant and is considered in addition to RTESC.

Incidental areas: idle lands that are not used for forage or crop production immediately adjacent to (e.g., hedgerows) or within (e.g., watercourses, wetlands) biomass production units.

Indicators: the quantitative or qualitative standard requirement assessed by the auditor (e.g. Indicator "1.1.1 Baseline Information"). The sum of related Indicators provides a means of judging whether biomass production complies with the requirements of a Criterion.

Integrated Pest Management Plan: progressive and holistic approach to biological crop damage involving periodic damage and pest/disease population assessments, monitoring, and control using biological, chemical, and/or mechanical means.

Integrated Resource Management Plan: a comprehensive and detailed plan that outlines management goals and objectives for a designated area of land, based on consideration of all of the resources on that land and that may be impacted by activities on that land, and that specifies the practices that will be used to achieve management objectives. See Principle 1 of the CSBP Standard.

Invasive species: plants, animals, and microbes not native to a region, which when introduced either accidentally or intentionally cause economic or environmental harm or harm to human health. (<http://agclass.nal.usda.gov/>)

Life cycle assessment (LCA): a suite of analytical techniques for compilation and evaluation of the inputs, outputs, and the potential environmental impacts of a product system throughout its life cycle. (ISO International Standard, 14040 Environmental Management – Life Cycle Assessment – Principles and Framework, 2006. 2nd Edition)

Management component: a specific part of agricultural management, including: input management, field/stand management, harvest, incidental area treatment, carbon cost, and field/stand access.

Management objectives: the specific aims a landowner or manager seeks to achieve through management plans and practices.

Management options: different practices or programs that may be used to achieve management objectives.

Management practices: specific activities, measures, courses of action, or treatments used to achieve management objectives.

Mitigation: 1. action taken to alleviate potential adverse effects of natural or human-caused disturbances 2. compensation for damage done – note in this usage, in-kind mitigation is replacement of a lost resource with one similar (stream for stream or species for species), while out-of-kind is replacement of one kind with another (lake for stream or one species for another).

Narrow spectrum pesticide: a selective pesticide (usually an insecticide) that is toxic to one or a few species or species groups —*synonym* selective pesticide. Contrast with **broad-spectrum pesticide** (a nonselective pesticide - usually an insecticide -that is toxic to many species).

Native Natural Grasslands: undisturbed grassland ecosystems with a plant cover composed principally of undisturbed native grasses, grass-like plants, forbs, and suitable for grazing or browsing. (<http://www.ers.usda.gov/AmberWaves/September11/Features/NativeGrassland.htm#box1>). Grasslands are defined by land cover and use. Grasses are the dominant vegetation, but grasslands also include legumes, forbs, and other vegetation.

Grassland use includes such activities as grazing, haying, and other forms of forage harvest. Native grasslands are also referred to as “native sod.” Native grasslands are usually classified as rangeland based on native vegetation)

Native Sod: lands on which the plant cover is composed principally of native grasses, grass-like plants, forbs, or shrubs suitable for grazing and browsing, and lands that have never been tilled for the production of an annual crop as of January 1, 2008.

Natural Heritage programs: state-level programs that manage site-specific and species/ecosystem-specific information on priority species and ecosystems, Natural Heritage programs identify species and ecosystems are priorities for conservation effort; build and maintain a database for priority species and ecosystems; and share the information with others so that it can be used for environmental assessments and conservation planning purposes.

Natural/native ecosystems and lands: Vegetation where ecological processes primarily determine species and site characteristics; that is, vegetation comprised of a largely spontaneously growing set of plant species that are shaped by both site and biotic processes. Natural vegetative forms recognizable physiognomic and floristic groupings that can be related to ecological site features. Human activities influence these interactions to varying degrees (e.g., logging, livestock grazing, fire, introduced pathogens), but do not eliminate or dominate the spontaneous processes. (www.NatureServe.org)

Natural Resources Conservation Service (NRCS): a program of the U.S. Department of Agriculture to help America's private land owners and managers conserve their soil, water, and other natural resources. NRCS provides technical and financial assistance for many conservation activities. (www.nrcs.usda.gov)

Natural Savannah: ecosystems with a continuous native grasses and forbs layer with scattered native trees or shrubs. There are five discrete types in North America: pinyon (*Pinus cembroides*, *P. edulis*, *P. monophylla*), juniper (*Juniperus* sp.), pine (e.g. *Pinus ponderosa*, *P. palustris*), oak (*Quercus* sp.), and mesquite (*Prosopis* sp.) types. Oak savannahs are divided into California, southwestern, and Midwestern oak savannahs.

NatureServe: a non-profit conservation organization whose mission is to provide the scientific basis for effective conservation action; represents an international network of biological inventories-known as natural heritage programs or conservation data centers-operating in all 50 U.S. states, Canada, Latin America, and the Caribbean. (www.natureserve.org)

New Information Request (NIR): a written request by a certification body to provide additional information to determine compliance with specific requirements. It is possible that a new non-conformity may result from the evaluation of new information submitted.

Non-Conformity (NC): receiving a non-conformity means that the program is not compliant with a specific requirement of the CSBP Standard.

Nonforested Land: land that is not forestland.

Nutrient Management Plan: the overall conservation system that addresses all aspects of an animal feeding operation to help ensure that both agricultural production goals and natural resource concerns dealing with nutrient and organic by-products and their adverse impacts on water quality are achieved. A CNMP incorporates practices to utilize animal manure and organic by-products as a beneficial resource.

(<http://www.nrcs.usda.gov/technical/afo/pdf/CNMPFactSheet.pdf>)

Operation's Scale or Intensity: the relative size and complexity of the operations considered for CSBP certification, including the use of technologies and sophistication when compared to similar Participants in the fuel shed or vicinity.

Peatland: ecosystems dominated by moss species, especially *Sphagnum* or *Carex* sp. as the principle life form, and in which the production of biomass exceeds its decomposition resulting in the accumulation of organic matter from plant debris. Peatlands are areas with or without vegetation, with a naturally accumulated peat layer at the surface.

Prairie: native grasslands of North America. Prairies can be roughly divided into tallgrass, mixed-grass, and shortgrass prairie, based on height and species of grasses.
(<http://www.npwrc.usgs.gov/news/>)

Primary Biomass Production Area: See Biomass Production Area definition.

Principle: the highest organizational category of the Standard expressed as a key element of sustainable biomass production: Principles provide the framework for the Criteria and the respective Indicators of those Criteria in the Standard.

Participants: a biomass producer who enrolls in the CSBP program to achieve third-party certification for meeting the CSBP Standard for sustainable biomass production.

Rare, Threatened, and Endangered Species and Communities (RTEC): species that are federally listed (e.g. by the U.S. Fish and Wildlife Service or National Marine Fisheries Service) or state listed (e.g. by state agencies or natural heritage programs) as G1-G3 and S1-S2. S3 species or communities that are listed as candidates for federal or state listing are also included. Other S3 species or communities may be considered rare based on the assessment by the landowner or manager in consultation with the appropriate state fish and wildlife agency.

Renewable Fuel Standard (RFS2): U.S. law that directs EPA to promulgate regulations ensuring that applicable volumes of

renewable fuel are sold or introduced into commerce in the United States annually. RFS regulations apply to refiners, blenders and importers and set forth a phase-in for renewable fuel volumes beginning with 9 billion gallons in 2008 and ending at 36 billion gallons in 2022. The proportion of cellulosic biofuels that must be sold rises from 100 million gallons in 2010 to 16 billion gallons in 2022.

(www.epa.gov/oms/fuels/renewablefuels/regulations.htm)

Restored lands: lands that through human intervention or natural processes once again exhibit some or all natural ecosystem characteristics.

RUSLE2 (T score): Revised Universal Soil Loss Equation, which estimates soil loss from rill and interrill erosion caused by rainfall on cropland (rill and interrill erosion is the removal of layers from the land surface by the action of rainfall and runoff); used to predict the long-term average rate of rill and interrill erosion for several alternative combinations of crop system and management practices. T score refers to soil loss tolerance, the amount of soil that can be replenished annually through soil forming processes, and usually varies from 1-5 tons per acre per year, depending on the soil type. RUSLE2 calculates the average annual soil loss (A) based on factors of climate, soil, slope length, slope steepness, cover management and support practice. This value is compared with T to determine whether the system is sustainable from a soil loss perspective.
(<http://www.ia.nrcs.usda.gov/news/factsheets/RUSLE2FactSheet.html>)

Secondary Biomass Production Area: See Biomass Production Area definition.

Self-assessment: an evaluation of management practices against a set of criteria and indicators conducted by the landowner or land manager.

Semi-natural vegetation/lands: typically encompasses vegetation types where the species composition and/or vegetative growth forms have been altered through anthropogenic disturbances such that no clear natural analogue is known, but they are a largely spontaneous set of plants shaped by ecological processes.

Socio-economic well-being: the social and economic health, stability, and vitality of a community.

Soil Capability: the suitability of soils for numerous uses, including the sustained production of crops, rangelands, or pastureland and is dependent upon the texture, structure, drainage, slope, organic matter, acidity, nutrition, depth, bearing capacity, erodability, base saturation, etc. See also
(<http://soils.usda.gov/technical/handbook/contents/part622.html>)

Soil Conditioning Index (SCI): a qualitative tool that predicts the effects of management systems on soil organic matter as one of three outcomes - organic matter decline, organic matter increase, or organic matter equilibrium. The index considers

organic material (biomass) produced and returned to the soil, the influence of climate on organic matter decay, the influence of tillage, and the influence of erosion. (www.nrcs.usda.gov)

State Wildlife Action Plan: One of the conservation planning documents written by a state, tribe, or territorial fish and wildlife agency (agency) to proactively conserve wildlife and their habitats to prevent wildlife from declining to the point of becoming endangered and more costly to protect. These plans assess the health of each state's wildlife and habitats, identify problems they face, and outline the actions that are needed to conserve them over the long term. While all SWAPs share a common framework of required elements, they are tailored to each state's circumstances, wildlife, habitats, and conservation needs. As such there is variability in scope, species lists, focus, habitats, actions, risks, threats and needs among state plans. These plans are written with public participation and must be updated every 10 years, although may be updated more frequently.

Sustainability: Adopting practices and developing products that are environmentally, socially, and economically sound, and that can meet present needs without compromising the ability of future generations to meet their needs.

Untilled Prairie: prairie lands that has never been tilled, or the Participant cannot substantiate that the ground has ever been tilled for crop production.

Vegetation Category: the determination of the primary type of vegetative cover present on biomass acres. Examples of vegetation categories include annual crops, perennial crops, native natural grassland, established grassland, natural savannah, semi-natural savannah, native sod, pastureland, prairie, and woodlots.

Wetland: lowland areas with hydric soils that are seasonally inundated or saturated sufficiently to support a prevalence of hydrophilic vegetation adapted for life in water-saturated soil conditions. (Food Security Act, as set forth in 7 C.F.R. Part 12, Section 12.2, 1985)

Appendix B

Guidance for the CSBP Standard

COUNCIL ON SUSTAINABLE
BIOMASS PRODUCTION



**STANDARD
FOR SUSTAINABLE PRODUCTION OF AGRICULTURAL BIOMASS
GUIDANCE**

September 19, 2012

Version 1.0

COUNCIL ON SUSTAINABLE BIOMASS PRODUCTION



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1 GUIDANCE FOR STANDARD IMPLEMENTATION

The following Guidance has been developed during field testing of the CSBP Standard for Sustainable Production of Agricultural Biomass based upon field interviews, assessments, and analysis. The Guidance provides a participant-friendly pathway for meeting the expectations in the CSBP Indicators and Standard implementation. Guidance for this sustainability Standards will change in response to the growth in scientific knowledge and experiences from the utilization of the Standard. As such, the Guidance provided incorporates good agricultural production practices based on grower-related experiences and scientific research. Consequently, the Participants and auditors will add to the growth and refinements of Guidance for the Standard quickly over time.

This Guidance is organized around the respective CSBP Standard Principles, Criteria, and Indicators that users of this Standard seek to address. For select Indicators, key sources of information, resources, tips, and other evidence are provided to the Participants, NRCS field offices, technical service providers, or consumers. Specific resources provided are practical aids for compliance with the CSBP Standard and include additional definitions of common certification terminology not found in the CSBP Standard. Appendix A contains a summary of the respective Natural Resource Conservation Service Tools and Documentary Sources for CSBP Standard Implementation. Appendix B contains guidance for consultation of fish and wildlife agencies.

1 INTEGRATED RESOURCE MANAGEMENT PLANNING (IRMP)

PRINCIPLE: Biomass production is based on an integrated resource management plan that is completed, implemented, monitored, and updated to address the environmental risks associated with current and future production, appropriate to the scale and intensity of the operation.

1.1.1 BASELINE INFORMATION

GUIDANCE: *Participants complete the CSBP self-assessment checklist or workbook to the best of their knowledge. Instructions for filling out this form are located on the "Instructions" worksheet of the electronic workbook. The information from the CSBP self-assessment checklist will automatically populate the IRMP template after Participants fill out the CSBP self-assessment checklist. The generated IRMP must be reviewed and edited by the Participants. This information establishes the baseline prior to the audit. Participants are also responsible for updating this document year-by-year. See IRMP guidance below in 1.2.1-1.3.2 for objectives.*

Key documents are needed for the completion of the IRMP:

- *USDA Soil Map of biomass acres;*
- *USDA Soil Conservation Plan;*
- *USDA RUSLE "T" score¹ for the erosion from your production acres;*
- *USDA Soil Conditioning Index² for biomass (can be provided by NRCS Field office from RUSLE Calculator);*
- *Information accumulated from the use of USDA tools and resources by USDA/NRCS field office (as referenced in Appendix A);*
- *A map showing the Watershed acres that drain into the Participants' biomass acreage;*
- *Knowledge of any impairment of that watershed and if biomass acres contribute to impairment issues;*
- *Knowledge of State fish and wildlife documents (as referenced by Appendix B);*
- *Extension Pamphlets used in the production decisions made by the grower;*
- *Results from Farm-a-Syst or other State developed environmental assessment tools utilized by Participants;*
- *Documents provided by their consumer on production practices or systems the consumer wants deployed in the fuel shed (or Best Practices the consumer wants utilized);*
- *Area Economic Development documentation if involved in getting a biomass facility to the area of operation;*
- *State incentives or practices set up to attract biomass production to the area of the operation.*

Particular care is needed when changes in the scope or intensity of the operation may adversely affect social, economic, or environmental resources such as water, habitat, and soils, or add additional CO₂ to the atmosphere. An electronic workbook is provided as part of the CSBP checklist to determine if changes in the scope of Participants' operations present an increased risk to the environment. Some non-agricultural lands and land cleared after December 19, 2007, are ineligible for CSBP certification.

¹ The NRCS field offices have the ability to calculate your operation's RUSLE "T" values as part of your Soil Conservation Plan and can be provided at your USDA Natural Resource Conservation Service field office.

² The NRCS field offices have the ability to calculate an operation's Soil Conditioning Index and can be provided at the local USDA Natural Resource Conservation Service field office.

Participants with biomass acres in areas of high ecological values will need to consult State fish and wildlife agencies, NatureServe, and Natural Heritage programs. Wildlife habitat requires special considerations. Participants must build upon experience with wildlife species to adequately assess the uniqueness or commonness of the habitat on or adjacent to biomass acres for an initial assessment. For protection of any rare, threatened, or endangered species and communities, Participants must consult the list of endangered or threatened species protected by the US Endangered Species Act (or species and communities considered critically imperiled, imperiled, or vulnerable by and important wildlife species and habitats identified in regional, state, or national conservation plans). Wildlife and habitat considerations are addressed in the IRMP Objectives (1.2.1 below) and Management Plan (Management Planning 1.3.1 and Implementation 1.3.2 below).

1.2.1 ESTABLISH OBJECTIVES

GUIDANCE: Completing the IRMP template is the first step to assessing IRMP objectives. An independent assessment of the IRMP will be conducted by the certification body. The feedback from auditors or the self-assessment is valuable information. Participants that do not choose to be audited can use the self-assessment as a surrogate for audit processes and benchmark their sustainability achievements against the CSBP Criteria and Indicators. However, Participants will not be able to make any public claims about their production as being CSBP certified when using the self-assessment.

1.3.1 OPERATIONS PLANNING

GUIDANCE: Participants that receive non-conformities against CSBP Indicators are required to develop Corrective Action Plans as part of the IRMP. Participants that change the intensity or scope of the operation or otherwise incur higher social or environmental risks, or endanger third parties in their production systems must document their respective safeguards, such as for soil, wildlife habitat, aquatic ecosystems, water quality, water quantity, control invasive species, or social impacts in the IRMP. In addition to safeguards, increasingly more complete assessments may be required with increased risks associated with the Participants' biomass acres. Examples of objectives that require more in-depth environmental assessments include introduction of invasive species, removal of key wildlife habitat, or the use of land-moving equipment for vegetation removal if conservation measures cannot be demonstrated. More complete assessments include but are not limited to areas of eroded or compacted soils, habitats or species that are rare, threatened, or endangered, or invasive or impaired water bodies or streams, or blue line streams without buffers or conservation measures. Conversion of tracks of forested lands to biomass acres will require an assessment. An independent auditor may agree or disagree with the Participants' IRMP findings for land conversion. The independent auditor represents the certification body.³ The certification body's findings may change the eligibility of biomass acres for CSBP certification. Participants have the right to appeal the audit decision. See Indicators: 2.1.1 Soil Productivity and Conservation Planning, 2.1.2 Residue Removal, 3.1.1 Vegetation Types and Wildlife Habitat Planning, 3.1.4 Control of Non-Crop Invasive Species, 3.2.1 Invasiveness, 4.1.1 Water Quality Management Planning, 4.2.1 Irrigation Plan, and 4.3.1 Aquatic Ecosystem Management Plan and the respective guidance for more information on implementation.

Non-conformities from the certification body's Audit Report must be addressed after each audit cycle to maintain the certification status within CSBP. Corrective Action Plans are developed by the Participants as a written response to non-conformities. Corrective Action Plans developed by the Participants are among the fundamental objectives for updating the IRMP year-by-year. The Participants must submit Corrective Action Plans to the Certification Body as a result of all non-conformities from the Certification Body Audit Report.

Corrective Action Plans must be implemented within the timelines agreed upon between the Certification Body and the Participants. The Audit Report will provide timelines for addressing non-conformance issues raised during field or desk audits of the Participants' biomass operations.

1.3.2 MONITORING AND REVIEW

GUIDANCE: Monitoring the environmental status of the Participants' operations and implementation of Corrective Action Plans are a program requirement for continued certification. Corrective Action Plans will be assessed by the auditor each year. Participants must be vigilant that planned Corrective Actions are implemented in a planned area.

2 SOIL

PRINCIPLE: Biomass production maintains or improves soil quality by minimizing erosion, maintaining or enhancing soil carbon and nutrients at appropriate levels, and promoting healthy biological systems and chemical and physical properties.

2.1.1 SOIL PRODUCTIVITY AND CONSERVATION PLANNING

GUIDANCE: Participants should seek assistance from USDA Field Offices in their counties to utilize the appropriate resources to assess soil capabilities, conduct conservation planning, and utilize conservation practices to maintain or enhance the productivity of their biomass acres. The practices prescribed by those USDA Modeling tools should be utilized on the landscape to assess environmental risks and guide Participants' conservation system choices. Participants should utilize a number of resources such as soil maps, soil capability information, soil tests, tissue sampling, grower observations, and yield data to guide future production decisions.

³ This certification body has the right to review major forest certification systems to determine if their respective planning provisions regarding land use change are robust.

2.1.2 RESIDUE REMOVAL

GUIDANCE: An in-depth assessment is required if agricultural residue removal by Participants increases the risk of erosion by either wind or water. Initially default values for soil carbon will be used. Soil organic matter is a surrogate for soil carbon and can be estimated in part from soil tests.

2.1.3 COMPACTION

GUIDANCE: Identification of compaction is experience-based and should be explained as part of the Participants' learning process over time. Knowledge obtained from any forms, is valuable. Participants describe measures to maintain perennial crops and other cover methods in areas vulnerable to compaction (e.g. do not make permanent paths, there by maintaining soil cover, reduce compaction by spreading the load). Production loading zones vulnerable to compaction should also be consistent with objectives in Indicator 2.1.4 In-Field or On-Farm Travel.

2.1.4 IN-FIELD OR ON-FARM TRAVEL

GUIDANCE: The planning of field travel zones or travel paths should be based on the Participants' knowledge of harvesting patterns, soil types, topography, and equipment capabilities. Participants describe practical planning solutions to minimizing erosion and rutting in travel paths and solutions to correct the impacts if in-field travel and loading zones.

2.1.5 EROSION

GUIDANCE: The Revised Universal Soil Loss (RUSLE-II or latest version) takes into consideration extreme weather events or upgrades to on-farm conservation systems and is an excellent overall farming system benchmark. Conservation systems or practices (state or local voluntary or mandatory Best Management Practices may suffice) should be identified. Participants' conservation systems include, but are not limited to practices such as stream buffers, terraces, ponds, tiling, no till, tiled inlets with dry ponds, and other structures used to reduce erosive forces and for retaining sediments on site. Many other effective examples of conservation practices may be addressed in the IRMP and witnessed on farm. Other conservation practices include culverts (tubes), low water crossings, bridges, gabions, rip-rap, geotechnical solutions, riparian buffers, grass waterways (seeded buffers), contour and strip farming, windbreaks, seed side slopes, haul roads, and the seeding of right of ways or road cuts.

2.1.6 SOIL CARBON

GUIDANCE: Participants periodically evaluate soil organic matter through soil testing and utilize USDA conservation practices to improve organic matter results. When growers seek consultation from USDA/NRCS field offices and their farm's Conservation Plans are reviewed, they should request a Soil Condition Index⁴ be calculated for their biomass acres. The Soil Condition Index information should be included in the IRMP. For Continuous Improvement, Participants provide the Soil Conditioning Index numerical value trending greater than zero. Information for their biomass acres as calculated in the latest USDA/NRCS RUSLE calculations.

3 BIOLOGICAL DIVERSITY

PRINCIPLE: Biomass production contributes to the maintenance or enhancement of biological diversity, in particular native plants and wildlife.

3.1.1 VEGETATION TYPES AND WILDLIFE HABITAT PLANNING

GUIDANCE: Participants should contact or consult with their State fish and wildlife Agency's private lands division, State natural resources conservation services, State US Fish and Wildlife Service, office university extension wildlife, specialists/staff, wildlife conservation organizations, or private wildlife consultants. Contact information is included in Appendix B of the CSBP Agricultural Standard. Participants might seek additional information regarding habitat types in their areas by contacting local Nature Conservancy representative. The Nature Conservancy eco-regional portfolio site: www.landscape.org, or searching NatureServe Explorer <http://www.natureserve.org/explorer/>.

Participants engaged in small family farming operations (for CSBP the point of reference for Biodiversity is a family farm employing less than five family members or two family members and less than four full-time employees) may be exempted from a full assessment. The IRMP should adequately describe all relevant Good Agricultural Practices that provide for the protection and maintenance of species and habitats at risk as identified through the consultation with State fish and wildlife agencies, State Natural Resources personnel, University Extension wildlife, or private wildlife consultants.⁵

⁴ The Soil Condition Index (SCI) can be obtained from the NRCS field offices. Note that the NRCS RUSLE erosion calculator automatically generates the SCI

⁵ The Highly Erodible Land Conservation and Wetland Conservation Certification is a voluntary certification initiated with the submission of the AD-1026 form acknowledges the NRCS right to perform an erodibility assessment and whether there are any wetlands present. Note that this assessment is a prerequisite for USDA loan program (e.g. Direct Payment or Conservation Payment). If wetlands are present this will be indicated below the "Cropland" areas on the report format. Additional resources are provided in the IRMP (e.g. www.NatureServe.org, state wildlife action plans).

An independent assessment of the IRMP will be conducted by the third-party auditing firm. However, Participants are responsible for carefully documenting any real or potential threats that the operation might have to local biodiversity. A full assessment is required if high environmental risks are associated the Participants' operation. High risks include real or potential presence of rare, threatened, or endangered species or for the clearing or alteration of rare, threatened, or endangered species' habitat(s). The independent auditor may agree or disagree with the Participants' IRMP findings for biodiversity. The auditor's findings may change the eligibility of biomass acres for CSBP certification or require additional conservation measures be implemented as a condition for certification. Participants have the right to appeal the auditor's decision.

3.1.2 IMPORTANT WILDLIFE SPECIES AND THEIR HABITATS

GUIDANCE: It will be important for Participants to be knowledgeable of the important wildlife species, their habitats, and food sources. Participants are expected to identify practices that preserve habitat and nesting areas for wildlife, provide basic feed, and adjust timing of mechanical operations to avoid negatively affecting nesting, calving, fawning, or brood rearing seasons for that identified wildlife. The IRMP should outline the actions Participants take to preserve native vegetation on or near the biomass acres and the important game or wildlife species on or near the biomass acres.

3.1.3 RARE, THREATENED, AND ENDANGERED WILDLIFE, COMMUNITIES AND BIODIVERSITY

GUIDANCE: Through the consultation process with the state fish and wildlife agency's private lands division, State natural resources conservation services, State US Fish and Wildlife Service, office university extension wildlife, specialists/staff, wildlife conservation organizations, or private wildlife consultants, Participants should identify and protect any state or federally listed species or habitats associated with their biomass acres in the IRMP. Participants with known state or federally listed species map, take concrete actions to protect, and monitor state/federally listed species activity.

The independent auditor may agree or disagree with the Participants' IRMP findings for the needs of rare, threatened, and endangered wildlife, communities or biodiversity. The independent auditor represents a certification body that has the right to review the specific practical measures to protect or conserve known occurrences appropriate to the scale and intensity of the biomass operation.

As a response to non-conformities, Participants will develop both the knowledge and a suite of management practices to protect state or federally listed species and known native vegetation. The identified species and/or vegetation will be addressed in annual IRMP updates and Indicator 9.2.2 Improve Performance. The certification body will review, approve, or reject the respective protection measures for environmental risks to these species or vegetative communities.⁶

3.1.4 CONTROL OF NON-CROP INVASIVE SPECIES

GUIDANCE: While completing the IRMP; Participants should be able to identify noxious plant species in their locale or non-crop invasive species which are on or near their biomass acres. Once identified, the IRMP should include strategies to control or minimize the spread of non-crop invasive species in the biomass production. Participants should enlist the oversight and participate with crop consultants, plant society staff or Extension specialists to identify, educate the public and control the spread of vegetation that are non-crop invasive species as identified by state or local authorities.

3.2.1 INVASIVENESS

GUIDANCE: It is the Participants' responsibility to be knowledgeable of the invasiveness of the types of feedstock grown for biomass production and to not introduce or reproduce invasive species as determined by a 3rd party assessment. The Participants' knowledge should include the methodology for determining what crop to plant and who was consulted in making the planting decision(s). The cultivation of a biomass crop that is invasive in the Participants' region or which may disrupt biodiversity on an eco-regional scale is not permitted under CSBP Standard.

3.2.2 CROP SPREAD

GUIDANCE: The IRMP outlines protocols which would limit the potential spread of invasive species including pollen spread plant growth into field borders, plant matter during harvest, or seed spread while transporting production to the consumer. It is the Participants' responsibility to be knowledgeable of the invasiveness and to stem the spread of crop germplasm through cultural and/or chemical measures.

3.3.1 DOCUMENTATION OF VEGETATION CATEGORY

GUIDANCE: Imagery from the public or private domain should be sought to document the land use cover as of December 19, 2007. The particular agriculture crops are not needed for assessing the vegetation category. However, if fallow vegetation from agriculture or pasturelands is converted to biomass acres, the woody cover characteristics, such as average diameter at breast height and basal area are needed for estimations of the volume and carbon content as required in Indicator 5.1.4 Soil Carbon and Organic Matter, if applicable. As with any changes to the scope of intensity of a Participants' operation, an assessment of potential impacts are an essential part of the IRMP, Indicator 1.3.1 Operations Planning, to be updated annually. See Guidance for Indicator 3.3.2 Lands Eligible for Conversion.

⁶ Growers can access NatureServe Explorer <http://www.natureserve.org/explorer/>, to search by location to get a list of G1-G3 species by county or watershed and use the map viewer to quickly zoom in to an area of interest, and view whether the place you are looking at falls within a The Nature Conservancy Eco-regional portfolio site: www.landscape.org.

3.3.2 LANDS ELIGIBLE FOR CONVERSION

GUIDANCE: Greater scrutiny will be undertaken during the third-party audit wherever doubt exists as to the cultivation of biomass acres that have remnants of native species or forested stands (e.g. old fields, grazed areas with large trees, etc.). However, annual encroachment of woody vegetation (e.g. ingrowth along irrigation ditches, field or forest edges, and woodlots) is not considered as land conversion. Regrowth of spontaneous vegetation for complete fields, farms, or other management units⁷ will be subjected to auditor review.

3.4.1. CONTROL AGENTS

GUIDANCE: Participants provide a list of product names and the volume of active ingredients for applications to biomass acres. In referencing biological or mechanical controls, Participants document the control method (e.g. mowing, rouging, parasitoid or predator), population rates (if applicable), and the target pest.

4 WATER

PRINCIPLE: Biomass and bioenergy production maintains or improves surface water, groundwater, and aquatic ecosystems.

4.1.1. WATER QUALITY MANAGEMENT PLANNING

GUIDANCE: Participants' biomass acres should be identified on a map of the watershed and submitted a part of the IRMP. If there are impairments in the watershed the Participant must describe how the biomass production will impact, if at all, those impairments. For Participants with irrigation for their biomass production, a working knowledge of the water district rules governing the use of irrigation water and the impact of the biomass crop on water usage should be described in the IRMP. Participants describe key operational risks to water quality, groundwater, and aquatic ecosystems. Participants' use of Good Agricultural Practices and Best Management Practices should be described in the IRMP⁸.

4.1.2 EROSION AND SEDIMENT AND RUNOFF CONTROL

GUIDANCE: The USDA Conservation Plan for the tract of land with biomass production provides a suite of conservation practices and tillage systems which will help the Participants' production to reduce runoff and erosion. Participants demonstrate the use of those systems, practices, and additional Best Management Practices to reduce erosion as a road map for continuous improvement. The USDA Conservation Plan has been designed to achieve the appropriate "T" value from RUSLE for your operation. This RUSLE "T" value can be provided by your local NRCS field office.

4.1.3 USE OF WASTEWATER FOR IRRIGATION

GUIDANCE: The utilization of waste water or livestock wastes through irrigation must be applied according to a nutrient management plan. Plans developed by USDA and NRCS should provide acceptable guidelines for such applications. Participants need to have their wastewaters tested and maintain records of the chemical analysis. For all wastewater sources test results, nitrogen, phosphorus, and suspended solids are required. For municipal wastewater, in addition to nitrogen, phosphorus, and suspended solids, source nitrogen, nitrate, and phosphorus should be documented through an accredited chemical laboratory. Industrial wastewater applications require metals, organics and volatiles be tested in addition to the municipal chemical profile requirements. These records will be inspected by the certification body.

4.1.4 TRACE ELEMENTS IN BIOSOLIDS

GUIDANCE: Participants should provide documentation of the analysis of the biosolids being applied to biomass acres. Biosolids are applied according to an approved nutrient management plan and monitored according to any federal, state, or local regulations which permit the utilization of biosolids in agriculture production.

4.1.5 NITROGEN

GUIDANCE: Participants provide evidence of nitrogen nutrient management through crop or soil testing. Acceptable tests include, but are not limited to, periodic soil testing, plant tissue testing of the biomass production, or references tissue color charts. It will be important that Participants demonstrate knowledge regarding how conservation practices impact nitrogen utilization (e.g. the potential impact nitrogen fertilizer runoff or leaching, soil nutrient holding capacity, plant nutrient and eco-regional or downstream impacts of the biomass production, and nutrient management).

⁷ Approved CSBP forest certification programs (e.g. FSC) may be exempted, provided that added carbon is accounted for under Criteria 5.1.5 of the CSBP standard (e.g. clearing of mature woodlots).

⁸ Good Agriculture Practices and Best Management Practices include the judicious timing of spray applications to avoid drift, weather events or other product losses that might adversely impact water bodies shall be identified. Other Good Agricultural Practices for inclusion in the IRMP include pesticide and nutrient management plans, NRCS approved conservation practices or Best Management Practices to maintain or enhance water quality and quantity in the locale.

4.1.6 PHOSPHORUS

GUIDANCE: Participants provide evidence of phosphorus nutrient management through crop or soil testing. The utilization of the USDA Phosphorus Index can provide valuable planning assistance where phosphorus issues are prevalent in local water bodies.

4.1.7 PESTICIDE MANAGEMENT

GUIDANCE: The application of pesticides follows federal, state, or local laws and guidelines. Participants or their contractors document pesticide usage as required in Indicator 5.1.2 Production Inputs. Participants and their contractors should demonstrate a working knowledge of their pesticide selection processes which include the use of least-toxic and narrow in spectrum to achieve the management objectives and avoidance of pest resistance. The Integrated Pest Management Practices utilized in the operation should be documented according to the management objectives (e.g. crop scouting, spot spraying, spraying field borders, rouging, etc.). Participants might want to utilize USDA WIN-PSI or other appropriate tools to guide Pesticide utilization and application. Participants are encouraged to properly store and label the storage of pesticides and chemicals on the farmstead to improve or enhance family member or worker safety on the operation site. State-specific guidelines should be consulted (e.g. [ftp://ftp-fc.sc.egov.usda.gov/NJ/partnerships/farmasyst/pesticides.pdf](http://ftp-fc.sc.egov.usda.gov/NJ/partnerships/farmasyst/pesticides.pdf)). See Indicator 6.3.3 Hazardous Materials Protection and Indicator 9.2.3 Good Agricultural Practices. Identifying members of the operation and or providing documentation of Pesticide Applicator License Certificates will be required where restricted use chemicals are applied to biomass production acres. Applicator licenses will be provided to the certification body in accordance with federal, state, or local laws.

4.1.8 PESTICIDE USE

GUIDANCE: Participants identify areas of concern including biomass production areas where additional measures were utilized to protect the environment. Those measures might include, but are not limited to, correct timing of pesticide application, application rate adjustments, conservation practices utilized to protect those sensitive areas, and runoff containment structures or others.

4.1.9 WASTE DISPOSAL

GUIDANCE: The safe disposal of fuel, oil, and chemicals (e.g. solvents, containers, paints, unwanted pesticides, extra mixed materials, and pesticide containers) are very important to family member, worker, and contractor health and safety. Participants document (e.g. pictures) methods used to properly dispose of pesticide and chemical wastes for the biomass operation. Outlining the protocols and training all family members, workers and contractors will serve as partial compliance for Indicators: 6.3.2. Training; 6.3.3. Hazardous Materials Protection; 6.3.4. Accidents and Injuries; and 6.3.5. Sanitation.

4.2.1 IRRIGATION PLAN

GUIDANCE: Participants who farm in jurisdictions that have water boards, irrigation districts, or other authorities which regulate irrigation of ground or surface waters provide an outline of the regulations impacting irrigation planning considerations in the IRMP. The Plan includes practices and techniques used to maximize water efficiency, reduce water, water runoff considerations, and other key considerations relating to irrigation water usage and conservation. Identifying and documenting the reuse or treatment of waste water could serve as partial compliance for Indicators: 4.1.3 Use of Waste Water for Irrigation and 4.2.3 Preventing Depletion. Should Participants irrigate biomass production from non-regulated sources (e.g. a pond), they shall document the usage.

4.2.2 LEGAL COMPLIANCE

GUIDANCE: Participants provide documentation to the certification body regarding the irrigation water board authority's allotment/irrigation rights and compliance history.

4.2.3. PREVENTING DEPLETION

GUIDANCE: A copy of the Participants' irrigation permit(s) for the biomass acres seeking certification are included in the IRMP. The strategy adopted by either the water authority or the Participants should be spelled out in the IRMP.

4.2.4. USE RIGHTS

GUIDANCE: A copy of the use rights or utilization prescriptions from the water board or authority are documented in the IRMP.

4.2.5. IRRIGATION/SALINITY

GUIDANCE: One method to consider is NRCS Salinity and Sodic Soils Management (Practice code 610) http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044790.pdf

4.2.6. MAXIMUM WATER USE PER ACRE

GUIDANCE: As biomass productions systems evolve Participants will acquire the knowledge to understand biomass crop production water needs. This knowledge will better equip Participants to anticipate the circumstances where additional water use needs to produce economically sustainable production. Initially Participants will be required to identify potential water use needs based on rationale acquired from the production of their existing cropping systems. It will be important for the Participants to spell out with great detail the circumstances where additional water or waste water needs will be utilized in biomass crop production.

4.3.1. AQUATIC ECOSYSTEM MANAGEMENT PLAN

GUIDANCE: Mapping includes all wetlands, blue-line streams, riparian zones, streamside conservation zones, critical habitat areas, and other no-go areas that operationally critical. If the aquatic ecosystem properties, such as stream flow, temperature, or hypoxia are affected within the watershed, Participants identify affected areas on the map. Growers can access the following to evaluate whether their acres might be located in impaired watersheds:

<http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/index.cfm>

4.3.2. STREAM FLOW

GUIDANCE: All blue line streams are identified on the Participants' map. If the aquatic ecosystem's stream flow is affected within the watershed and the area of the Participants' biomass acres, these operational areas are identified on the map and what, if any, actions are being taken to mitigate the issue on or near the biomass acres.

4.3.3 STREAM TEMPERATURE

GUIDANCE: All blue line streams are identified on the Participants' map. If the aquatic ecosystem's stream temperature is affected within the area of the Participants' biomass acres, these operational areas are identified on the map and what, if any, actions are being taken to mitigate stream temperatures on or near the biomass acres.

4.3.4 HYPOXIA

GUIDANCE: All blue line streams are identified on the Participants' map. If hypoxia has impacted the aquatic ecosystem, Participants should identify on the map those actions being taken to mitigate low oxygen (e.g. nitrogen fertilizer utilization) on or near the biomass acres.

4.3.5 WETLANDS

GUIDANCE: All designated wetlands are identified on the Participants' map. If the site hydrology is impacted by drainage, filling, or degradation of the wetlands for biomass production these actions are considered "wetlands conversion" by provisions of the 1985 Food and Security Act. Participants that have converted wetlands after 1985 are not eligible for certification under the CSBP Standard.

5 AIR QUALITY AND EMISSIONS

PRINCIPLE: Emissions are estimated via a consistent approach to life cycle assessment.

5.1.1 YIELD DATA

GUIDANCE: Participants provide yield data for total biomass production acres on an annual basis. The biomass yield data should be based on documented inventory, contracted purchases, and/or product sales receipts. Participants may utilize existing accounting protocols and are not required to provide information beyond yield data regarding their contracts and sales.

5.1.2 PRODUCTION INPUTS

GUIDANCE: Participants provide the amount and type of nutrient amendments and the chemistry of pesticides applied to their biomass acres over the course of a year. Participants may provide the product name, active ingredient, and quantity utilized over the year for each individual amendment or aggregate all of their applications and provide to total breakdown per chemical of application. Nutrient amendment and pesticide application schedules are not required. CSBP Checklist may be appropriately completed to satisfy Indicator 5.1.2 Production Inputs.

5.1.3 PLANTING AND TILLAGE

GUIDANCE: Participants should provide equipment data that accurately reflect the planting methods and tillage practices utilized for biomass. Data should provide all equipment used, selected engine specifications, and usage data relevant to biomass production.

5.1.4 SOIL CARBON AND ORGANIC MATTER

GUIDANCE: For Continuous Improvement, Participants provide the Soil Conditioning Index information for their biomass acres as calculated in the latest USDA/NRCS RUSLE calculations. See Guidance for Indicator 2.1.6 Soil Carbon.

5.1.5 HARVESTING, COLLECTION, HANDLING, PROCESSING, AND STORAGE

GUIDANCE: Participants should provide equipment data that accurately reflects the equipment used for harvesting, collection, handling, process, and storage of biomass. Data should provide all equipment used, selected engine specifications, and usage data relevant to biomass production.

5.1.6 TRANSPORTATION

GUIDANCE: Participants should indicate the haul distance for purchased biomass, the type of equipment utilized for delivery, and the portion of the total biomass produced that is transported by each specified haul type/distance.

6 SOCIO-ECONOMIC WELL-BEING

PRINCIPLE: Biomass and bioenergy production takes place within a framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders (including land owners, farm workers, suppliers, biorefiners, and the local community), ensures compliance or improves upon all applicable federal and state labor and human rights laws, and provides for decent working conditions and terms of employment.

6.1.1. FAIR LABOR STANDARD ACT

GUIDANCE: Participants engaged in small family farming operations (for CSBP the point of reference for Fair Labor Standard Act is a family farm employing less than five family members or two family members and less than four full-time employees) may be exempted from a full evaluation under this Principle. Participants must demonstrate that employees meet minimum wage and applicable overtime payment for work performed. Local wages paid for piecework must also meet local minimum wage statutes. Although local wages are usually competitive and exceed minimum wages, the burden of proof resides upon Participants to demonstrate that employee protection is equivalent to or in excess of Fair Labor Standards Act (FLSA) provisions concerning wages, working hours, retirement and leave benefits, equal opportunity hiring, safety and health in the workplace, and fair youth employment.

6.2.1. GRIEVANCE PROCEDURES

GUIDANCE: Participants engaged in small family farming operations (for CSBP the point of reference for Grievance Procedures is a family farm employing less than five family members or two family members and less than four full-time employees) may be exempted from an evaluation under this Indicator. For larger Participants, the Participants' contractors or contracting agencies should have a written policy in place to allow employees a procedure or platform to air grievances without negatively impacting their jobs.

6.2.2. EMPLOYMENT CONTRACT

GUIDANCE: Written agreements are used by Participants that have more than five full-time employees (or equivalent with two family members and less than four full-time employees). Small family farmers or other Participants that use short-term on-farm contractors for less than four working days in any growing or harvesting season may be exempted.

6.2.3. WORKPLACE IMPROVEMENTS

GUIDANCE: Participants demonstrate a mechanism allowing employees to provide input and feedback to improve the workplace environment. For Continuous Improvement, the Program Participant summarize and memorialize outcomes from the previous year's suggestions.

6.2.4. FREEDOM OF ASSOCIATION

GUIDANCE: Workers and management have inalienable rights under Article I of the U.S. Constitution. Freedom of speech cannot be denied to workers or employers. Union-breaking or the harassment of workplace advocates will not be tolerated under CSBP. Workers' right to organize and associate freely, and/or negotiate working conditions must be understood and agreeable to Participants.

6.3.1. COMPLIANCE WITH LAWS AND REGULATIONS

GUIDANCE: At an easily accessible site (i.e. prominent location at the facility), Participants should display posters which summarize the required Federal, State, and Local employment conditions and occupational health and safety laws. These posters can be acquired free of charge from OSHA, US Department of Labor and from other State Labor Agencies. Participants should demonstrate their efforts to comply with those Federal, State, and Local laws in their corporate environment for occupational health and safety with human resource records (e.g. OSHA 300 forms for reporting work-related injuries).

6.3.2. TRAINING

GUIDANCE: Family member, worker, and contractor safety are important to productivity, profitability, and liabilities attributable to the biomass production operation. Participants must provide proper health, safety, and operations training for all equipment operators and other employees using or engaged with hazardous materials or work-related processes. Participants should have evidence that their contractors and contractors' staff also have proper health, safety, and operational training on the equipment they will provide to the biomass operation. Employees, contractors and contractor staff should be trained or provide evidence of training and knowledge for hazardous materials protection, accident and illness, and sanitation as included in the guidance for Indicators: 6.3.3 Hazardous Materials Protection, 6.3.4 Accidents and Illness, and 6.3.5 Sanitation.

6.3.3. HAZARDOUS MATERIALS PROTECTION

GUIDANCE: Worker and contractor hazardous material protection is important to productivity and the liabilities of the operation. Participants provide hazardous material protection commensurate with the risks of the operations involving biomass production. All workers and

contractors should be trained in the utilization of the protective equipment, provided with personal protective equipment in good working order and at no charge to employees (e.g. protective masks, gloves, and eye and ear protection), and provide for a designated the location for training and other safety materials and devices on the farmstead.

6.3.4. ACCIDENTS AND INJURIES

GUIDANCE: Worker and contractor safety and emergency services are important to the productivity of the workforce and production efficiency. Participants provide access to a well-stocked first aid kit or station that is well-marked and easily accessible. Having a member of the operation trained in some basic emergency services will be very beneficial and should be knowledgeable to employees or contractors. It will be important that workers be knowledgeable of the emergency service providers in the vicinity (e.g. list of emergency phone numbers, numbers in handheld electronic devices, locations of local hospitals, or clinics). Participants are responsible for planned communications and transportation with service providers in case of emergencies. Any employees or contractors working with hazardous materials should comply with guidance set forth in Indicator 6.3.3 Hazardous Materials Protection. Participants annually supply a record of accident and Injuries to Certification Body (e.g. OSHA 300 forms for reporting work-related injuries).

6.3.5. SANITATION

GUIDANCE: Participants and their contractors provide evidence that sanitation services are provided for employees and contractors employees which include but are not limited to: clean drinking water and access to sanitation while working on biomass production appropriate to the size and scale of their production operations.

6.3.6 INSURANCE AGAINST WORKPLACE INJURY

GUIDANCE:

Participants and contractors provide evidence of payments, policy number and/or policy period to workers compensation insurance program for all full-time employees as required by local, State, and Federal occupational health and safety legal provisions. See Indicator 6.3.1 Compliance with Laws and Regulations. The Participants' contractors or contracting agencies should be made aware of this CSBP requirement.

7 LEGALITY

PRINCIPLE: Biomass production complies with applicable federal, state, and local laws, statutes, and regulations.

7.1.1. KNOWLEDGE OF LAWS

GUIDANCE: It is the responsibility of Participants to be knowledgeable of the laws governing agriculture production from a federal, state, and local perspective. Where local ordinances or laws specific to agriculture or biomass production in the locale exist, Participants demonstrate knowledge and compliance. If a new or pending regulation is anticipated by Participants or the biomass consumer, Participants should identify the corrective action needed to comply with the law and an anticipated timetable to achieve compliance.

7.1.2. ENSURING COMPLIANCE

GUIDANCE: The Participants should inform the Certification Body of any pending litigation against the Participants' agriculture operation.

8 TRANSPARENCY

PRINCIPLE: The process of certified biomass production is transparent.

8.1.1. PUBLIC TRANSPARENCY

GUIDANCE: The public would benefit from being knowledgeable of biomass production carried out in their community and Participants should identify outreach activities conducted by the operation (e.g. Cooperative Extension or other agriculture association field days conducted, education events with local schools presentations to local civic organizations, news media events, or publication). In addition, the credibility of the certification systems demands transparency and public disclosure within the confines of confidentiality (contractual documentation, prices, production statistics, and other proprietary information is to remain confidential ⁹). Participants will identify together with the Certification Body major audit findings and basic elements of the biomass operation, while respecting the confidentiality of information. Participants are responsible for releasing the publicly available summary to the certification body and/or CSBP upon request.

9 CONTINUOUS IMPROVEMENT

PRINCIPLE: Biomass and bioenergy producers continuously improve practices and outcomes based on the best available science and appropriate grower development benchmarks.

⁹ If there is other information about the biomass production Participants wish not to be revealed to the public or CSBP, those items need to be disclosed to the Auditor representing the Certification Body.

9.1.1. PARTICIPANT COMPLIANCE

GUIDANCE: *Following the on-site audit, Participants provide evidence of compliance to the Certification Body. Participants must update the CSBP self-assessment checklist annually. Common year-to-year changes that require reporting include changes in the operation due to new science or consumer requests, annual production inputs, such as fertilizer and fuel, conservation planning, and any corrective action plans due to audit non-conformities.*

9.2.1 STANDARD REVIEW

GUIDANCE: *Participants are encouraged to participate in the periodic review of the CSBP Standard. The CSBP Council is committed to continuous improvement of the Standard as the industry matures and the science guiding the industry expands and is vetted. The Council or the Participant may openly engage in standard review and suggestions for improvement.*

9.2.2. IMPROVE PERFORMANCE

GUIDANCE: *Participants will improve his or her sustainability performance as a result of the audit process and other identified weaknesses against the CSBP Standard. Non-conformities are presented to all Participants as a result of the audit process¹⁰. Although improvements in air quality and emissions may not be demonstrated annually, continuous improvements are expected with more precise calculations of air quality and emissions above default values that are required for initial certification. A workbook with tools, user-friendly guidelines, and tabulated values will be developed, as part of the CSBP checklist or through a reporting web-based portal.*

9.2.3. GOOD AGRICULTURAL PRACTICES (GAP)

GUIDANCE: *Participants' development of practices and techniques that sustain their operations, their local environment, and their communities is tied to continuous improvement and requires documentation and demonstration. Participants advance their farm's sustainability through the compliance with the CSBP Standard. Participants should be able to demonstrate the farm's environmental and socially responsible practices to the auditor. Examples of Good Agricultural Practices include but aren't limited to reduced tillage practices, reduction in equipment passes during field preparation, cultivation and harvesting, practices to reduce runoff or erosion from biomass acres, safe handling and judicious application of chemical products and nutrient amendments, scouting as part of integrated pest management, the used of tier 2 and tier 3 engine technologies, purchasing or generation of renewable power on the farm, on farm research projects, community outreach and consuming public education, worker safety and work place improvements.*

Collective grower sustainability strategies used to meet their important sustainability priorities might be documented by your farm and shared with other growers in their locale. Partial credit for the Indicator 9.2.3 Good Agricultural Practice may be awarded for this important attribute of continuous improvement.

2 GLOSSARY OF ADDITIONAL TERMINOLOGY

Biosolids: products generated from tertiary treatment of waste, activated sludge or the residual, semi-solid material left from industrial wastewater, or sewage treatment processes.

Chain-of-Custody: ensures that the certified biomass can be traced back to a certified Program Participant. The chain-of-custody mechanism is an accounting process where CSBP-certified materials can be traced through the distinct stages from production through processing, transformation, distribution, and finally consumption. The management and accounting of CSBP-certified materials is designed to provide a credible guarantee to customers that CSBP-certified materials originated from sustainably cultivated agricultural systems.

Consumer: the buyer, purchaser, blender, or aggregator of biomass for the Participants with Chain-of-Custody certification.

CSBP Checklist: an electronic workbook of CSBP requirements populated by the Participants year-by-year to document their Integrated Resource Management Plan. Following the initial self-assessment, Participants are required only to provide information that has changed¹¹ in the operation.

Gabion: a wire basket filled with rock, used to stop erosive forces in creeks or other erosion-prone landscape settings.

¹⁰ Examples of non-conformities that may be issued by the auditor include assessing or conserving riparian zones or biodiversity can be expected for operations that are changing scale or intensity and may pose a risk to blue-line streams or wildlife habitats.

¹¹ Common year to year changes that require reporting include: 1. Changes in the operation due to new science or consumer requests, 2. Annual production inputs, such as fertilizer and fuel, 3. Conservation planning, and 4. Any corrective action plans, due to audit non-conformities.

Noxious plant species: are plant species designated by country, state, provincial, or national¹² agricultural authority as injurious to agricultural crops, horticultural crops, natural habitats, natural ecosystems, humans, or livestock. Most, but not all noxious weeds are introduced species (non-native) and have been introduced into an ecosystem by ignorance, mismanagement, or accident.

Opportunity for Improvement: A noted weakness¹³ of Participants' operations regarding the Standard that is recommended but not required.

¹² The Federal Noxious Weed Act of 1974 ("FNWA", [Pub.L. 93-629](#), 88 [Stat.](#) 2148, enacted January 3, 1975) established a federal program to control the spread of noxious weeds. The Act was superseded in 2000 by the [Plant Protection Act \(Pub.L. 106-224\)](#) on June 20, 2000, except for the introductory section of the FNWA, and the amendment of 1990 (section 15, [7 U.S.C. § 2801](#) note and [7 U.S.C. § 2814](#)).

¹³ Opportunities for Improvement are optional, and may be provided to the Participant Operator by the auditor as mechanism of continuous improvement. Opportunities for Improvement may become new planning objectives.

APPENDIX A: NATURAL RESOURCE CONSERVATION SERVICE TOOLS AND DOCUMENTARY SOURCES FOR CSBP STANDARD IMPLEMENTATION

Appendix B.2 - List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production		
USDA Tools	Description	Applicability
NRCS CPA 52 www.ia.nrcs.usda.gov/technical/envircomp/NRCS-CPA-52.xlsx	Provides for the documentation of the impacts of a planned action on people, their physical surrounding and nature and provides for documenting compliance with federal, state and local laws, regulations, (federal) Executive Orders and requirements.	1.1, 1.2, 1.3.5
NRCS CPPE Worksheets http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_026849	Provide evaluation of the physical effects of implementing conservation practices on soil, water air plants and animals and human considerations.	1.3.4, 1.3.5, 4.1.2, 4.3.1, 4.3.5
Quality Criteria, Section 3, NRCS Field Office Technical Guide http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg	The minimally acceptable level of treatment required to achieve a resource management system for identified resource considerations for a particular land use as defined in the technical guide of NRCS.	1.3.1, 1.3.4
NRCS CPA 1155	A form for documenting producer's Conservation Practice Implementation Schedule.	1.3.1, 1.3.2, 1.3.3, 1.3.4
State Agronomy Handbooks Example – Illinois Agronomy Handbook http://www.aces.uiuc.edu/iah	Information on climatology, corn, soybeans, small grains, grain sorghum, cover crops, alternate crops, hay and pasture, seed, water quality, soil	2.1.1, 2.1.2, 2.1.6

	testing and fertility, nutrient management, tillage systems, water management, weed control, insects, diseases and other topics.	
NRCS 590 http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_026849	Nutrient Management Practice Standard Includes considerations to Minimize Agricultural Non Point Source Pollution of Surface and Groundwater and to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere	2.1.2, 4.1.1, 4.1.3, 4.1.5
Revised Universal Soil Loss Equation 2 (RUSLE2), SCI, STIR http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20 %20NRCS	Predicts sheet and rill erosion from rainfall or water, utilizing the soil condition index (SCI), the soil tillage intensity rating (STIR) and energy requirements for the planned crop system.	2.1.3, 2.1.6, 2.1.7, 4.1.2
WEPS or WEQ http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20 %20NRCS	WEPS predicts wind erosion on site and quantifies the offsite movement of soil and includes PM-10. WEQ erosion model is designed to predict long term, average annual soil losses from a field having specific characteristics.	2.1.3, 2.1.6, 2.1.7, 4.1.2
State NRCS Wildlife Habitat Assessment Procedures Example: http://www.or.nrcs.usda.gov/technical/ecs/biology/biology-technotes.html	Several Guides provide a relatively simple and objective means of determining the value of wildlife habitat. The guides can be used to determine if a CMU meets the minimum	3.1.1, 3.1.2

	standard for wildlife conservation practices and measures can be identified to meet the minimum resource management system standard or to meet the wildlife habitat objectives of the land owner.	
NRCS 647 – Early Succession Wildlife Habitat Development/Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabeticall/ncps/?&cid=nrcs143_0_26849	Includes considerations for vegetative manipulation to maximize plant and animal diversity	3.1.2
NRCS 386 – Field Border http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabeticall/ncps/?&cid=nrcs143_0_26849	Includes Criteria for Reducing Erosion from Wind and Water, Protecting Soil and Water, Managing Pest Populations, Providing Wildlife Food and Cover and Pollinator Habitat, Increasing Carbon Storage and Improving Air Quality	3.1.2
NRCS 380 – Windbreak/Shelterbelt Establishment http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabeticall/ncps/?&cid=nrcs143_0_26849	Includes Criteria to Reduce Wind Erosion and Protect Growing Plants, Improve Air Quality Reducing and Intercepting Airborne Particulate Matter, Chemicals and Odors, Increasing Carbon Storage in Biomass and Soils, Enhancing Wildlife Habitat, Improving Irrigation Efficiency and Reduce Energy Use	3.1.2
Rare, Threatened and Endangered Species http://www.fws.gov/endangered/	Can search for County Distribution of Federally Threatened, Endangered and Candidate Species	3.1.3, 3.3.3
Invasive Species www.invasivespecies.gov	Can search for County lists of known invasive species	3.1.4, 3.2.1
NRCS 595 – Pest Management	Includes Criteria to	3.1.4,

http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_026849	Prevent or Mitigate Off-site Pesticide Risks to Water Quality from Leaching, Solution Runoff and Adsorbed Runoff Losses, to Prevent Off-site Pesticide Risks to Soil, Water, Air, Plants, Animals and Humans from Drift and Volatilization Losses, and to Prevent or Mitigate Onsite Pesticide Risks to Pollinators and Other Beneficial Species through Direct Contact.	3.2.1, 3.2.2, 4.1.6
Weed Initiated Pest Risk Assessment Guidelines (APHIS) http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/wra.pdf	Provides a template for conducting Food and Agriculture Organization Stage 1 and 2 assessments.	3.2.2
USDA FSA-578 http://forms.sc.egov.usda.gov/efcommon/eFileServices/eFormsAdmin/FSA0578MANUAL_031015V01.pdf	A USDA FSA Form for reporting crops/land use by Tract and Field.	3.3.1, 5.1.1
NRCS 633 Waste Recycling http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_026849	When manure or other wastes are used for plant nutrients the practice shall comply with conservation practice standard 590, Nutrient Management.	4.1.1, 4.1.3, 4.1.5
USEPA – Methods for Biosolids Testing www.epa.gov/region8/water/biosolids/analyticalmethods.html	Lists analytical methods to be used when testing Biosolids.	4.1.4
WINPST http://go.usa.gov/Kok	WIN-PST is an environmental risk screening tool for pesticides. Evaluates the potential of pesticides to move with water and eroded soil/organic matter and affect non-targeted organisms.	4.1.6, 4.1.7
NRCS 449 – Irrigation Water Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_026849	Lists Knowledge, Skills and Capabilities required of Irrigator.	4.2.1, 4.2.6

<p>26849</p>	<p>Includes criteria to Manage Soil Moisture to Promote Desired Crop Response, to Optimize Use of Water Supplies, to Minimize Irrigation Induced Soil Erosion, to Decrease Non-Point Source Pollution of Surface and Groundwater, to Manage Salts in the Crop Root Zone, to Manage Air, Soil or Plant Micro-Climate, to Reduce Particulate Matter Movement and to Reduce Energy Use.</p>	
<p>FIRI 1.2, CPED http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20 %20NRCS</p>	<p>FIRI is A procedure for comparing improvements or changes</p> <ul style="list-style-type: none"> * Year to year * Field, Farm and project level <p>Relative rating A season long evaluation not a single event Composed of three elements</p> <ul style="list-style-type: none"> * Management * System * Potential efficiency <p>CPED models water distribution under a Center Pivot or Linear Move sprinkler system.</p>	<p>4.2.1, 4.2.6</p>
<p>NRCS Soil Test Kit Guide http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044790.pdf</p>	<p>Describes procedures for 12 on-farm tests, includes an interpretive section for each test and data recording worksheets. Includes instructions for assembling a kit.</p>	<p>4.2.5</p>
<p>NRCS EFH2 http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/manage/?&cid=stelprdb1042921</p>	<p>A program for determining peak discharge as prescribed by Engineering Field Handbook Chapter 2.</p>	<p>4.3.2</p>

	Includes procedure for computing Runoff Curve Number (RCN).	
NRCS 395 – Stream Habitat Improvement and Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_0_26849	Lists 13 measures that may be taken singularly or in combination to improve stream habitat.	4.3.3
NRCS 657 – Wetland Restoration http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_0_26849	Includes criteria for Hydric Soil Restoration, Hydrology Restoration, and Vegetative Restoration and considerations for Soil and Hydrology.	4.3.5
NRCS 659 – Wetland Enhancement http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_0_26849	Includes criteria for Hydric Soil Enhancement, Hydrology Enhancement, and Vegetative Enhancement and considerations for Soil, Hydrology, Vegetation and Fish and Wildlife Habitat.	4.3.5
NRCS 396 – Riparian Herbaceous Cover http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_0_26849	Includes criteria to Maintain or Improve Water Quality and Quantity, to Stabilize Streambanks and Shorelines, for Increasing Net Carbon Storage in Biomass and Soils, for Pollinator Habitat, for Terrestrial Wildlife and for Restoring Desired Plant Community	4.3.5
Greenhouse Gases, Regulated Emissions and Energy Use in Transportation (GREET) http://greet.es.anl.gov/	GREET1_2011 includes new pathways for bio-oil production from palm, rapeseed, jatropha and camelina and updated farming assumptions for corn stover, forest residue, switchgrass, sugarcane and soybean.	5.1.2 (?), 5.1.5(?), 5.1.6(?)
USDA Energy Estimator-Tillage	Estimates diesel fuel use	5.1.3

http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/resources/?&cid=nrcsdev11_001_039	and costs in the production of key crops in crop management zones and compares energy savings between conventional and alternative tillage systems.	
COMET 2 http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/resources/?&cid=nrcsdev11_001_039	Provides estimates of carbon sequestration and net greenhouse gas emissions from soils and biomass for U.S. farms and ranches.	5.1.4

APPENDIX B: GUIDANCE FOR CONSULTATION OF FISH AND WILDLIFE AGENCIES

Under Development



Self-Assessment Checklist

CSBP Standard

Version 1.0

Sept. 19, 2012

INSTRUCTIONS:

This booklet is used by both growers and auditors.
Complete all questions and tables in Worksheets 1-9.
Please include supporting documentation as requested and
whenever appropriate. List document or file name in Column
E.
Additional information is found on the Instructions tab.

WORKSHEETS:

	# of Questions
1 Integrated Resource Management Plan	6
2 Soil	11
3 Biological Diversity	19
4 Water	41
5 Air Quality, Emission, and Energy	12
6 Socio-Economic Well-Being	33
7 Legality	2
8 Transparency	1
9 Continuous Improvement	8
Total:	133

SIGNATURE:

As an authorized Applicant representative, I hereby affirm
Company:
Name:
Signature:
Date:

This sheet provides descriptions and guidance related to the other sheets within this electronic booklet. There are red boxes marked with a "?" in the upper-left hand corner of each sheet. Hold your mouse over these boxes for a second to see a pop-up explanation of what that sheet does and how it works. There are also little red triangles placed in strategic locations throughout the sheets. Hold your mouse over the triangle for a second and a box will pop up with some information.

Tab Name	Description	Comments
Tabs 1-9	The Grower fills the appropriate box in Column B, C, or D with a number "1". If the Grower has evidence for Partial Compliance or Compliance, the evidence should be written in Column E . These forms are designed to be completed electronically. If you must complete the form by hand, please print clearly. Be as thorough as possible. A complete application saves time and money. Items not completed or attachments not included could slow the certification review and add to the cost of your assessment.	When answering questions, you may supply electronic or PDF files as attachments rather than fill in blanks so long as the file name is provided. If the full text of electronic documents or urls are available, write the names of these documents and a brief description in Column E . Attach the electronic document to the email or fax the document to the certification body.
Tabs 1-9	The Auditor will evaluate the evidence provided by the Grower in Box E and gather evidence on-site for Compliance, Non-Compliance or Partial Compliance. The Auditor's findings are written into Column L .	The Auditor will review all evidence documented by the Grower and conduct a site assessment. Column L will be filled out for all Compliances and Partial Compliances.

Integrated Resource Management Planning

Farm Name
Producer Name
City, State

Date

Background

Please provide background information describing your operations, management strategies, and goals as a biomass producer.

Please provide answer here....

Soil Principle

Biomass production shall maintain or improve soil quality by minimizing erosion, enhancing carbon sequestration, and promoting healthy biological systems and chemical and physical properties.

What do you do in your operation to monitor soil nutrient levels, conserve soil, and maintain productivity under a NRCS conservation plan to guide management decisions and reduce loss to air and water? What are your goals in doing this?

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Biological Diversity Principle

Biomass production shall contribute to the conservation or enhancement of biological diversity, in particular native plants and wildlife.

How do you assess wildlife habitat on your operation with regard to vegetation cover, threatened and endangered species, or species identified in state wildlife action plans? How does your assessment affect your planning and management activities? What would you like to

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Water Principle

Biomass production shall maintain or improve surface water, groundwater, and aquatic ecosystems.

How do your management plans affect water on and around your farm operation? What do you do to assess and implement practices that conserve water, reduce runoff and erosion, and improve water quality? What are your goals in implementing these practices?

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Air Quality/Emissions Principle

Cellulosic bioenergy shall reduce GHG emissions as compared to fossil-based energy. Emissions shall be estimated via a consistent approach to life cycle assessment.

How do your management plans affect air quality? What steps do you take to reduce air emissions and improve air quality? What goals do you hope to achieve by implementing these practices?

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Socio-Economic Principle

Biomass production shall take place within a framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders (including land owners, farm workers, suppliers, bioenergy producers, and the local community), and ensures compliance with labor laws and human rights.

How do your management plans affect the socio-economic environment on your operation? How are laborers treated fairly and provided a safe work environment? How do these practices contribute to the goals on your operation?

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Legality Principle

Biomass production shall comply with applicable federal, provincial, state, and local laws, ordinances, and regulations.

How do you consider legality in our management planning? What steps do you take to ensure that your operation follows all applicable local, state, and federal laws? What are your goals in doing so?

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Transparency Principle

Production of certified biomass shall be transparent.

How do your management plans enhance the transparency of your operation? What steps do you take to accomplish this? Please explain.

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Continuous Improvement Principle

Biomass production practices and outcomes shall continuously improve based on the best available science.

What steps are included in your management planning that foster continuous improvement? Can you provide an example of continuous improvement on your operation?

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	INTEGRATED RESOURCE MANAGEMENT PLAN	Yes	No / PC	N/A	Evidence for Compliance
				1.1	Assessment				
				1.1.1	Baseline Information				
					Have you compiled and evaluated baseline information on existing conditions within the area proposed for certification to inform decisions about resource goals and land management options?				
					<i>For further indicators and implementation guidance regarding assessment, see the following:</i> 2.1.1 Soil Productivity and Conservation Planning 3.1.1 Vegetation Types and Wildlife Habitat Planning 3.1.4 Control of Non-Crop Invasive Species 3.2.1 Invasiveness 3.2.2 Crop Spread 4.1 Water Quality 4.2 Water Quantity 4.3 Aquatic Ecosystems 9.2.3 Good Agricultural Practices				
				1.2	Objectives				
				1.2.1	Establish objectives				
					Using information developed during the assessment process, have you determined priorities and described management objectives and options for the area proposed for certification and for production, taking into account landscape factors as appropriate?				
					<i>For further indicators and implementation guidance regarding establishment of management objectives, see the following:</i> 2.1.1 Soil Productivity and Conservation Planning 3.1.3 Rare, Threatened, and Endangered Wildlife, Communities, and Biodiversity 3.1.4 Control of Non-Crop Invasive Species 3.2.2 Crop Spread 4.1.1 Water Quality Management Planning 4.2.1 Irrigation Plan 4.3.1 Aquatic Ecosystem Management Plan 9.2.3 Good Agricultural Practices				

Grower name:
Inspection date:

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	INTEGRATED RESOURCE MANAGEMENT PLAN	Yes	No / PC	N/A	Evidence for Compliance
				1.3	Operations Plan				
				1.3.1	Operations Planning				
					Have you developed specific land management actions for each mapped production area, soil type, and vegetation cover type within the area proposed for certification?				
				1.3.2	Monitoring and Review				
					Have you developed a timetable to implement management actions, and established a corresponding system for documenting implementation?				
					Do you continually monitor specific management practices in order to ensure that management objectives are being met?				
					Are the management plans comprehensively reviewed at least every five years and updated as needed?				

Other Comments

Producer			CSBP Standard Nomenclature			Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	SOIL	Yes	No / PC	N/A	Evidence for Compliance
				2.1	Maintain or Improve Soil Health				
				2.1.1	Soil Productivity and Conservation Planning				
					Do you assess and monitor nutrient levels of the soil or plants and soil capabilities to guide management decisions?				
					Do you conserve soil and maintain its productivity through an integrated resource management plan?				
					Are nutrients managed to reduce loss to air and water?				
				2.1.2	Residue Removal				
					Do you retain biomass materials required for erosion control and soil fertility?				
				2.1.3	Compaction				
					Do you identify techniques that might lead to compaction?				
					Do you identify soils vulnerable to compaction?				
					Do you use appropriate methods to reduce compaction if necessary and maintain site productivity?				
				2.1.4	In-Field or On-Farm Travel				
					Do you limit field travel zones or paths as needed to meet management objectives?				
				2.1.5	Erosion				
					For agricultural operations, is your RUSLE-II score less than or equal to T? If not, please provide explanation in the 'comments' column. (Attach supporting documentation if applicable, and list document name in Column D.)				
					Do you apply USDA conservation practices and conservation systems?				
				2.1.6	Soil carbon				
					Can you demonstrate that you maintain or improve soil carbon levels?				

Other Comments

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	BIOLOGICAL DIVERSITY	Yes	No / PC	N/A	Evidence for Compliance
				3.1	Biodiversity				
				3.1.1	Vegetation Types and Wildlife Habitat Planning				
					Have you assessed vegetation cover types and wildlife habitats on enrolled acres and associated incidental areas and, where credible data are available, across the landscape?				
					Are there known occurrences of rare, threatened, and endangered species and communities (i.e., species listed as endangered or threatened)?				
					Have you identified important wildlife species and habitats identified in state wildlife action plans?				
					Have you consulted with an appropriate state fish and wildlife agency, conservation organization, biomass consumer, or expert professional to develop conservation actions?				
					Have you documented and incorporated the findings of the assessment into planning and management activities?				
				3.1.2	Important Wildlife Species and their Habitats				
					Have you developed and implemented practices that contribute to the conservation of important wildlife species, native vegetation, and native wildlife?				
				3.1.3	Rare, Threatened, and Endangered Wildlife, Communities, and Biodiversity				
					Have you developed and implemented practices to protect rare, threatened and endangered wildlife and biodiversity appropriate to the scale and intensity of the operation?				
				3.1.4	Control of Non-Crop Invasive Species				
					Have you adopted conservation practices related to control of non-crop invasive species (e.g., those not intentionally planted) on biomass production acres?				
					If invasive species are observed, have you included a strategy in the IRMP to manage them?				
				3.2	Species and Cultivars				
				3.2.1	Invasiveness				
					Do you plant crops that are known to be invasive or potentially invasive in your eco-region?				
					Have you had an assessment completed by a suitable 3rd party prior to planting to ensure that you do not utilize species that are known to be invasive or are potentially invasive in your eco-region? Please provide supporting documentation.				
					Has the crop been grown at a reasonable scale for similar purposes in the target region and not been found to be invasive?				

Producer				CSBP Standard Nomenclature			Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	BIOLOGICAL DIVERSITY	Yes	No / PC	N/A	Evidence for Compliance	
					If the crop has not previously been grown in the target region, has it been evaluated to determine if it is "potentially invasive" in the target region?					
				3.2.2	Crop spread					
					Does your Integrated Resource Management Plan include protocols for the biomass crop prior to cultivation that includes, where applicable, adoption of conservation practices that limit potential for the spread of the crop, including: - Harvest, transportation, equipment cleaning, and storage protocols (e.g., steps to limit seed dispersal during transport)? - Chemical or cultural control methods to ensure crop removal at the conclusion of production?					
					Does your Integrated Resource Management Plan include protocols for the biomass crop prior to cultivation that includes, where applicable: - Conservation practices, or chemical, cultural or physical control methods, for removal of plants or pests that represent a significant risk of establishment outside the production system, including assistance to owners or managers of neighboring properties to respond if spread occurs?					
				3.3	Land Conversion					
				3.3.1	Documentation of vegetation category					
					Have you documented the vegetation types on your farm, as of December 19, 2007?					
				3.3.2	Lands eligible for conversion					
					Can you verify that your operation does not produce raw materials or convert land areas designed by law or by the relevant competent authority for nature protection purposes?					
				3.4	Pest Management					
				3.4.1	Control Agents					
					Do you use the most effective pesticide necessary to achieve biomass management plans considering biological and environmental impacts?					
					Are control agents applied in accordance with approved protocols and in compliance with applicable federal and/or state laws?					

Other Comments

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	WATER	Yes	No / PC	N/A	Evidence for Compliance
				4.1	Water Quality				
				4.1.1	Water Quality Management Planning				
					Have you completed a water management plan that addresses impacts to water quality?				
					Are you currently complying with the above plan and mitigating or avoiding pollution?				
					Does this plan include the customization of nutrient application rates, based upon soil and plant tissue testing?				
					If you do not apply manure, do you have an up to date IRMP that addresses nutrient management planning, and pesticide application (runoff and drift control) for their entire operation?				
					If you do apply manure, do you have an up to date Comprehensive Nutrient Management Plan (in accordance with NRCS FOTG)?				
				4.1.2	Erosion and Sediment and Runoff Control				
					Does your operation employ conservation practices and tillage systems to erosion control?				
				4.1.3	Use of Wastewater for Irrigation				
					If using wastewater for irrigation, is the water properly tested and treated?				
				4.1.4	Trace Elements in Biosolids				
					Do you test sludge and manure for heavy metals on a quarterly basis?				
				4.1.5	Nitrogen				
					Does your operation use the following to avoid ground or surface water contamination? Please document.				
					Do you have a working knowledge of nutrient balancing and nutrient uptake?				
					Do you use USDA conservation practices or conservation systems to impact plant nutrient utilization while avoiding water pollution?				
				4.1.6	Phosphorus				
					Does your operation use the following to avoid ground or surface water contamination? Please document.				
					Do you have a working knowledge of nutrient balancing and nutrient uptake?				

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	WATER	Yes	No / PC	N/A	Evidence for Compliance
					Do you use USDA conservation practices or conservation systems to impact plant nutrient utilization while avoiding water pollution?				
				4.1.7	Pesticide Management				
					Do your pest and disease management methods effectively control outbreaks of pests, diseases, and fire while not harming human health or the environment?				
					Are you using Integrated Pest Management?				
					Does your pesticide mgt include all of the following?: - where possible, use of least-toxic and narrow-spectrum pesticides to achieve management objectives? - application of pesticides in compliance with label requirements? - application of pesticides in accordance with conservation practices? - provision of equipment and training to employees and contractors for the safe application? - storage of pesticides and response to hazardous spills? - biological control agents are used following strict protocols and by trained personnel?				

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	WATER	Yes	No / PC	N/A	Evidence for Compliance
				4.1.8	Pesticide Use				
					Have you identified farm areas where pesticide might contaminate water sources?				
					If the potential for pesticide contamination exists, do you have a plan to mitigate the potential impacts?				
				4.1.9	Waste Disposal				
					Do you dispose of agricultural chemicals, containers, and liquid or solid nonorganic wastes, including fuel and oil, off site and in compliance with federal and state laws?				

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	WATER	Yes	No / PC	N/A	Evidence for Compliance
				4.2	Water Quantity				
				4.2.1	Irrigation Plan				
					Can you provide annual documentation of compliance with and updates to a water management plan that ensures efficient use of water in irrigation practices?				
					Does your water management plan include a strategy to maximize efficiency in irrigation systems and reduce water use where possible?				
					Does your water management plan include re-use of treated wastewater where possible?				
					Have you adopted conservation practices related to water management ?				
					Does your operation conform to local or regional water allotments, if required?				
				4.2.2	Legal Compliance				
					Can you demonstrate compliance with local water laws?				
				4.2.3	Preventing Depletion				
					Have local water authority determined that ground or surface water is being depleted faster than it is being naturally replenished?				
					If so, have you acquired existing water rights for any new irrigation, rather than securing new water rights from the local water authority?				
				4.2.4	Use Rights				
					Did you hold legally valid use rights for irrigation water before commencement of biomass production or have rights been subsequently acquired through legal means? Please provide documentation of compliance with local water laws as prescribe by the local water board, irrigation district or similar at right.				
				4.2.5	Irrigation/Salinity				
					Can you demonstrate that salinity of your soil is within acceptable parameters for the crop produced?				
					If soil salinity exceeds acceptable parameters, have you taken action to bring soil salinity into acceptable parameters?				
				4.2.6	Maximum Water Use per Acre				

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	WATER	Yes	No / PC	N/A	Evidence for Compliance
					Do you measure water use in a way that allows calculation of acre-feet of water applied per acre of cropland?				
					Do you ensure that water use per acre of cropland is consistent with the water use rates of the most efficient irrigation technology available in the area for the same or similar crops? Please provide documentation.				
					If specific circumstances warrant the use of other irrigation methods, please provide satisfactory documentation of the rationale and demonstrate that water is being used in the most efficient manner reasonable given the circumstances.				
				4.3	Aquatic Ecosystems				
				4.3.1	Aquatic Ecosystem Management Plan				
					Have you addressed the impact(s) of your operation on aquatic ecosystem health within the watershed in the IRMP?				
					Are you implementing the IRMP to address the impact(s) of your operation on aquatic ecosystem health within the watershed?				
				4.3.2	Stream Flow				
					Have you adopted conservation practices considered sufficient to avoid negative impact on local stream flows and stream channel morphology, flood storage and conveyance capacity, and in-stream habitat conservation practices?				
				4.3.3	Stream Temperature				
					Have you taken measures to prevent negative impact on stream temperature regimes and conservation practices?				
				4.3.4	Hypoxia				
					Have you ensured that your operations do not increase the risk of hypoxia in downstream environments?				
				4.3.5	Wetlands				
					Have you adopted conservation practices and other measures as appropriate to prevent negative impact on local wetlands?				

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	WATER	Yes	No / PC	N/A	Evidence for Compliance
					Have you ensured that you do not directly impact or make changes to hydrology that result in the drainage, filling, or degradation of any wetland that is not considered "prior converted" or drained prior to passage of the 1985 Food Security Act's "Swampbuster" provision?				

Other Comments

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Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	AIR QUALITY AND EMISSIONS	Yes	No / PC	N/A	Evidence for Compliance
				5.1	Data Reporting				
				5.1.1	Yield Data				
					Have you provided yield data?				
				5.1.2	Production Inputs				
					Do you have data on the amount and type of nutrient amendments and the chemistry of pesticides applied to biomass production acres?				
				5.1.3	Planting and Tillage				
					Do you know the name or type of equipment used on biomass acres?				
					Do you know the number of passes each piece of equipment over biomass production acres annually?				
					Do you know the fuel consumption of each piece of equipment?				
				5.1.4	Soil Carbon and Organic Matter				
					Do you have documentation of soil organic matter for your biomass production acres?				
				5.1.5	Harvesting, Collection, Handling, Processing, and Storage				
					Do you know the name or type of equipment used on biomass acres?				
					Do you know the number of trips each piece of equipment makes annual and how far the trip is on average?				
					Do you know the fuel consumption of each piece of equipment?				
				5.1.6	Transportation				
					Do you know the name or type of equipment used to transport biomass while in your custody?				
					Do you know the number of trips each piece of equipment makes annual and how far the trip is on average?				
					Do you know the fuel consumption of each piece of equipment?				

Other Comments

Producer			CSBP Standard Nomenclature			Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	AIR QUALITY AND EMISSIONS	Yes	No / PC	N/A	Evidence for Compliance

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	SOCIO-ECONOMIC WELLBEING	Yes	No / PC	N/A	Evidence for Compliance
				6.1	Compliance with Labor Laws				
				6.1.1	Fair Labor Standards Act				
					If you hire full-time workers please answer the following questions:				
					Can you demonstrate compliance with the Fair Labor Standards Act (FLSA) and all other federal and state labor laws?				
					Do you comply with all state and federal laws regarding minimum wage and overtime pay?				
					Do you provide workers with health, retirement and leave benefits?				
					Do you practice equal opportunity hiring?				
					Do you take measures to provide a safe and healthy workplace?				
					When you employ minors, do you ensure that the work is safe and does not jeopardize their health, well-being or educational opportunities?				
					Do you recognize union rights in accordance with FLSA and all other federal and state labor laws?				
				6.2	Fair Treatment of Workers				
				6.2.1	Grievance procedures				
					If you hire full-time workers please answer the following questions:				
					If you have 10 or more full time employees (including seasonal workers) do you provide a mechanism for employees to raise concerns, safety issues, or grievances without fear of termination or any other reprisal?				
					Do you inform workers of the policy at the time of hire or adoption of the policy?				
					Do your contracts with contractors or contracting agencies require comparable grievance procedures?				
				6.2.2	Employment contract				
					If you hire full-time workers please answer the following questions:				
					Do you provide workers with a written agreement (e.g., employment contract) describing the terms of hire?				
					Do the terms of hire comply with local, state, and federal labor contract laws?				
					Do your contracts with contractors or contracting agencies require written agreements describing terms of hire?				
				6.2.3	Workplace Improvements				

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	SOCIO-ECONOMIC WELLBEING	Yes	No / PC	N/A	Evidence for Compliance
					Do you provide opportunities for employees to make suggestions for workplace improvements?				
				6.2.4	Freedom of Association				
					If you hire full-time workers, do you respect the right of workers to associate freely in the workplace and, if desired, organize among themselves to negotiate working conditions?				
				6.3	Environment, Health, and Safety (EHS)				
				6.3.1	Compliance with Laws and Regulations				
					Do you maintain documentation of compliance with all federal, state and local occupational health and safety laws and regulations? Please provide documentation.				
					Do your contracts with contractors or contracting agencies require compliance with OSHA and applicable federal and state health and safety laws?				
				6.3.2	Training				
					If you hire workers please answer the following questions:				
					Do you keep records of training for health and safety in the workplace?				
					Do all employees, including seasonal employees, receive health and safety information in a language they understand?				
					Do all full time employees receive health and safety training and get updated training at least every 5 years?				
					Do all employees using potentially dangerous chemicals and machinery receive appropriate training?				
					Are supervisors trained in emergency procedures and provided information about who to contact in case of emergency and location of emergency kits?				
					Do your contracts with contractors or contracting agencies require comparable training?				
				6.3.3	Hazardous Materials Protection				
					Do you provide employees handling highly toxic chemicals with adequate protective clothing, appropriate safety equipment, and filtered air respirator systems and/or positive pressure cabs?				
					Do your contracts with contractors or contracting agencies require comparable protective equipment and clothing for the use of hazardous materials?				
				6.3.4	Accidents and Injuries				
					Do you ensure that employees are prepared to handle injuries and chemical spills?				

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	SOCIO-ECONOMIC WELLBEING	Yes	No / PC	N/A	Evidence for Compliance
					Do employees have access to well-stocked first aid kit at each work site?				
					Are employees trained in emergency response procedures?				
					Do you maintain procedures, materials, and training to address spills of hazardous materials, appropriate to the size of operation?				
				6.3.5	Sanitation				
					Are workers provided clean drinking water and sanitation devices?				
					Do your contracts with contractors or contracting agencies require assurances to provide workers with clean drinking water and access to sanitation?				
				6.3.6	Insurance against Workplace Injury				
					Do you provide workers compensation and disability insurance for all full time employees?				
					Do your contracts with contractors or contracting agencies require the purchase of workman's compensation insurance?				

Other Comments

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	LEGALITY	Yes	No / PC	N/A	Evidence for Compliance
				7.1	Knowledge and Compliance				
				7.1.1	Knowledge of Laws				
					Are you, your employees, and relevant contractors able to demonstrate working level awareness and knowledge of the laws, ordinances, and regulations that apply to your ownership/leasehold and operation?				
				7.1.2	Ensuring Compliance				
					Do you have a program or processes in place to ensure compliance with applicable laws, ordinances, and regulations?				

Other Comments

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	TRANSPARENCY	Yes	No / PC	N/A	Evidence for Compliance
				8.1	Public Access				
				8.1.1	Public Transparency				
					Do you promote transparency by allowing the Council to release summary certification audit reports that do not contain any proprietary data to the public upon request?				

Other Comments

Producer				CSBP Standard Nomenclature		Auditor			
Yes	No / PC	N/A	Supporting Document (file name)	Criterion / Indicator	CONTINUOUS IMPROVEMENT	Yes	No / PC	N/A	Evidence for Compliance
				9.1	Compliance				
				9.1.1	Participant Compliance				
					Can you demonstrate compliance with changes to the standard within the specified compliance period? (If applicable.)				
				9.2	Review and Improvements				
				9.2.1	Standard Review				
					Will you/have you provided feedback about and engaged with the CSBP Standard?				
				9.2.2	Improve Performance				
					Can you demonstrate compliance with the time table of the IRMP?				
					Have you addressed nonconformity issues with a specified timeframe? (when applicable)				
				9.2.3	Good Agricultural Practices (GAP)				
					Do you exercise care in the storage of agricultural chemicals?				
					Do you exercise care in the storage of fertilizers and manure?				
					Can you demonstrate that your farm uses integrated pest and disease management plan?				
					Can you demonstrate that your usage of agricultural chemicals and germplasm (seeds) is used in accordance with federal, state, and local laws and treaty obligations?				

Other Comments

Farm Name:	
Producer Name:	
City, State:	
Date:	

Principle Area	Applicable Questions	Score
Integrated Resource Management Plan	6	✓ 0%
Soil	11	✓ 0%
Biological Diversity	19	✓ 0%
Water	41	✓ 0%
Air Quality-Emissions	12	✓ 0%
Socioeconomic	33	✓ 0%
Legality	2	✓ 0%
Transparency	1	✓ 0%
Continuous Improvement	8	✓ 0%
Total	133	✓ 0%

Indicator	Description	Yes	No	N/A	No. of Applicable Questions	Score
Integrated Resource Management Plan						0%
1.1.1	Baseline Information	0	0	0	1	0% ✓
1.2.1	Establish objectives	0	0	0	1	0% ✓
1.3.1	Operations Planning	0	0	0	1	0% ✓
1.3.2	Monitoring and Review	0	0	0	3	0% ✓
Soil Principle						0%
2.1.1	Soil Productivity and Conservation Planning	0	0	0	3	0% ✓
2.1.2	Residue Removal	0	0	0	1	0% ✓
2.1.3	Compaction	0	0	0	3	0% ✓
2.1.4	In-Field or On-Farm Travel	0	0	0	1	0% ✓
2.1.5	Erosion	0	0	0	2	0% ✓
2.1.6	Soil carbon	0	0	0	1	0% ✓
Biological Diversity Principle						0%
3.1.1	Vegetation Types and Wildlife Habitat Planning	0	0	0	5	0% ✓
3.1.2	Important Wildlife Species and their Habitats	0	0	0	1	0% ✓
3.1.3	Rare, Threatened, and Endangered Wildlife, Communities, and Biodiversity	0	0	0	1	0% ✓
3.1.4	Control of Non-Crop Invasive Species	0	0	0	2	0% ✓
3.2.1	Invasiveness	0	0	0	4	0% ✓
3.2.2	Crop spread	0	0	0	2	0% ✓
3.3.1	Documentation of vegetation category	0	0	0	1	0% ✓
3.3.2	Lands eligible for conversion	0	0	0	1	0% ✓
3.4.1	Control Agents	0	0	0	2	0% ✓
Water Principle						0%
4.1.1	Water Quality Management Planning	0	0	0	5	0% ✓
4.1.2	Erosion and Sediment and Runoff Control	0	0	0	1	0% ✓
4.1.3	Use of Wastewater for Irrigation	0	0	0	1	0% ✓
4.1.4	Trace Elements in Biosolids	0	0	0	1	0% ✓
4.1.5	Nitrogen	0	0	0	3	0% ✓
4.1.6	Phosphorus	0	0	0	3	0% ✓
4.1.7	Pesticide Management	0	0	0	3	0% ✓
4.1.8	Pesticide Use	0	0	0	2	0% ✓
4.1.9	Waste Disposal	0	0	0	1	0% ✓
4.2.1	Irrigation Plan	0	0	0	5	0% ✓
4.2.2	Legal Compliance	0	0	0	1	0% ✓
4.2.3	Preventing Depletion	0	0	0	2	0% ✓
4.2.4	Use Rights	0	0	0	1	0% ✓
4.2.5	Irrigation/Salinity	0	0	0	2	0% ✓
4.2.6	Maximum Water Use per Acre	0	0	0	3	0% ✓
4.3.1	Aquatic Ecosystem Management Plan	0	0	0	2	0% ✓
4.3.2	Steam Flow	0	0	0	1	0% ✓
4.3.3	Steam Temperature	0	0	0	1	0% ✓
4.3.4	Hypoxia	0	0	0	1	0% ✓
4.3.5	Wetlands	0	0	0	2	0% ✓
Air Quality and Emissions Principle						0%
5.1.1	Yield Data	0	0	0	1	0% ✓
5.1.2	Production Inputs	0	0	0	1	0% ✓
5.1.3	Planting and Tillage	0	0	0	3	0% ✓
5.1.4	Soil Carbon and Organic Matter	0	0	0	1	0% ✓
5.1.5	Harvesting, Collection, Handling, Processing, and Storage	0	0	0	3	0% ✓
5.1.6	Transportation	0	0	0	3	0% ✓
Socioeconomic Principle						0%
6.1.1	Fair Labor Standards Act	0	0	0	7	0% ✓
6.2.1	Grievance procedures	0	0	0	3	0% ✓
6.2.2	Employment contract	0	0	0	3	0% ✓
6.2.3	Workplace Improvements	0	0	0	1	0% ✓
6.2.4	Freedom of Association	0	0	0	1	0% ✓
6.3.1	Compliance with Laws and Regulations	0	0	0	2	0% ✓

Indicator	Description	Yes	No	N/A	No. of Applicable Questions	Score	
6.3.2	Training	0	0	0	6	0%	✓
6.3.3	Hazardous Materials Protection	0	0	0	2	0%	✓
6.3.4	Accidents and Injuries	0	0	0	4	0%	✓
6.3.5	Sanitation	0	0	0	2	0%	✓
6.3.6	Insurance against Workplace Injury	0	0	0	2	0%	✓
Legality Principle						0%	
7.1.1	Knowledge of Laws	0	0	0	1	0%	✓
7.1.2	Ensuring Compliance	0	0	0	1	0%	✓
Transparency Principle						0%	
8.1.1	Public Transparency	0	0	0	1	0%	✓
Continuous Improvement Principle						0%	
9.1.1	Participant Compliance	0	0	0	1	0%	✓
9.2.1	Standard Review	0	0	0	1	0%	✓
9.2.2	Improve Performance	0	0	0	2	0%	✓
9.2.3	Good Agricultural Practices (GAP)	0	0	0	4	0%	✓

Appendix C
Chain of Custody

COUNCIL ON SUSTAINABLE
BIOMASS PRODUCTION



CHAIN OF CUSTODY STANDARD

September 19, 2012

Version 1.0



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1 INTRODUCTION

Chain of Custody is an accounting process that tracks the path taken by CSBP-certified materials through the different stages of production including processing, transformation, distribution, and consumption. The management and accounting of CSBP-certified materials is designed to provide a credible guarantee to consumers that CSBP-certified materials originated from sustainably cultivated agricultural systems.

The Chain of Custody standard is applicable for any organization handling CSBP-certified material after it leaves the operation where the biomass is grown. For biomass producers applying for CSBP certification, the Chain of Custody standard only applies to the sale of the CSBP-certified material (see Section 3). The remainder of the Chain of Custody standard is applicable to any organization that utilizes CSBP-certified material as a production input.

2 SCOPE

This standard specifies the management and production requirements for Chain of Custody control with respect to sourcing and sale of CSBP-certified materials. The standard is applicable for any change of ownership to a user intending to make a CSBP claim.

Section 3 defines and addresses the requirements for the initial sale of CSBP-certified materials from a producer that has applied for and achieved CSBP certification.

Section 4 of the standard defines and addresses the basic elements of a Chain of Custody management system:

- Quality Management: responsibilities, personnel, training, and procedures
- Management Control: inspection, control and technical facilities
- Records of Management: record keeping and retention time

Section 5 and Section 6 of the standard specify the requirements under each system, that if successfully implemented, allow organizations to sell material as CSBP 100% or CSBP Mixed. These two claims adhere to two optional approaches for chain of custody, namely physical separation and percentage-based methods. The standard defines and addresses the basic elements of each of these approaches:

- Material Sourcing: input specifications and supplier verification
- Material Receipt and Storage: identification at delivery and segregation of certified material
- Material Processing: material balances and conversion factors
- Material Sales and Delivery: identification of certified products and documentation

This standard specifies the minimum management system requirements for the implementation and management of the Chain of Custody process. An organization's quality (ISO 9001:2008) or environmental (ISO 14001:2004) management system can be used to meet the minimum requirements for the management system defined in section 4 and to accommodate requirements for the certification process defined in sections 5 or 6.

Section 6 defines and addresses the appropriate use of and documentation for outsourcing within the Chain of Custody.

3 PRODUCER SALES

3.1 MATERIAL SALES AND DELIVERY

3.1.1 IDENTIFICATION OF CERTIFIED PRODUCTS

- 3.1.1.1 At the point of sale or transfer of the certified products to another entity, the producer provides the consumer with a document verifying conformance with the CSBP Standard and clear identification of the certified products. This can be in the form of, but not limited to, an invoice, bill of lading, shipping document, letter, or other forms of communications between the organization and the consumer.

3.1.2 DOCUMENTATION

- 3.1.2.1 The producer ensures that documentation of the certified products clearly states at least the following information:
- a. producer's identification and contact details;
 - b. consumer's identification and contact details;
 - c. description of the product

- d. quantity of delivery;
- e. date of delivery / delivery period / accounting period;
- f. CSBP claim; and
- g. if separate delivery documents are issued, information sufficient to link the sale and related delivery documentation to each other.

3.1.2.2 The producer verifies the accuracy of the delivered documentation.

4 MINIMUM MANAGEMENT SYSTEM REQUIREMENTS

The organization operates a management system in accordance with the following elements of this standard, which ensure correct implementation and maintenance of the chain of custody process. The management system is appropriate to the type, range, and volume of work performed.

An organization's quality (ISO 9001:2008) or environmental (ISO 14001:2004) management system can be used to meet the minimum requirements for the management system defined in this standard.

4.1 QUALITY MANAGEMENT

4.1.1 RESPONSIBILITIES AND AUTHORITIES

- 4.1.1.1 The organization's top management defines and documents its commitment to implement and maintain the chain of custody requirements, and make this available to its personnel, suppliers, consumers, and other interested parties.
- 4.1.1.2 The organization's top management appoints a member of the management who, irrespective of other responsibilities, has overall responsibility and authority for the chain of custody.
- 4.1.1.3 The organization's top management carries out a regular periodic review of the chain of custody and its compliance with the requirements of this standard.

4.1.2 PERSONNEL

- 4.1.2.1 The organization identifies personnel performing work affecting the implementation and maintenance of the chain of custody, and establishes and sets responsibilities and authorities relating to the Chain of Custody process:
 - a. raw material procurement and identification of the origin;
 - b. product processing;
 - c. product sale;
 - d. record keeping; and
 - e. internal audits and non-conformity control.
- 4.1.2.2 All relevant staff demonstrates awareness of the organization's procedures and competence in implementing the organization's Chain of Custody management system.
- 4.1.2.3 The organization ensures that all personnel performing work affecting the implementation and maintenance of the Chain of Custody are competent on the basis of appropriate training, education, skills, and experience.

4.1.3 TRAINING

- 4.1.3.1 The organization establishes and implements a training plan according to the qualifications and/or training measures defined for each procedure.

4.1.4 PROCEDURES

- 4.1.4.1 The organization's procedures for the Chain of Custody are documented and include at least the following elements:
 - a. description of the raw material flow within the production process;
 - b. organizational structure, responsibilities, and authorities relating to Chain of Custody; and
 - c. procedures for the Chain of Custody process covering all requirements of this standard.

4.2 MANAGEMENT CONTROL

4.2.1 INSPECTION

4.2.1.1 The organization conducts internal audits at intervals of no more than one year covering all requirements of this standard, and establishes corrective and preventive measures if required.

4.2.2 CONTROL

4.2.2.1 The report from the internal audit is reviewed by the organization's top management at least annually.

4.2.3 TECHNICAL FACILITIES

4.2.3.1 The organization identifies, provides, and maintains the infrastructure and technical facilities needed for effective implementation and maintenance of the organization's Chain of Custody to meet the requirements of this standard.

4.3 RECORDS OF MANAGEMENT

4.3.1 RECORD KEEPING

4.3.1.1 The organization maintains complete and up-to-date records covering all applicable requirements of this standard.

4.3.2.1 The organization establishes and maintains records to provide evidence it has conformed to the requirements of this standard and its Chain of Custody procedures are effective and efficient. The organization keeps at least the following:

- a. records of all suppliers of CSBP-certified material, including information to confirm requirements at the supplier level are met;
- b. records of all purchased certified material, including information on its origin;
- c. records that demonstrate how the certification percentage for each production batch was calculated;
- d. records of all biomass sold and their claimed origin including, as applicable, records of movements through the Chain of Custody;
- e. records of internal audits, non-conformities which occurred, and corrective actions taken;
- f. records of training provided to staff in relation to implementation of this standard; and
- g. records of top management's periodic review of compliance with chain of custody requirements.

4.3.2 RETENTION TIME

4.3.2.1 Retention time for all records and reports, including purchase and sales documents, training records, production records, volume summaries, and trademark approvals are specified by the organization and are held at least three (3) years unless stated otherwise by law.

5 REQUIREMENTS FOR CHAIN OF CUSTODY PROCESS – PHYSICAL SEPARATION METHOD

5.1 MATERIAL SOURCING

5.1.1 INPUT SPECIFICATIONS

5.1.1.1 The organization adopts and uses the definitions and categorizations of input materials as specified by this standard

5.1.1.2 The organization applying the physical separation method ensures that the CSBP-certified material is separated and clearly identifiable at all stages of the production or trading process.

5.1.2 SUPPLIER VERIFICATION

5.1.2.1 The organization ensures materials meet appropriate criteria for certification and obtains confirmation from suppliers of CSBP-certified materials that the criteria have been met.

5.2 MATERIAL RECEIPT AND STORAGE

5.2.1 IDENTIFICATION AT DELIVERY

5.2.1.1 The organization identifies and verifies the category of the origin of all procured materials. Documents associated with the delivery of materials include at least:

- a. supplier identification;
- b. quantity of delivery;
- c. date of delivery / delivery period / accounting period;
- d. category of origin (i.e. percentage from CSBP 100% and from CSBP Mixed); and
- e. The supplier's chain of custody number, if applicable.

The information can be documented in the form of, but not limited to, an invoice, bill of lading, shipping documents, letter, or other forms of communications between the organization and the consumer.

- 5.2.1.2 On receipt of material or prior to further use or processing, the organization checks the supplier's invoice and supporting documentation to ensure the following:
- the supplied material quantities and quality are in compliance with the supplied documentation;
 - the material category and, if applicable, the associated percentages or credit claim is stated for each product item or for the total products; and
 - the supplier's CSBP Chain of Custody is quoted for material supplied with CSBP claims.

5.2.2 SEGREGATION OF THE CERTIFIED BIOMASS

- 5.2.2.1 CSBP-certified material remains clearly identifiable throughout the whole production, trading, and storage process. This is achieved by:
- physical separation in terms of production and storage space or
 - physical separation in terms of time or
 - permanent identification of the CSBP certified material.

5.3 MATERIAL PROCESSING

5.3.1 MATERIAL BALANCES

- 5.3.1.1 The organization establishes a material accounting record to ensure that at all times the quantities produced and/or sold with CSBP claims are compatible with the quantities of appropriate inputs with CSBP claims. The accounting record includes at least the following:

For inputs and outputs

- invoice references;
- quantities (by volume or by weight)

For inputs

- material category and, if applicable, percentage claim or credit claim;

For outputs

- CSBP claim;
- information to identify the product item in invoices; and
- applicable claim period or job order.

- 5.3.1.2 The organization prepares annual summaries (by volume or by weight) providing quantitative information for each material category received/used and product type produced/sold as follows:
- input received;
 - inputs used for production (if applicable);
 - inputs still in stock;
 - outputs still in stock; and
 - outputs sold.

5.3.2 CONVERSION FACTORS

- 5.3.2.1 The organization identifies the main processing steps involving a change of material volume or weight and specifies the conversion factor(s) for each processing step or, if not feasible, for the total processing steps.
- 5.3.2.2 The organization specifies the methodology for calculating the conversion factor(s) and ensures that conversion factors are kept up to date.

5.4 MATERIAL SALES AND DELIVERY

5.4.1 IDENTIFICATION OF CERTIFIED PRODUCTS

- 5.4.1.1 At the point of sale or transfer of the certified products to another entity, the organization provides the consumer with a document verifying conformance with the chain of custody requirements and clear identification of the certified products. This can be in the form of, but not limited to, an invoice, bill of lading, shipping document, letter, or other forms of communications between the organization and the consumer.

5.4.2 DOCUMENTATION

- 5.4.2.1 The organization ensures that documentation of the certified products clearly states at least the following information:
- a. organization's identification and contact details;
 - b. consumer's identification and contact details;
 - c. description of the product
 - d. quantity of delivery;
 - e. date of delivery / delivery period / accounting period;
 - f. CSBP claim;
 - g. the organization's chain of custody number; and
 - h. if separate delivery documents are issued, information sufficient to link the sale and related delivery documentation to each other.
- 5.4.2.2 The organization verifies the accuracy of the delivered documentation.

6 REQUIREMENTS FOR CHAIN OF CUSTODY PROCESS – PERCENTAGE-BASED METHOD

6.1 MATERIAL SOURCING

6.1.1 INPUT SPECIFICATIONS

- 6.1.1.1 The organization adopts and uses the definitions and categorizations of input materials as specified by this standard
- 6.1.1.2 The percentage-based method applies to organizations with facilities where CSBP-certified material is mixed with non-CSBP-certified material and the CSBP-certified material cannot be identified in the output products
- 6.1.1.3 The organization implements the requirements for the chain of custody process of this standard for the specific production batch.
- 6.1.1.4 The organization identifies its production batch(es) based on the following criteria
- a. material included in the products covered by the production batch;
 - b. production site at which the products covered by the production batch has been produced; and
 - c. time period over which the products covered by the production batch have been produced for sold/transferred.
- 6.1.1.5 The organization identifies an entity within the organization for which the production batch is defined and only products produced or controlled by that entity are included within the production batch.
- Note the entity may be a standalone manufacturing facility, a contractor with multiple harvest sites, a trader or distributor with multiple suppliers, a remanufacturing facility supplied by multiple primary manufacturers, or a centralized sales department within an organization with responsibilities for multiple manufacturing units.
- 6.1.1.6 For credibility purposes of the production batch, the maximum time period is three months.
- 6.1.1.7 The organization uses a batch identifier to identify all products included in the production batch covered by the Chain of Custody so it is possible to determine the production batch to which the products belong. The batch identifier can be a unique number or a name that all products within the production batch belong to.

6.1.2 SUPPLIER VERIFICATION

- 6.1.2.1 The organization ensures materials meet appropriate criteria for CSBP-certified materials and obtains confirmation from suppliers of CSBP-certified materials that the criteria have been met.

6.2 MATERIAL RECEIPT AND STORAGE

6.2.1 IDENTIFICATION AT DELIVERY

- 6.2.1.1 The organization identifies and verifies the category of the origin of all procured materials. Documents associated with the delivery of materials include at least:
- a. supplier identification;
 - b. quantity of delivery;
 - c. date of delivery / delivery period / accounting period;
 - d. category of origin (i.e. percentage from CSBP 100% and from CSBP Mixed); and
 - e. The supplier's chain of custody number, if applicable.

The information can be documented in the form of, but not limited to, an invoice, bill of lading, shipping documents, letter, or other forms of communications between the organization and the consumer.

- 6.2.1.2 On receipt of material or prior to further use or processing, the organization checks the supplier invoice and supporting documentation to ensure the following:
- the supplied material quantities and quality are in compliance with the supplied documentation;
 - the material category and, if applicable, the associated percentages or credit claim is stated for each product item or for the total products; and
 - the supplier's CSBP Chain of Custody is quoted for material supplied with CSBP claims.

6.3 MATERIAL PROCESSING

6.3.1 MATERIAL BALANCES – PERCENTAGE SYSTEM

- 6.3.1.1 The organization calculates the certification percentage separately for each production batch according to the following formula:

$$P_c = \frac{V_c}{V_c + V_o} * 100$$

P_c = Certification percentage

V_c = Certified material

V_o = Other raw material (certified sourcing)

- 6.3.1.2 The organization calculates the certification percentage based on a single measurement unit used for all material covered by the calculation.
- 6.3.1.3 If the procured material includes only a proportion of certified content, then only the quantity corresponding to the actual certification percentage claimed by the supplier can enter the calculation formula as certified content. The rest of that material enters the calculation as non-certified material.
- 6.3.1.4 The organization applying the simple certification percentage bases the calculation of P_c (the certification percentage) for each production batch on the figures for V_c (certified material) and V_o (other non-certified material) for that specific production batch. As a result, it is necessary for the organization applying this method to know the percentage of certified content before any product of the production batch is sold or transferred.
- 6.3.1.5 The organization applying the rolling average certification percentage bases the calculation of P_c (the certification percentage) for each production batch on the figures for V_c (certified material) and V_o (other non-certified material) for a specified number of prior production batches (excluding the current production batch). The time period covered by the specified number of prior production batches does not exceed 12 months.

6.3.2 MATERIAL BALANCES – CREDIT SYSTEM

- 6.3.2.1 The organization applying volume credit recognizes volume credits in the single measurement unit used for all material inputs. Volume credits are transferred to a volume credit account based on the amount of certified raw material used in each production batch. The amount of material considered certified can be calculated by using either the simple average or rolling average method.
- 6.3.2.2 The volume credit is distributed to the output products from the volume credit account in a way that all products are sold as certified are sold as 100% certified. The amount of volume credit required for each output unit is based on the specific ratio of input material to output product unit for that specific product.
- 6.3.2.3 The organization can cumulate the volume credit by creating a credit account, which can be used for the next production batches.
- 6.3.2.4 The total quantity of credits cumulated at the credit account cannot exceed the sum of credits entered into the credit account during the last 12 months.

6.3.3 CONVERSION FACTORS

- 6.3.3.1 The organization identifies the main processing steps involving a change of material volume or weight and specifies the conversion factor(s) for each processing step or, if not feasible, for the total processing steps.
- 6.3.3.2 The organization specifies the methodology for calculating the conversion factor(s) and ensures that conversion factors are kept up to date.

6.4 MATERIAL SALES AND DELIVERY

6.4.1 IDENTIFICATION OF CERTIFIED PRODUCTS

6.4.1.1 At the point of sale or transfer of the certified products to another entity, the organization provides the consumer with a document verifying conformance with the chain of custody requirements and clear identification of the certified products. This can be in the form of, but not limited to, an invoice, bill of lading, shipping document, letter, or other forms of communications between the organization and the consumer.

6.4.2 DOCUMENTATION

6.4.2.1 The organization ensures that documentation of the certified products clearly states at least the following information:

- a. organization's identification and contact details;
- b. consumer's identification and contact details;
- c. description of the product;
- d. quantity of delivery;
- e. date of delivery / delivery period / accounting period;
- f. CSBP claim;
- g. the organization's chain of custody number; and
- h. if separate delivery documents are issued, information sufficient to link the sale and related delivery documentation to each other.

6.4.2.2 The organization verifies the accuracy of the delivered documentation.

7 OUTSOURCING

7.1 SCOPE

7.1.1.1 Organizations that outsource work on a flexible basis to any one of a number of potential contractors may apply for inclusion of the outsourced process within the scope of the CSBP Chain of Custody certificate.

7.2 PROCESS

7.2.1 PRE-CONDITIONS FOR OUTSOURCING

7.2.1.1 Organizations which wish to include outsourcing within the scope of their CSBP chain of custody certificate ensure the following:

- a. the organization has legal ownership of all input material to be included in outsourced processes;
- b. the organization does not relinquish legal ownership of the materials during outsourced processing;
- c. the organization has an agreement or contract covering the outsourced process with each contractor. This agreement or contract includes a clause reserving the right of the certified auditors to audit the outsourcing contractor or operation;
- d. the organization has a documented control system with explicit procedures for the outsourced process which are shared with the relevant contractor.

Note: where the outsourced process would not usually involve the physical re-possession of the material following outsourced processing, the organization is not required to re-take physical possession.

7.2.2 RECORD KEEPING

7.2.2.1 The organization's control system for the outsourced process ensures that:

- a. the material used for the production of CSBP-certified material can be tracked and controlled and cannot be mixed or contaminated with any other material during outsourced processing;
- b. the contractor keeps records of inputs, outputs, and delivery documentation associated with all CSBP-certified material which is processed or produced under the outsourcing contract or agreement.

7.2.2.2 The organization records the names and contact details of all contractors used for the processing or production of the CSBP certified materials.

7.2.2.3 The organization issues the final invoice for the processed or produced CSBP-certified material following outsourcing. The invoice states the certificate holder's Chain of Custody certificate number.

7.2.3 PROMOTION

7.2.3.1 The organization ensures that the contractor does not use the CSBP Trademarks for promotional use.

7.2.4 PRECLUSION OF SUBCONTRACTING

7.2.4.1 The organization ensures that contractors do not themselves outsource processing.

Appendix D

Life Cycle Associates Final Report



Greenhouse Gas Modeling for Default Bioenergy Pathways Based on Herbaceous Agricultural Feedstocks

LCA. 6065.61.2012
September 2012

Prepared by:
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Brent Riffel

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Terms and Abbreviations

ARB	California Air Resources Board
Btu	British thermal unit
CA	California
CI	Carbon Intensity
Denatured	Fuel denatured with gasoline
EPA	Environmental Protection Agency
GHG	Greenhouse gas
GREET	Greenhouse gas, Regulated Emissions and Energy Use in Transportation (Argonne National Laboratory’s well-to-wheels model)
GW	Global warming intensity
GWP	Global warming potential
IPCC	Intergovernmental Panel on Climate Change
J	Joule
LCA	Life cycle assessment
LCFS	Low Carbon Fuel Standard
LCI	Life cycle inventory
LCM	Life Cycle Module
LHV	Lower heating value
MOUSE	Matrix Organization Using Specific Energy
MDT	Million dry tons
MGY	Million gallons per year
MJ	Mega joule
ml	Milliliters
mmBtu	Million Btu
NG	Natural gas
NREL	National Renewable Energy Laboratory
RBOB	Reformulated gasoline blendstock for oxygen blending
RFG	Reformulated gasoline
RFS	Renewable Fuel Standard (U.S.)
TTW	Tank-to-wheels
ULSD	Ultra low sulfur diesel
U.S.	United States
WTT	Well-to-tank
WTW	Well-to-wheels



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Summary

This study examines the GHG emissions impact associated with agricultural biomass pathways to ethanol or electric power. The result of this study is a regional greenhouse gas (GHG) model for four bioenergy pathways based on agricultural feedstocks.

- Corn stover in the mid-west U.S. for ethanol
- Switchgrass in the southeastern U.S. for ethanol
- Switchgrass in the upper mid-west U.S. for electricity
- Miscanthus from the southeastern U.S. for electricity

GHG emissions are reported on a life cycle basis. The carbon intensity is a measure of the total (direct + upstream fuel cycle) greenhouse gas (GHG) emissions associated with fuel production across the entire fuel pathway life cycle. The scope of the emission calculations are divided into two phases. The first feedstock or producer phase includes crop establishment, farming, fertilizer production, field emissions, harvesting, baling, and transport to a biorefinery. The fuel production of consumer phase includes biorefinery operation and fuel transport. Carbon emissions from the vehicle are treated as neutral since net field carbon emissions are taken into account.

Four regional pathways using input from the DAYCENT model (developed by the Colorado State University Natural Resource Ecology Laboratory) determine agricultural GHG fluxes (field emissions) and the GREET Model provides data for direct and upstream fuel cycle emissions.

Life Cycle Model

Farming inputs based on data collection proposed for the CSBP producer standard are combined with emission factors for direct and upstream fuel cycle emission factors to determine GHG emissions on a life cycle basis. GHG calculations are based on the GREET model (Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation) model developed by Argonne National Laboratory (ANL)). The model provides upstream fuel cycle data and a framework for the calculation of life cycle emissions. GREET_1_2012 is the spreadsheet version of the GREET model available at this time.

Farmer data based on a survey input sheet and field emissions based on the DAYCENT model are converted to per unit of biomass values that are consistent with the GREET model inputs. The model calculates the upstream fuel cycle and direct emissions for farming equipment, fertilizer production, transport, and other processing steps. DAYCENT predictions provide an alternative to the IPCC Tier 1 method for N₂O calculations in GREET.

The calculations are implemented both in GREET and a life cycle module (LCM) that allows for the disaggregation of results. The approach follows the following steps:



- Convert farmer data to GREET inputs
- Convert DAYCENT data to GREET inputs
- Calculate life cycle data from GREET in life cycle module (LCM)
- Calculate life cycle results

Results

The results for feedstock production for switch grass, miscanthus, and corn stover are shown in Figure S.1. These are based on default GREET assumptions for farming operations and DAYCENT predictions for nitrogen fertilizer and field emissions.

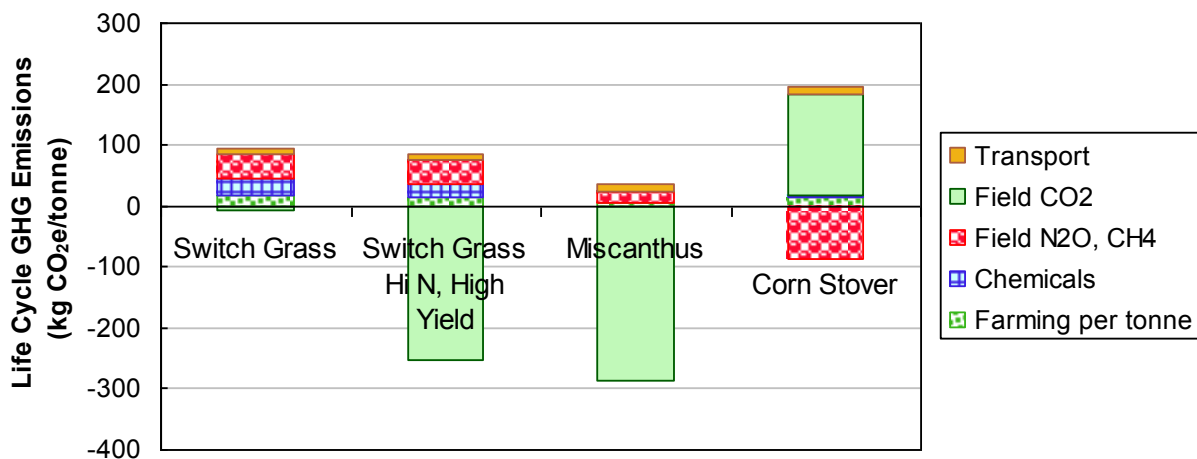


Figure S.1. Life Cycle GHG Emissions for Crop Production (kg CO₂e/tonne biomass)

The results are dominated by the field emissions of N₂O, CH₄, and the carbon storage or release represented as CO₂ field emissions. Note the wide range in results based on different fertilizer application scenarios for switchgrass. High yield scenarios for switchgrass resulted in much higher carbon storage than low yield scenarios. The N₂O per tonne of switchgrass was about the same for both scenarios. Miscanthus does not require nitrogen fertilizer, thus its N₂O emissions are lower.

The corn stover case examined here was based on the conversion of intensely farmed corn land to corn farming with stover collection. The DAYCENT scenarios showed carbon storage in the base case for corn farming. Removal of stover reduced the carbon storage, thus the scenario resulted in a net release of CO₂ from the field. The set of DAYCENT assumptions from Colorado State University reflected corn farming on relatively depleted soil. The analysis showed a net soil carbon storage with conventional corn farming. With a switch to reduced tillage and stover removal carbon was still stored in the soil but at a reduced level.



The results per tonne of biomass provide the basis for calculating life cycle emissions for ethanol or electric power pathways.

Conclusions

The GHG analysis tools developed here allow biomass producers to track their energy inputs and emissions on a life cycle basis. The collection of farm level fertilizer and tractor activity allow for the calculation of GHG emissions associated with the crop and the continued improvement in monitoring inputs and the reduction in emissions over time.

The prediction of field emissions from DAYCENT modeling is highly uncertain since model inputs are not tied to actual farm level activity. For example the extent of nitrogen application results in a swing 350 kg CO₂e/tonne swing in GHG emissions for switch grass. Other means of assessing field emissions such as monitoring of soil carbon index could provide a means to monitor progress in soil carbon storage.



1. Introduction

GHG emissions associated with energy use are a significant concern with respect to climate change. Biomass resources are available for use as energy feedstocks to the transportation sector and can be converted into either liquid fuel burned in internal combustion engines or fuel for power generation facilities. The use of biomass for these applications requires little petroleum inputs. However, the life cycle of biofuel pathways results in GHG and criteria pollutant emissions. Thus, understanding the emissions associated with feedstocks and biofuel conversion is an essential part of understanding the sustainability of biomass use.

1.1 Background

Recently, agriculture and forestry have emerged as potential mechanisms to meet U.S. energy demands and to address resource and environmental concerns through biomass-based energy. The potential benefits, such as increased domestic energy security, reduced GHG emissions, and increased support for rural and agricultural economic development, have focused the attention of industry, policymakers, and the environmental and scientific communities on the development of biomass-based energy. Since agriculture, forestry, and energy production all have significant impacts on resources and the environment, developing sustainable production methods and consumption patterns in each of these sectors is critical.

“Green energy” mandates and incentives have received increased attention on the manner and means by which biomass-based fuel and power is generated. In light of these concerns and preceding the anticipated increase in demand for bioenergy production, biomass growers, energy producers, germ plasm providers, academics, and the agricultural, forestry, and environmental communities joined together in 2007 to establish the CSBP to encourage adoption of sustainable methods of biomass and bioenergy production. The CSBP’s work is guided by a simple principle:

“To ensure that in the United States biomass feedstocks and bioenergy (both fuel and electricity) are produced in a sustainable manner, balancing economic, environmental and social imperatives.”

Beginning in 2007, CSBP members have worked to develop a provisional voluntary standard for sustainable biomass production. The provisional standard was field tested first in 2010 and will continue to be field tested in preparation for the release of a final standard in June 2012. CSBP members plan to have the full standard (agriculture, forestry, and bioenergy components) ready for certification by early 2013. A current draft of the agricultural standard is available online (CSBP 2012).

CSBP is supported by member contributions and grants from the US Department of Energy and US Department of Agriculture, including a Conservation Innovation Grant awarded by the Natural Resources Conservation Service.



1.2 Prior Switchgrass and Stover Modeling

Stover and switchgrass pathways are examined in the GREET model as well as the regulatory impact analysis under the RFS2.

GREET provides the following calculation approach:

- Life cycle emissions from agriculture based on Btu/ton data
- Life cycle emissions from fertilizers and pesticides based on g/ton data
- Estimate N₂O at 1.3% of fertilizer + 1.25 or 1.3% of crop residue (zero for grasses)
- Transport emissions based on cargo capacity, fuel economy and diesel life cycle data
- Biorefinery and power plant emissions represent combustion emissions minus biogenic CO₂. Chemical and enzyme inputs are included in 2012 version of GREET_1
- Fuel distribution based on distance, fuel economy, and carbon capacity
- Vehicle emissions include CO₂ but these are subtracted from the feedstock production phase to reflect a carbon neutral treatment.

The EPA RFS2 consequential LCA approach differs from the GREET attributional LCA approach primarily in the treatment of farming inputs and land emissions. EPA estimated the marginal emissions associated with fertilizers, field emissions, and land use emissions. In the case of switchgrass, indirect land use emissions are included in the EPA analysis. GREET defaults reflect the activity on the land used to produce the biomass for bioenergy production. The same attributional approach is applied in this study.

1.3 Feedstock Options

Many types of biomass are suitable as feedstocks for energy production. These include purpose grown energy crops, residues, waste materials and other resources.

Grasses are a broad source of cellulosic biomass feedstocks. Woody material is considered more suitable for thermo-chemical conversion processes because it generally contains lower ash content than grasses. This study focuses only on grasses because these were the first class of feedstocks to be examined by the CSBP. Several types of grassy or herbaceous biomass are available as energy crops. A baseline analysis is provided for switch grass, miscanthus, and corn stover. Switch grass and corn stover inputs are based on GREET model default values. These feedstocks differ in their inputs for farming and collection and represent a range of potential life cycle impacts.

1.4 Study Contents

This study documents the analysis tools to determine the GHG emissions associated with four biomass-to-energy pathways. Section 2 describes the system boundary and study constraints. Section 3 describes the life cycle calculation approach. Section 4 describes data sources and model inputs. Section 5 describes the results. At this time the results reflect the producer or feedstock emissions. Section 6 discusses the implications of these results and makes recommendations. Appendix A provides instructions for using the model.



2. Objective, Scope, and Definition

This study provides the documentation for a GHG analysis tool for the CSBP producer standard. The purpose of the tool is to calculate GHG emissions while also addressing the reduction of inputs to achieve continued improvement, and important element of sustainability.

2.1 Objective

The objective of this study is to support the Council on Sustainable Biomass Production (CSBP) in developing a GHG modeling tool for four default bioenergy pathways based on agricultural feedstocks. The tool should account for and model GHG emissions from the initiation of feedstock production through the final production of bioelectricity and the stoichiometric combustion of biofuels. The model for these four pathways will need to be completed by April 2012 for the June 2012 release of the CSBP standard. These four pathways represent a few likely near-term bioenergy pathways that will be incorporated into the standard. More pathways will be modeled and added to the standard at a later date. CSBP expects that the model will utilize existing tools and those under development, rather than developing new models to meet the objectives.

The results are presented as the CI of each pathway, which include the life cycle GHG emissions from feedstock production to vehicle fuel combustion. The analysis is based on input parameters from GREET default values, DAYCENT model results for agricultural emissions, as well as supplemental data from other published studies.

2.2 Fuel Pathway System Boundary

The system boundary defines the scope of activities and emissions associated with a life cycle analysis. General classes of inputs and output are identified for key processing steps. The system boundary for the reference system to assure that the analysis is performed on a consistent basis. The fuel pathways considered include biomass feedstock production/collection, feedstock transport to a biorefinery, fuel blendstock production, blendstock transport to a fuel distribution terminal for blending with petroleum gasoline blending component (RBOB) or a comparable E85 blending component, finished fuel transport to a refueling station, and vehicle operation (fuel combustion). For electric power production emissions include power generation and delivery of power to the end user.

The scope of the analysis represents the same system boundary for ethanol and electric power as used by the EPA and California Air Resources Board with the exception that the government programs address indirect and consequential effects. Land use conversion in the following diagrams refers to indirect effects or the land required to grow crops that were diverted from other uses. The analysis tool in this study handles land emissions such as those associated with field clearing and annual field emissions from agricultural activity and burning.



2.2.1 Ethanol System Boundary

The processing steps for the conversion of biomass to ethanol are shown in Figure 2.1. Biomass is harvested, collected, and transported to a biorefinery. Harvesting involves establishing the crop, applying fertilizer inputs, and collecting biomass with harvesting equipment. In the case of switch grass, the biomass is typically field dried and then baled for storage and transport. Fuel processing involving the production of ethanol incorporates pretreatment and conversion to ethanol. Residue lignin is burned to generate electric power. Fuel is then transported to fueling stations for vehicle operation.

Excess power is exported to the grid. The excess power is treated as a credit using the substitution method assuming that the power is generated from biomass. The credit for co-produced power is based on the concept that an alternative use of the biomass was power production. This approach is different than that used under the EPA RFS2 and the default GREET model, where the credit is based on the U.S. electricity mix.

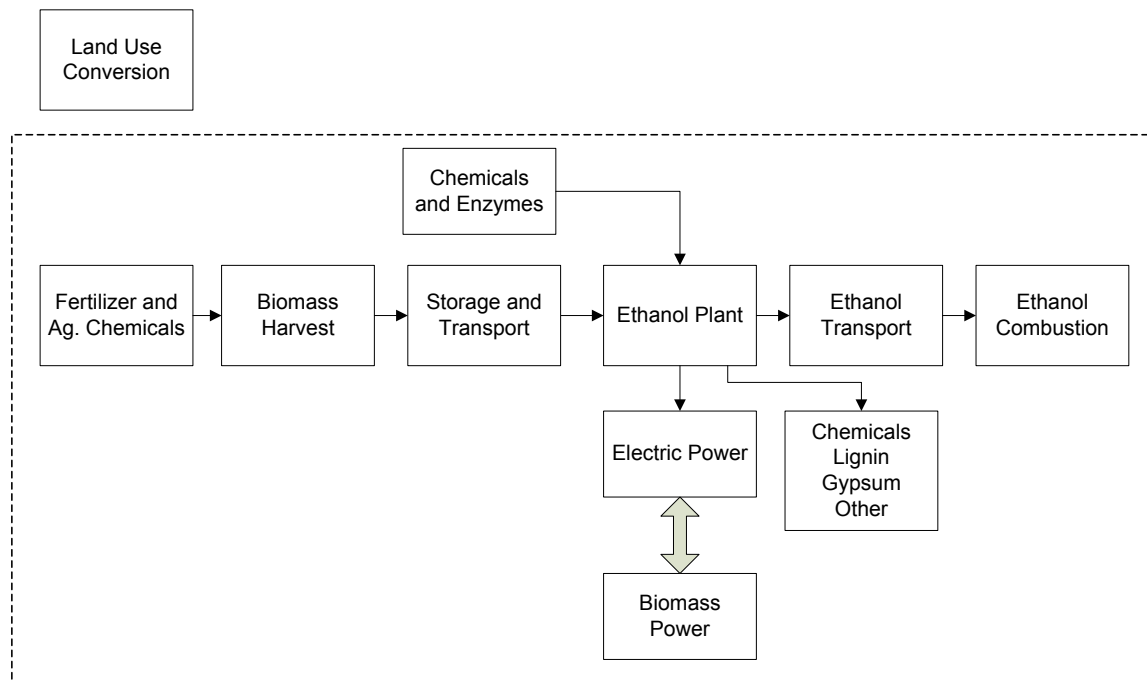


Figure 2.1. Switchgrass or Miscanthus to Cellulosic Ethanol System Boundary Diagram

Figure 2.2 shows the system boundary diagram for corn stover to ethanol. The pathway steps are the same as those for farmed grasses. The energy inputs and emissions associated with incremental changes to the corn farming pathway are assigned to corn stover. These changes include farming equipment, fertilizer inputs, and field emissions. Emissions associated with stover removal, transport, and conversion to fuel follow the same steps as the farmed grasses to ethanol pathway.



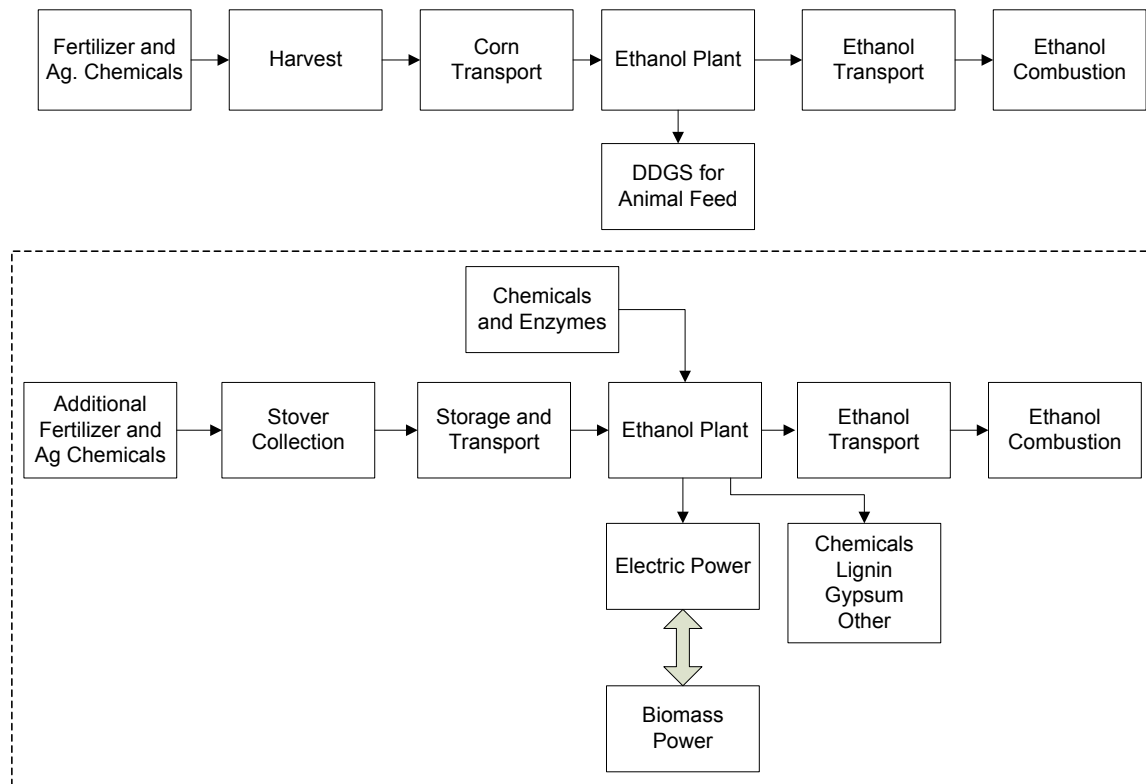


Figure 2.2. Corn Stover to Cellulosic Ethanol System Boundary Diagram

2.2.2 Power Generation System Boundary

The system boundary diagram for the switchgrass or miscanthus to electric power is shown in Figure 2.3. The accounting for the feedstock production is the same as that in the ethanol pathways per tonne of feedstock.

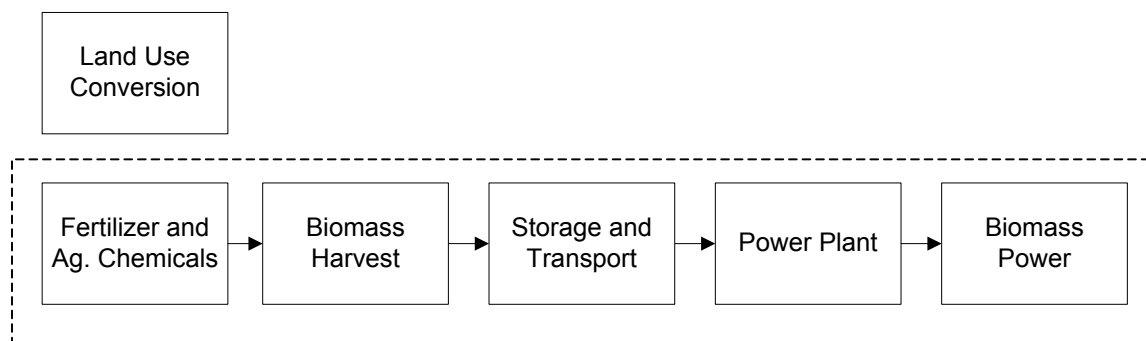


Figure 2.3. Switchgrass or Miscanthus to Electric Power System Boundary Diagram.

2.3 Scope of LCA Analysis

The scope of the analysis includes GHG emissions from fuel production to vehicle end use or power generation. The treatment of GHG emissions for each of the categories in the fuel cycle is described in the following subsections. The scope of the analysis is complete from field to



wheels or field to plug. Note that not all categories may be covered under the CSBP standard (for example transport from producers may not be part of the producer standard).

2.3.1 Farm Operation

Equipment emissions are based on the direct energy use and upstream fuel cycle emissions for farming operations from seed planting to biomass baling. . The calculations are based on the GREET model upstream factors and equipment direct emission factors.

2.3.2 Field Emissions

Field emissions include N_2O , CH_4 , and CO_2 . Net CO_2 emissions reflect a gain or loss of carbon on the agricultural land. DAYCENT model results are presented for a variety of feedstocks and geographical regions. Additional key inputs to DAYCENT are the extent of fertilizer, carbon content of the crop, and reference case emissions.

Several methods have been used to estimate these emissions including IPCC Tier 1 estimates for N_2O , DAYCENT modeling of crops, EPA's analysis under the RFS2, and soil monitoring at the farm level. Monitoring of soil carbon index could also provide a basis for predicting net CO_2 from farming.

2.3.3 Agricultural Burning

Emissions for periodic agricultural burning are included in the model. Emissions factors are based on GREET and implemented in the same manner as the burning for the Brazilian sugarcane ethanol pathway.

2.3.4 Feedstock Transport

Feedstock transport includes transport of material to the biorefinery. GHG emissions occur from the diesel truck and upstream fuel cycle emissions.

2.3.5 Biorefinery

Biorefinery emissions include the combustion of lignin residue to generate steam. Other inputs to the biorefinery are chemicals and enzymes.

2.3.6 Power Plant

Emissions from the power plant are based on the emission factors for biomass combustion. Carbon in the biomass is treated as neutral. The small amount of carbon that forms CH_4 is treated as a CO_2 credit as these emissions are counted as CH_4 .

Consumables such as limestone and ammonia are not included in the analysis at this time as they represent a small fraction of the fuel cycle and are not included in GREET.

2.3.7 Fuel Transport and Distribution

Fuel transport includes combustion emissions for truck and rail equipment. Fugitive emissions and spills also results in hydrocarbon emissions that are converted to CO_2 as well as product loss.

Electric power is moved via transmission lines. The line losses are incorporated into the analysis.



2.3.8 Vehicle

Vehicle emissions include CH₄ and N₂O from the vehicle. Carbon in fuel is treated as neutral as discussed in the following section.

2.3.9 Carbon Balance

In the case of biomass feedstock, the net carbon flux associated with the feedstock is taken into account in the form of a land use conversion (LUC) adder. These additional emissions correspond to the overall change in global carbon stocks over a 30-year time horizon. The LUC adder approach is shown generically in Figure 2.4. Fossil fuels do not result in any LUC emissions. The LUC adder contributes to the biofuel WTW emissions. Alternatively, all of the direct emissions from the biofuel process could be added and the uptake of CO₂ over a time horizon could be subtracted. Additional adjustments would still be needed to reflect an overall change in carbon stocks.

The model includes an LUC adder for direct and indirect emissions. The direct emissions are calculated using DAYCENT. The default values for indirect LUC are zero. The LUC emissions correspond to the net change in CO₂ from the field. The approach used in this study follows the general methods used under the RFS2 and the LCFS.

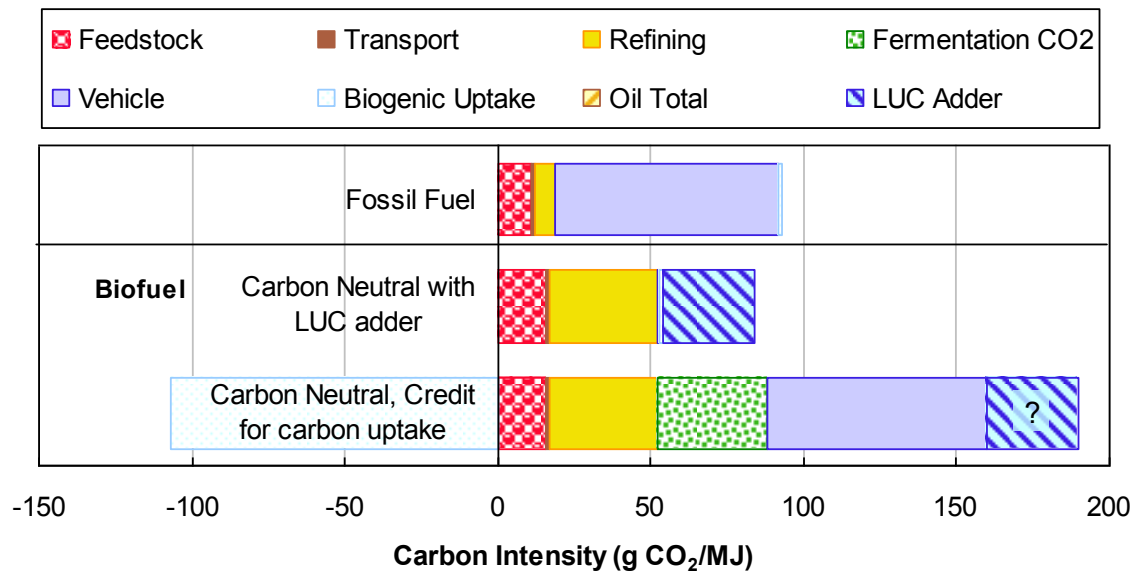


Figure 2.4. Accounting of Life Cycle Biogenic Emissions

Defining the approach to the carbon balance is essential since feedstock emissions will be combined with biorefinery emissions. Calculating life cycle emissions correctly requires a consistent treatment of biogenic carbon. For example, some LCA databases include the carbon uptake as a credit for feedstock. The carbon release is counted as part of the biorefinery operation. The end results is the same as treating biogenic carbon as neutral but the perception is different when emissions from fuel combustion and processing plant are shown with an



offsetting credit for the biogenic uptake. Alternatively, the credit may not be offsetting depending on the extent of LUC emissions, which can be positive or negative.

2.3.10 Equipment Construction and Recycling

Emissions associated with equipment and vehicle construction are not included in the analysis. These emissions represent a relatively small portion of the overall life cycle energy inputs and emissions.

Farming equipment emissions are included in GREET for corn ethanol to illustrate this point. GREET2.7 models the emissions associated with vehicle production. The same life cycle factors could provide the basis for an analysis of facility equipment.

2.3.11 Indirect and Other effects

This study does not include indirect LUC or other indirect effects such as market effects and fossil energy supply effects. Note that the calculation of LUC emissions involves considerable overlap in the RFS2 and LCFS analyses. EPA calculates field emissions for the biofuel crops as well as field emissions for indirectly impacted crops.

2.4 Functional Unit

The functional unit for the present analyses is a metric tonne of delivered feedstock as an intermediate calculation. Life cycle results are examined per unit of ethanol or electric power fuel energy (mmBtu or MJ) delivered.

2.5 Life Cycle Criteria

The model is configured to determine energy inputs, GHG emissions, and criteria pollutant impacts. This phase of the analysis focuses on GHG emissions. Energy inputs are part of the overall accounting system. Energy use is expressed as a ratio of total energy input (including fuel energy) per unit of fuel output (Btu/mmBtu or J/MJ). GHG emissions are expressed as grams of CO₂ equivalent per unit of fuel energy (g CO₂e/MJ), and are referred to as the carbon intensity (CI). The GHG emissions constituents considered in the analysis are CO₂, N₂O, CH₄, CO, and volatile organic compounds (VOC). GHG emissions from tank to wheel (TTW, the emissions from vehicle use) portion of the analysis arise from the carbon content of the fuel (g C/MJ fuel) converted to CO₂ (44 g CO₂/12 g C), plus vehicle emissions of CH₄ and N₂O.

Global warming potentials (GWP) (g CO₂e/g constituent) for CH₄ and N₂O are taken from the Intergovernmental Panel on Climate Change (IPCC) global warming potential (GWP) values (IPCC 2007) for a 100 year time horizon. CO and VOC are oxidized to CO₂ in the atmosphere, and thus have a GWP of 1 when expressed as CO₂ (fully oxidized form). All of the tank-to-wheel CO₂ emissions (including VOC and CO) are credited back in the life cycle analysis because the fuel carbon is derived from a biogenic biomass feedstock; this means that the net TTW component includes only vehicle CH₄ and N₂O emissions. The analysis excludes the climate impact of secondary and higher order atmospheric species that arise from direct emissions, including ozone, oxides of nitrogen (NO_x), and secondary aerosols.



3. Analysis Methods

3.1 Model Approach

The life cycle components included in this analysis are all the pathway process steps including feedstock production/collection and transport to processing, feedstock processing into vehicle fuel, and vehicle fuel transport to fueling stations. These steps comprise the field-to-tank which parallels the well-to-tank (WTT) components. The WTT portion includes the upstream or fuel cycle energy use and emissions. The addition of the tank-to-wheel (TTW), or vehicle energy use and emissions, gives the total fuel cycle well-to-wheels (WTW) results.

The analysis uses life cycle inventory (LCI) data from CA-GREET and other data sources in a separate spreadsheet workbook to calculate disaggregated fuel cycle emissions in gCO₂e/MJ biofuel produced. LCI data were extracted from the CA-GREET or assembled from the other data sources for the individual process fuels, chemical inputs, and transport segments contained in a given fuel pathway. These data arrays are assembled in an off-model matrix format that multiplies the input energy for each process fuel (or chemical input) with the LCI data and cumulative downstream loss factor to calculate results for each step of the fuel pathway. GHG emissions are summed using the same energy accounting system as in the CA-GREET model. The specific energy or material consumption per unit of final fuel product provides the consumption rate for the life cycle.

3.2 GREET Life Cycle Model

The life cycle analysis model that forms the core basis of the methodology used in this fuel cycle analysis is the Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET) model developed by Argonne National Laboratory (ANL). The model was released in 2012.

GREET1_2012 primarily includes more fuel pathways than earlier versions of GREET. CA GREET reflects emission factors, transportation distances, and other factors that reflect California specific scenarios and is used for the CA LCFS. This study does not use CA GREET factors.

Some of the key parameters associated with the GREET model include:

- Biomass feedstock is treated as carbon neutral. Biogenic carbon is counted in the vehicle emissions with an equivalent uptake credit. CO₂ emissions from fermentation and biomass combustion from power plants are treated as carbon neutral. LUC is treated as an adder for corn ethanol.
- Process feedstocks including electric power, natural gas, and diesel fuel are based on the resource mix, emission factors (including fugitive CH₄), transportation distances, and conversion efficiencies associated with average U.S.
- Field emissions include N₂O based on the IPCC Tier 1 method. DAYCENT inputs results can be inputted on a g/ton feedstock basis and the underlying GREET calculations do not change.



- The regional resource mix for electric power, fertilizer, diesel fuel, and other inputs are difficult to define in the model as the same resource mix applies to all energy carriers
- Data inputs are difficult to find for the inexperienced user
- Macros that manipulate data in the model are protected, which makes manipulation of the model via macros and software difficult or impossible.

3.3 Life Cycle Inventory Data

LCI data represent the energy and emissions associated with process fuels, transport segments, fuel pathway components, and any process or input relevant to fuel production. LCI data are organized as a column (or array) of energy use and emissions values. An LCI array can represent a single process fuel or feedstock, such as natural gas used for fuel production, or it can represent aggregated fuel cycle results, such as ethanol transport and distribution. For example, the LCI array result for U.S. average natural gas combusted in a stationary reciprocating engine is presented in Table 3.1. The life cycle data are organized in two arrays in this case, using the methodology of the GREET model, but the results can be presented at any level of disaggregation. The first column accounts for the WTT energy use and emissions associated with natural gas recovery (extraction) and transport, processing to pipeline gas, and pipeline delivery to the point of use. The second column shows natural gas engine emission factors and the third column indicates the total natural gas LCI array. The table indicates that most of fuel cycle emissions for natural gas (and all fossil fuels) arise from the fuel combustion (the carbon in fuel) rather than from fuel production.

Table 3.1. LCI Data for Natural Gas as Stationary Fuel

Natural Gas	Recovery, Processing, Pipeline Transport	Stationary Fuel Combustion	Total (g/mmBtu)
Total energy	69,898	1,000,000	1,069,898
Fossil fuels	69,649	1,000,000	1,069,649
Coal	1,780	0	1,780
Natural gas	62,816	1,000,000	1,062,816
Petroleum	5,053		5,053
VOC	6.283	41.12	47.403
CO	11.544	342.445	353.989
NO _x	21.991	1200	1,221.991
PM ₁₀	0.762	5.53	6.292
PM _{2.5}	0.496	5.53	6.026
SO _x	10.856	0.269	11.125
CH ₄	128.830	368.94	497.770
N ₂ O	0.066	1.5	1.566
CO ₂	5,229	57,732	62,960
CO ₂ (inc. VOC and CO)	5,266	58,398	63,664
Total GHG (g/mmBtu)	8,507	68,069	76,575
Total GHG (g/MJ)	8.06	64.52	72.58

Source: GREET_1



LCI arrays may be obtained from many sources, including life cycle analysis models (including GREET), published studies, LCI databases, and calculated based on other available LCI arrays. Combined with the process specific input parameters (energy or chemicals) and downstream loss factors, LCI arrays can be organized in an external spreadsheet or database and used to model new fuel pathways. Table 3.2 summarizes the LCI data used in this analysis and the corresponding LCI data sources.

Table 3.2. Life Cycle Components

Life Cycle Component	Data Source	Region
Diesel, Gasoline Upstream and Farming Equipment	GREET	U.S. Average
Agricultural chemicals	GREET	U.S. Average
Agricultural N ₂ O, CH ₄ , CO ₂	DAYCENT	MO, IA, MS, TN
Heavy duty truck feedstock and fuel transport	GREET	U.S. Average
Lime, Sulfuric Acid	GREET	U.S. Average
Enzymes, Yeast	GREET1_2012	U.S. Average
Natural gas	GREET	U.S. Average
Electricity, farm inputs	GREET	eGrid
Electricity from biomass, co-product credit		
Rail and truck transport	GREET	U.S. Average
Exhaust Vehicle CH ₄ , N ₂ O	GREET	U.S. Average
Direct LUC	DAYCENT	MO, IA, MS, TN

Note: Regional data for inputs such as electricity are readily calculated. However, electric power represents a small fraction of the life cycle of bio feedstocks.

3.3.1 Combining LCI Data and Input Parameters

The LCI data are combined (multiplied) with life cycle input parameters to model life cycle energy use and emissions associated with each fuel pathway input. Life cycle input parameters characterize all fuel pathway steps, including feedstock production, chemicals and natural gas or waste heat for processing, fuel for distribution, and fuel combustion. The life cycle inputs are discussed in Section 4.

Direct and Upstream Fuel Cycle Emissions

GHG emissions are summed using the same energy accounting system as in the GREET model. The specific energy or material consumption (S) per unit of feedstock or fuel provides the consumption rate for the life cycle inventory. The life cycle emissions (E) for each LCI component step (i) are based on values from the GREET model and include direct emissions and upstream emissions. Inputs upstream of the fuel plant include a loss factor (L). The energy and emissions over the total fuel cycle are represented by:

$$E = \sum (S \times (ED + EU) \times L)_i$$



The loss factor represents the total of downstream losses associated with evaporation, spillage, or other losses. Each conversion process also has a loss factor associated with that process, which is included in the cumulative downstream loss factor applied to processes upstream of that step.

Fugitive Emissions and Spills

Fugitive emissions and spills result in ethanol that escapes to the atmosphere. The ethanol decomposes to form CO₂. These product losses must also be made up by the fuel and feedstock production systems in order to deliver a given quantity of fuel.

Field Emissions

Field emissions correspond to the release of CH₄, N₂O, and CO₂ from farm operations. The emissions are predicted per tonne of feedstock from DAYCENT runs performed by Colorado State University. The field emissions are calculated in proportion to fuel conversion yield. Using the fuel specific feedstock consumption, the calculation is the same as that for other portions of the fuel cycle such that total emissions are summed for each pollutant:

$$E = \sum (S \times (EF) \times L)_i$$

Transport

Transport emissions are calculated from fuel use, cargo capacity and distance traveled. The calculation is similar to the fuel cycle calculation where the energy used in transport determines the direct and upstream fuel cycle emissions.

Vehicle Emissions

Vehicle emissions are treated as carbon neutral. GREET subtracts the biogenic carbon from the vehicle emissions. Thus the contribution of vehicle N₂O emissions is expressed as:

$$\text{Vehicle N}_2\text{O (g/MJ)} = \text{N}_2\text{O g/mi} \times \text{Fuel use (MJ/mi)}$$

Methane emissions are calculated in the same manner. Since methane formed from carbon in the fuel, the carbon fraction in the methane results in a small CO₂ credit.

3.3.2 Feedstock and Fuel Properties

The life cycle calculations depend on the feedstock and fuel properties because energy and GHG emissions are calculated per unit feedstock and per unit fuel energy produced. Required feedstock and fuel properties include carbon content, density, moisture content, and heating value (lower). The analysis considered switch grass, miscanthus, and corn stover. The required properties for each of these feedstocks are given in Table 3.3. Fuel product heating values, density, and carbon content are also shown.



Table 3.3. Feedstock and Fuel Properties.

Feedstock	Heating Value ^a		Density (g/gal)	Carbon (wt%)	Carbon Factor (g CO ₂ /MJ), LHV
	(Btu/lb)	(Btu/gal)			
	LHV	HHV	LHV		
Corn Stover	7,038	7,487		44.5%	99.6
Switch Grass	7,399	7,791		42.6%	90.7
Corn	7,954				
Gasoline	18,679	20,007	116,090	2,819	86.3%
Ethanol	11,587	12,832	76,330	2,988	52.2%

3.4 Matrix Organization Using Specific Energy (MOUSE)

This analysis utilizes a modeling approach called matrix organization using specific energy (MOUSE) which uses matrix (linear) algebra to combine LCI data from the GREET model with input parameters and necessary constants to develop a customized fuel pathway analysis. Figure 3.1 illustrates how feedstock transport data are used in the Life Cycle Module (LCM) analysis. The topmost rows shown in Figure 3.1 contain the process input (input/unit output), the feedstock use factor (unit feedstock/unit fuel), the overall process input (input/MJ fuel output) and the cumulative downstream loss factor (which reflects fuel losses occurring downstream, necessitating extra fuel production to replace the losses). The figure illustrates diesel fuel consumed by a diesel tractor for biomass cultivation. The diesel energy consumed by the tractor is 221,388 Btu diesel/ton biomass and the feedstock use factor is 0.1 ton biomass/gal diesel.

The process factor is multiplied by the feedstock use factor and divided by the fuel heating value to yield the net process input 0.179 mmBtu diesel fuel used/mmBtu biodiesel produced. The net process input is multiplied by each value in the LCI data array and the cumulative loss factor. This process determines each energy and emission result shown in Figure 3.1. The cumulative downstream loss factor (1.00094) is the product of process loss factors for downstream processes and represents the extra processing required to produce enough extra fuel to account for downstream losses. The process loss factor affects only upstream results and does not affect the results for that process. The LCI array is located below the calculation matrix at the bottom of Figure 3.1. The given GHG constituents are summed into carbon dioxide equivalent emissions using GWP values. The resulting disaggregated carbon dioxide equivalent results for each process step and feedstock used are then summed to yield fuel cycle results for the entire production pathway.

The LCM framework facilitates life cycle analysis based on results from an existing model but in a separate modeling system. The approach includes an input sheet of parameter values; a database of LCI arrays, fuel property data, and unit conversions; the LCM framework; and a summary of the results. Figure 3.2 shows the components schematically. Input parameters are organized in an input sheet and linked to the LCM framework, allowing the user to easily modify input parameters and recalculate the results. All of the LCI arrays needed to represent a fuel pathway are stored in a separate database and linked to the LCM framework. Each LCI array is an array of energy and emission values in the same format used in GREET.



Process	Diesel Tractor
Process Loss Factor	1.00000
Cumulative Loss Factor per Fuel Pathway Component	1.00094
Feedstock Use Factor Units	0.10 dry ton/gal diesel
Process Specific Energy Units	221,388 Btu diesel/ton biomass
Specific Energy Units	0.179 mmBtu diesel/mmBtu diesel
Fuel Cycle Energy (Btu) Total	29,131
Fossil fuels	28,596
Coal	5,147
Natural gas	9,956
Petroleum	13,494
Fuel Cycle Emissions (g) VOC	13,848
CO	68,048
NO _x	129,133
PM10	12,639
PM2.5	10,585
SO _x	3,696
CH ₄	17,641
N ₂ O	0,191
CO ₂	16,192
CO ₂ (Incl. VOC and CO)	16,343
Total Fuel Cycle GHG Emissions (g CO ₂ e/mmBtu)	16,840
Total Fuel Cycle GHG Emissions (g CO ₂ e/MJ)	16.0
FT Diesel Allocated Emissions (g CO ₂ e/MJ)	11.7

LCI Data Vectors

Fuel Pathway Component	Denominator Units	Diesel Tractor
		mmBtu Diesel
Fuel Cycle Energy (Btu) Total		163,019
Fossil fuels		160,026
Coal		28,801
Natural gas		55,713
Petroleum		75,513
Fuel Cycle Emissions (g) VOC		77,492
CO		380,803
NO _x		722,644
PM10		70,728
PM2.5		59,238
SO _x		20,684
CH ₄		98,718
N ₂ O		1,067
CO ₂		90,614
CO ₂ (Incl. VOC and CO)		91,454

SAIC LCA_v3.xls

Figure 3.1. Illustrative LCI Array for Farming Equipment used for Biomass Cultivation



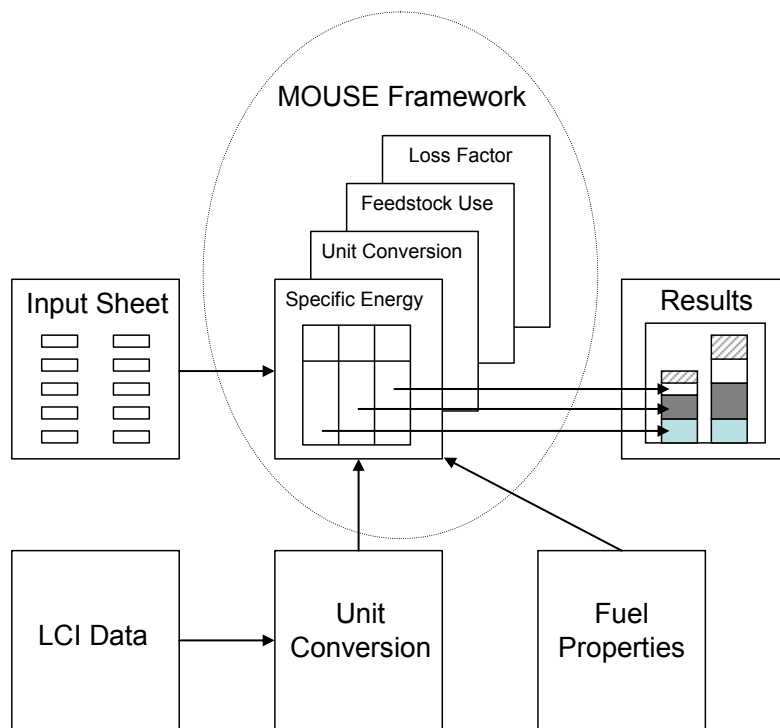


Figure 3.2. Schematic of an Overall Analysis Containing the LCM Framework

The major advantages of using the LCM approach for life cycle analysis include modeling flexibility, transparency, efficiency, crash free software with web interface, and ability to automatically generate documentation. The LCM framework is extremely flexible because it allows any level of disaggregation of inputs, calculations, and results; the analysis easily models high-level aggregated fuel pathway components and low-level unit processes. Because the LCM is based on a database of life cycle data, the analysis can easily represent multiple regions and resource mixes in a single fuel pathway. GREET for example defines a single resource mix across most fuel pathway steps. The methodology is transparent because all LCI data, input parameters, calculations and disaggregated results are clearly organized, labeled, and documented. Finally, the LCM approach is very efficient at assessing multiple fuel sub-pathway scenarios and conducting sensitivity analyses for key parameters. The method efficiently models fuel sub-pathway scenarios because it takes advantage of identical (or similar) fuel pathway components across scenarios. Sensitivity analysis is fast and efficient because the user can easily modify input parameters and quickly determine the effect on results.

3.5 Analysis Tools

Life Cycle GHG emissions are calculated using the analysis tools shown in Table 3.4. Results from the DAYCENT model provide field emissions per ton of crop. Farmer data are collected in a survey sheet. Life cycle inventory data used in biofuel processing are summarized from GREET. Finally the calculations are performed in the LCM.



Table 3.4. Life Cycle Analysis Tools

Filename (.xls)	Function	Scope
DAYCENT_Module_v7	Convert DAYCENT data to process specific inputs	Switch grass Miscanthus Corn conventional Corn Stover
Biomass_Farmer_Survey	Estimate farm energy inputs and fertilizer inputs. Estimate diesel use from tractor activity.	Farm level data, applicable to a range of crops.
GREET1_2012	Generate Life Cycle Inventory Data. Calculate regional LCI Data. Validate GHG Calcs	Petroleum Inputs Electric power Chemicals and Fertilizers Cellulosic ethanol Biomass to power
LCA_-_Grass_LCM	Calculate disaggregated LCA results	Input Sheet LCA LCM Results

The analysis tool developed to examine biomass pathways accommodates a mix of feedstocks. GREET defaults are used and the input data for feedstock collection with zero LUC. The tool is configured for switch grass (herbaceous biomass in GREET), miscanthus, and corn stover. The column on the far-right represents the weighted average of the selected feedstocks to facilitate modeling mixed feed streams.



4. Life Cycle Processes and Calculations

This section presents and discusses the life cycle input parameters for agricultural process and fuel conversion. GREET default input parameters for feedstock production and fuel conversion are presented here. The uses of the data in life cycle calculations are also described here.

4.1 Input Sheets

The LCA Module Input Sheets correspond to the tables in the following sections. Data for various fuel pathway scenarios are available in pull down menus. The inputs sheets provide an organized place for the user to enter data or select scenarios. They also serve as a prototype for the front end or user interface for a web based tool.

4.2 Biomass Feedstock Production

The currently included fuel pathway scenarios are configured for switch grass, miscanthus, or corn stover feedstocks.

4.2.1 Herbaceous Biomass

Switch grass is cultivated as a perennial crop that is grown from seeds. Many varieties (general) of switch grass are candidates for biomass production. Growing switchgrass leads to the build up of root mass with the potential for soil carbon storage compared to other agricultural activity.

Miscanthus is another grass grown as an energy crop. Miscanthus propagates by rhizomes with nitrogen fixing nodules. The crop requires little or no nitrogen fertilizer.

Once established, grasses would be harvested with a combine and the grass would remain in the field to dry. After drying the grass would be baled for storage and transport.

4.2.2 Corn Stover

Corn stover is the portion of the corn crop that remains after harvest. Stover includes the stalk, leaf, husk, and cob. The stover may also include weeds and other grasses. Typically stover is left in the field after the grain harvest. The stover mass is equal to about half of the corn grain mass yield. For biofuel production, a fraction of the stover is removed.

The fuel pathway for corn stover includes collection, transport of collected stover, and conversion to fuel or power. When corn stover is collected, the nutrient content supplied to the soil by the otherwise uncollected stover needs to be replaced by increased chemical fertilizer application to the subsequent crop. This requires that additional energy use and emissions to be assigned to the stover collection and use pathway. Upstream emissions associated with corn growing and harvesting are not included in the stover use pathway as these are assigned to corn grain ethanol production. Downstream emissions associated with the corn ethanol transportation and vehicle use as fuel are similarly not included.



4.2.3 Farming Inputs

Farm level data provides the basis for estimating farming energy inputs and fertilizer inputs. Several approaches may be needed to collect these data since some farms may produce multiple crops. Record keeping may also vary among farms. An example farmer survey is shown in Table 4.1. The survey can be customized to accommodate farmer's record keeping systems.

Table 4.1. Example Farm Survey

Farmer Identification		Comments		
Name of farm owner or farm	<input type="text"/>			
State where farm is located	<input type="text"/>			
Acres and Yield				
How many acres of biomass do you farm?	<input type="text"/>	acres		
What is the annual yield?	<input type="text"/>	tons/yr		
What is the moisture content of the baled product	<input type="text"/>	wt%		
What is the annual soil carbon accumulation	<input type="text"/>	lb/acre/year		
		See Soil Carbon Sheet		
Fuel and Electricity Inputs				
	Diesel	<input type="text"/>	gallons/ton	Indicate Equipment Type See Fuel Usage Sheet
	Gasoline	<input type="text"/>	gallons/ton	
	Natural gas	<input type="text"/>	Mscf/ton	
	LPG	<input type="text"/>	gallons/ton	
	Grid Electricity	<input type="text"/>	kWh/ton	
Fertilizer Inputs per Acre				
Nitrogen (N)				
Ammonia	<input type="text"/>	lb N/yr	Indicate Type <input type="text"/>	
Urea	<input type="text"/>	lb N/yr		
Ammonium Nitrate	<input type="text"/>	lb N/yr		
Other	<input type="text"/>	lb N/yr		
Phosphorus (P)				
DAP	<input type="text"/>	lb P ₂ O ₅ /yr	Indicate Type <input type="text"/>	
MAP	<input type="text"/>	lb P ₂ O ₅ /yr		
10-34-0	<input type="text"/>	lb P ₂ O ₅ /yr		
Other	<input type="text"/>	lb P ₂ O ₅ /yr		
Potassium (K)				
Potash	<input type="text"/>	lb K ₂ O/yr	Indicate Type <input type="text"/>	
Other	<input type="text"/>	lb K ₂ O/yr		
Limestone (CaCO ₃)	<input type="text"/>	lb CaCO ₃ /yr		
Burnt Lime (CaO)	<input type="text"/>	lb CaO/yr		
Herbicide and Insecticides				
Herbicides		Active Ingredient		
Atrazine	<input type="text"/>	lb/yr	Indicate Type <input type="text"/>	
Metolachlor	<input type="text"/>	lb/yr		
Acetochlor	<input type="text"/>	lb/yr		
Cyanazine	<input type="text"/>	lb/yr		
Glyphosate	<input type="text"/>	lb/yr		
Other	<input type="text"/>	lb/yr		
Insecticide			Indicate Type <input type="text"/>	
Insecticide	<input type="text"/>	lb/yr		
Biomass Transport				
Transport distance to customer or fuel plant	<input type="text"/>	miles	Indicate Destination <input type="text"/>	
Truck Gross Vehicle Weight	<input type="text"/>	lb		
Baled moisture content	<input type="text"/>	wt %		



Tracking farm level data poses several challenges. Biomass crops are likely to be part of an overall farming system with tractor activity used in the cultivation of all the crops. Disaggregating fuel use for biomass for fuel and other crops will be difficult. For example a fuel tank fill could be used for multiple crops. A method to estimate farming fuel use is shown in Table 4.2. Fuel use is determined from tractor passes and estimates of load factor. The fuel use is amortized over a multi year crop cycle. Tractor fuel is estimated from the number of passes per year for each activity, combined with the equipment type, power rating, and load factor. The example here is consistent with the fuel use rate in the GREET model; however, the inputs are only illustrative.

Table 4.2. Example Fuel Monitoring Input Sheet

Activity	Tractor Passes/year	Hours/acre	Cycles, Crops	Equipment Type	Power (hp)	Load Factor	Fuel Use (gal/acre)
Seeding	1	0.5	1	Deere	120	0.3	1.1
Raking	1	1.2	9	Cat	120	0.4	31.1
Baling	1	0.8	9	Cat	120	0.7	36.3
Other	1	0.5	2	Cat	80	0.4	1.9
Tilling	1	1	1	Deere	120	0.5	3.6
Total							74.0
<u>Average crop cycle fuel usage (gal/acre)</u>							<u>8.2</u>

The life cycle feedstock inputs are shown below in Table 4.3. Farm level data are converted to energy inputs and fertilizer use per metric tonne of biomass. The feedstock production inputs and results are based on the biomass feedstock properties in the GREET model, including feedstock carbon content, heating value, and moisture content.

The inputs below the feedstock properties represent the fuel and agricultural chemicals (fertilizer and pesticides) required to produce and harvest cultivated biomass or to collect biomass residues. The data for farming perennial crops (switch grass and *Miscanthus*) includes the contribution from land preparation and establishment (seeding, tilling, planting, etc).

Chemical and Fertilizer Inputs

The upstream fuel cycle and direct emissions associated with agricultural inputs are based on application rates and yields for farming and chemical use and fuel yield for biorefineries. Upstream emissions are determined in the GREET model. The same approach is used in the California LCFS. The EPA RFS2 estimates marginal fertilizer inputs from displaced crops.

Carbon bound in urea and limestone is converted to CO₂ when applied to the field. All (100%) of the available carbon is assumed to convert to CO₂. The crop may absorb the CO₂; however, since all of the carbon in the crop is treated as biogenic, the carbon from chemicals is assumed to be released into the atmosphere.



Table 4.3. Agricultural Input Sheet for LCA Calculations

Scenario Definitions

Feedstock	Switch Grass
Fuel	Ethanol
Functional Unit	mmBtu

Biomass Farming

Feedstock Region	US
Scenario	SG LF
Feedstock	Switch Grass
Moisture Basis (wt%)	0%

Fuel Inputs (Feedstock Basis)	Parameter	Units
Diesel	164,386 Btu/tonne	
Gasoline	0 Btu/tonne	
Natural gas	0 Btu/tonne	
LPG	0 Btu/tonne	
Total	164,386 Btu/tonne	

Electricity Input	Units	Value	Units
Electricity	9,818 Btu _e /tonne	2.877 kWh/tonne	

Chemical Inputs	Units
N	11,443 g/tonne
Ammonia	0 g/tonne
Urea	11,443 g/tonne
Ammonium Nitrate	0 g/tonne
P ₂ O ₅	110 g/tonne
K ₂ O	220 g/tonne
CaCO ₃	0 g/tonne
Herbicide	0.0 g/tonne
Atrazine	0 g/tonne
Metolachlor	0 g/tonne
Acetochlor	0 g/tonne
Cyanazine	0 g/tonne
Glysophate	0 g/tonne
Insecticide	0.00 g/tonne

Land Emissions (g/tonne)	Direct	Indirect
N content of ag system	11,443	0
N in N ₂ O as % of N in fertilizer and biomass	1.509%	0.000%
Field Emissions	0	
CH ₄	-514	0
N ₂ O	173	0
CO ₂	-8,528	0



4.2.4 Field Emissions

Field emissions include N₂O, CH₄, and CO₂ from agricultural activity including crop residue and fertilizer decomposition and field burning. Emissions associated with nitrogen fertilizer and crop decomposition are the focus of the analysis in GREET and under the RFS2. Several methods are used to estimate field emissions including the IPCC Tier 1 calculation in GREET as well as the DAYCENT model.

The GREET model assumes 1.3% of applied nitrogen and nitrogen in biomass residue is converted to nitrous oxide (N₂O) on the field or downstream; this conversion mechanism contributes significantly to the carbon intensity of cultivated feedstocks. Note that the Tier 1 IPCC method does not include N₂O emissions from nitrogen fixing crops such as soy beans or miscanthus.

DAYCENT estimates field emissions for different crop scenarios based on crop type, soil chemistry, plant physiology, fertilizer application rate, weather and rainfall predictions by region, and many other parameters. The model estimates N₂O, CH₄, and CO₂ emissions for various crops. Nitrogen application rate is a key input to the model as this parameter affects predicted crop growth rate.

Table 4.4 shows the field emission parameters based on DAYCENT analysis. The units are the same as those used in the GREET model except that GREET does not include field CH₄ emissions. N₂O emissions in GREET are calculated as a fraction of applied nitrogen fertilizer minus nitrogen removed with the crop. Fertilizer inputs and field emissions are averaged over a 30 year forecast period.

The DAYCENT results for switch grass are consistent with the GREET defaults. N application is about 50% higher for DAYCENT switch grass than the GREET default. N₂O production is about 1.5% to 1.8% of applied nitrogen, which is higher than the 1.3% used in the Tier 1 IPCC method.

DAYCENT results for Miscanthus indicate that no nitrogen fertilizer is applied because the crop is a nitrogen fixer. The N₂O emissions are about half those of switch grass per tonne or about the same per acre as those from switchgrass with high fertilization rates.

The results for corn stover reflect the difference between a reduced tillage system and conventional tillage system. Note that the conventional tillage system examined here via DAYCENT results in carbon storage over time. When corn stover is removed, less carbon is stored because it is removed with the stover. Corn stover removal may involve other changes to tillage practices than those modeled here.

Farm Level Soil Monitoring

Monitoring soil organic matter is another means of assessing the overall buildup or release of carbon in the soil from agricultural crop production.



Table 4.4. Field Emissions and Nitrogen Application from DAYCENT

Biomass Case	MO Switchgrass	TN Switchgrass	TN Switchgrass LF	MS Switchgrass LF	MS Miscanthus	IA Stover, Net	IA Corn (CT)	IA Corn and Stover (RT)
Scenario	Max Yield	Max Yield	Low Fert	Low Fert	Max Yield	Max Yield	Max Yield	Max Yield
Feedstock	Switchgrass	Switchgrass	Switchgrass	Switchgrass				
Location	Jackson, MO	Monroe, TN	Monroe, TN	Kemper, MS	Kemper, MS			
Chemical Inputs								
N (g/BD tonne)	11,305	11,433	8,553	9,061	0	1,499	23,654	24,245
N (g/bu), AR							601	616
Field Emissions (g/BD dry tonne feedstock)							g/tonne	g/tonne
CH ₄	-305.3	-312.2	-515.0	-514	-71.7	-68.3	-516.2	-543.1
N ₂ O	161.1	134.6	134.8	172.7	57.3	-282.7	886.5	775.0
Direct	125.6	96.9	98.4	138.5				
Indirect volatilization	24.7	24.3	22.4	21.5				
Indirect nitrate	10.7	13.5	14.0	12.7				
CO ₂	-225,659	-215,842	-160,385	-8,529	-243,049	166,647	-125,943	-60,222
Feedstock Yield (BD tonne/ha)	9.4	9.3	9.3	5.3	37.5	1.9	5.0	4.9

This worksheet converts the DAYCENT output for switchgrass, miscanthus and corn stover into input parameters for use in the GREET model or life cycle calculation too.

Note: Biomass parameters are on a dry tonne basis and corn inputs are on an as received basis in GREET

AR = As received. BD = Bone dry. Tonne = metric tonne = 1000 kg

Source: DAYCENT_Module_v7.xls

The assessment of soil carbon for GHG accounting purposes such as those used for the EPA RFS2 involves the collection of samples at 1 meter depths and performing laboratory analysis of the organic carbon. Many factors will affect the measurement of soil carbon including root depth, which can penetrate even further than 1 meter in the soil.

Measurements of soil carbon index are an indicator of soil health, but establishing a connection between soil carbon index and carbon storage requires additional research. Several factors in using a soil carbon index present challenges. First the depth of soil sampling may be only 10 cm. The measurement of carbon may be simplified compared to more detailed laboratory methods.

Nonetheless, soil carbon indicators can provide a valuable way to observe the buildup in soil carbon over time and additional analysis and research should be conducted to assess a relationship between soil carbon index and stored carbon. Soil carbon index measurements could be monitored annually and plotted against DAYCENT predictions as shown in Figure 4.1. Such a comparison, combined with additional research may be helpful in finding a low cost method to estimate soil carbon build up.

Other Data Sources

Other methods are used in fuel LCA models to estimate agricultural inputs and emissions. Most notably, EPA estimates direct and indirect land emissions from switchgrass and corn stover in its regulatory impact analysis (EPA 2010). The estimates reflect both the direct field emissions as well as indirect emissions from the production of displaced crops.

The GREET model uses the IPCC Tier1 method to estimate field N₂O emissions. N₂O is 1.3 % of applied nitrogen plus 1.3% of the nitrogen in the crop residue. This method appears to under report emissions with nitrogen fixing crops such as miscanthus and soybeans compared with the DAYCENT approach.



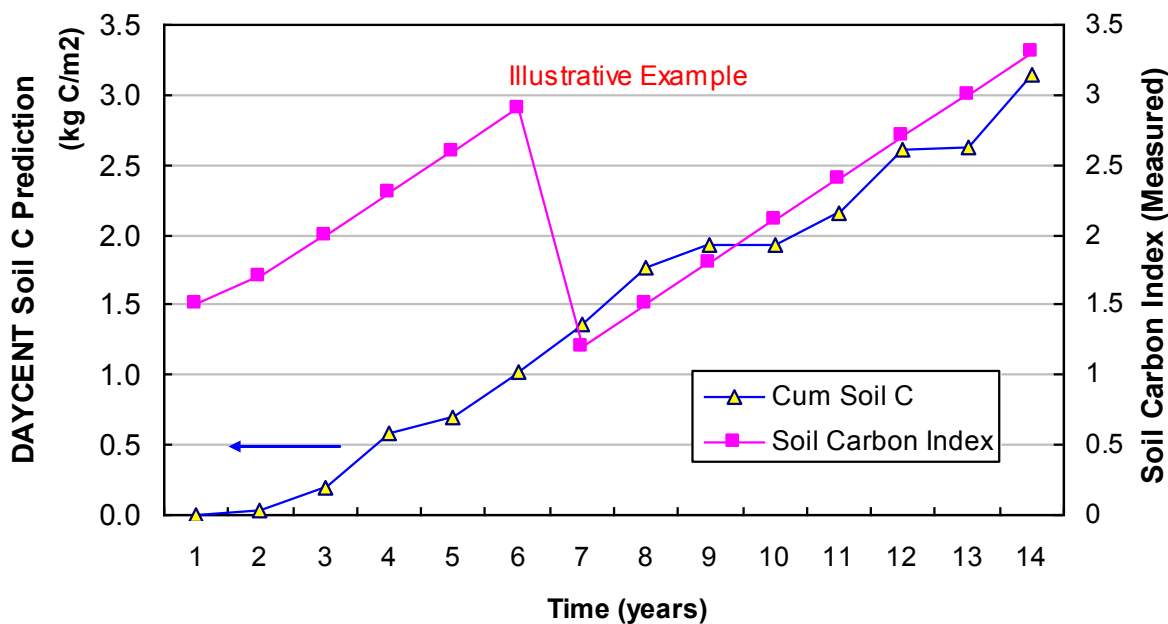


Figure 4.1. Example Approach to Combining Soil C Index with DAYCENT Data.

4.2.5 Biomass Transport

Biomass is transported to energy facilities primarily by heavy-duty truck. Since transport costs increase with distance from the fuel production facility, biomass fuel feedstocks must generally be transported no more than an average of 80 miles. Energy inputs for biomass transport in this study are shown in Table 4.5.

Transport distances are based on GREET defaults for each feedstock. The energy inputs are calculated based on the 25 ton (22.7 tonne) cargo capacity for an 80,000 GVW truck. The fuel use per bone dry ton takes into account the moisture content of the biomass. The full 25 ton capacity of the truck is available with chipped wood or baled grasses.

Energy inputs for pre-processing the feedstock are included in the feedstock collection and processing step. These energy inputs are commonly recorded in gallons of fuel used and the fuel used in this step may be commingled with farming data.

Table 4.5. Feedstock Transport Inputs.

Switch Grass Transport to Fuel Plant					
Transport Segment	Mode	As Received Capacity (tonnes)	Distance (mi)	Share	Fuel Economy (mpg)
Field to Ethanol Plant	MD Truck	7.3	10	0.0%	6
	HD Truck	22.7	30	100.0%	5
	Rail		100	0%	



4.3 Cellulosic Ethanol

Ethanol production from cellulosic feedstocks involves the fermentation of C6 and C5 sugars from biomass materials or the conversion of synthesis gas to ethanol via catalytic or biological processes. Various methods have been developed with the aim of separating lignin or capturing C5 (5-carbon ring monomers) sugars for separate fermentation processes. Sugars from cellulose and hemicellulose are released from biomass materials via pretreatment and hydrolysis steps. The sugars are fermented to produce ethanol. The key parameters that define the cellulosic ethanol production are fuel conversion yield, co-product electric power, and chemical inputs as shown in Table 4.6.

Table 4.6. Cellulosic Ethanol Inputs.

Select Case	SG EtOH GRT		
Yields		Biorefinery Output	
Fuel yield	99.21 gal/tonne		
Fuel Product	Ethanol		
Thermal Energy Inputs		Units	Fuel Share
Biomass	83,132 Btu/gal	100%	-8,247,276
Lube Oil	0 Btu/gal	0%	0
Net Electricity		Units	kWh/tonne
Electricity	-2.28 kWh/gal		-226

Residue including lignin is burned to generate power for export to the grid. Other potential co-products are steam and lignin for chemical processing.

4.4 Biomass Power

Fuel-fired power plants generate steam that is, in turn, used to drive steam turbines to produce electricity. Configurations for biomass power include fluid bed boilers, gasifiers, cofiring with coal, and numerous other options. The performance of biomass to power generation is characterized by the power plant heat rate. Heat rates are typically reported on a higher heating value basis in the U.S. The inputs for power generation use the same framework as that for cellulosic ethanol in Table 4.7. The power output is higher per ton and the ethanol yield is zero.

Table 4.7. Power Inputs.

Select Case	Power, SG		
Yields		Biorefinery Output	
Fuel yield	1,703.18 kWh/tonne		
Fuel Product	Electricity		
Thermal Energy Inputs		Units	Fuel Share
Biomass	9,577 Btu/kWh	100%	-16,311,345
Lube Oil	0 Btu/kWh	0%	0
Net Electricity		Units	kWh/tonne
Electricity	0.00 kWh/gal		0



4.5 Transport Inputs

The transport inputs for the feedstock and fuel (gasoline and diesel) transport and distribution are shown below in Table 4.8. Fuel delivery modes for ethanol to wholesale terminals are primarily rail and tanker truck. The inputs for fuel delivery include a mix of delivery logistics from the ethanol plant. If wholesale distribution includes both rail and truck modes then the mode share would be greater than 100%

Table 4.8. Feedstock and Fuel Transport Inputs

Product Transport and Distribution					
Transport Segment	Mode	Capacity (tonnes)	Distance (mi)	Share	
Fuel Distribution	Rail		200	20.0%	
	Pipeline		0	0.0%	
	To Blending Terminal	Heavy Duty Truck	25	80.0%	
				100.0%	
	To Fuel Station	Heavy Duty Truck	25	50	100.0%

Distribution to the local fueling station is accomplished by delivery truck when the fuel is blended as either E10 or E85. The analysis here reflects the ethanol portion of the haul. Thus, 10 truck loads of E10 would result in the same emissions as 9 truck loads of gasoline blending component and one truck load of ethanol. The hauling of denaturant is not considered in the analysis at this time.

Fuel distribution also includes fugitive losses and spillage. The fugitive emissions correspond to the expected fugitive emissions from wholesale terminals and fueling stations (Unnasch 2001).

4.6 Vehicle Emissions

Vehicle operation is the final stage in the fuel cycle. Vehicles consume liquid finished fuels in internal combustion engines or electric power in electric motors. Vehicle consumption accounts for much of the energy in the fuel cycle, depending on the fuel pathway. CO₂ from the vehicle is considered carbon neutral with the net carbon flux attributed to land use as discussed in Section 2. The contribution towards GHG emissions from the ethanol vehicle include CH₄ and N₂O generated during combustion.



5. Results

This section summarizes the disaggregated GHG emissions results for the scenarios described in this study. Section 5.1 shows the results per ton of biomass. The scope of the emissions includes farming to delivery to the biorefinery. Sections 5.2 and 5.3 show the GHG emissions on a life cycle basis from farming to end use.

The scope of emissions is consistent with the level of disaggregation used in fuel policy regulation and fuel LCA studies. The categories may not align with a final producer and consumer standard but the results are sufficiently disaggregated to allow the reader to select the categories of interest¹.

5.1 Feedstock GHG Intensity

The CI results per tonne of switch grass and corn stover are shown in Figure 5.1. The results include the fuel cycle steps from feedstock production to delivery to the biorefinery or power plant. Additional emissions for biomass combustion in the biorefinery or power plant as well as fuel distribution and vehicle end use differ among the fuel pathways.

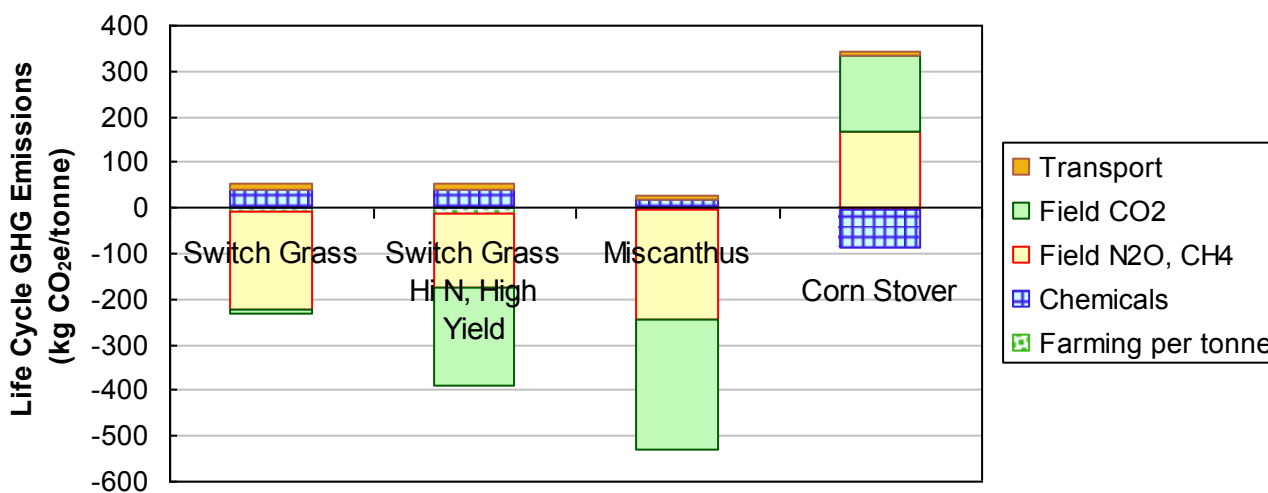


Figure 5.1. Life Cycle GHG Emissions for Crop production (kg CO₂e/tonne)

5.2 Cellulosic Ethanol Pathway

The CI results for switch grass and corn stover converted to ethanol are shown in Figure 5.2.

¹ A producer standard might not include transport emission to the bio refinery. Also the consumer standard might not include vehicle emissions or transport to the fueling station. These emissions are included in the analysis for completeness.



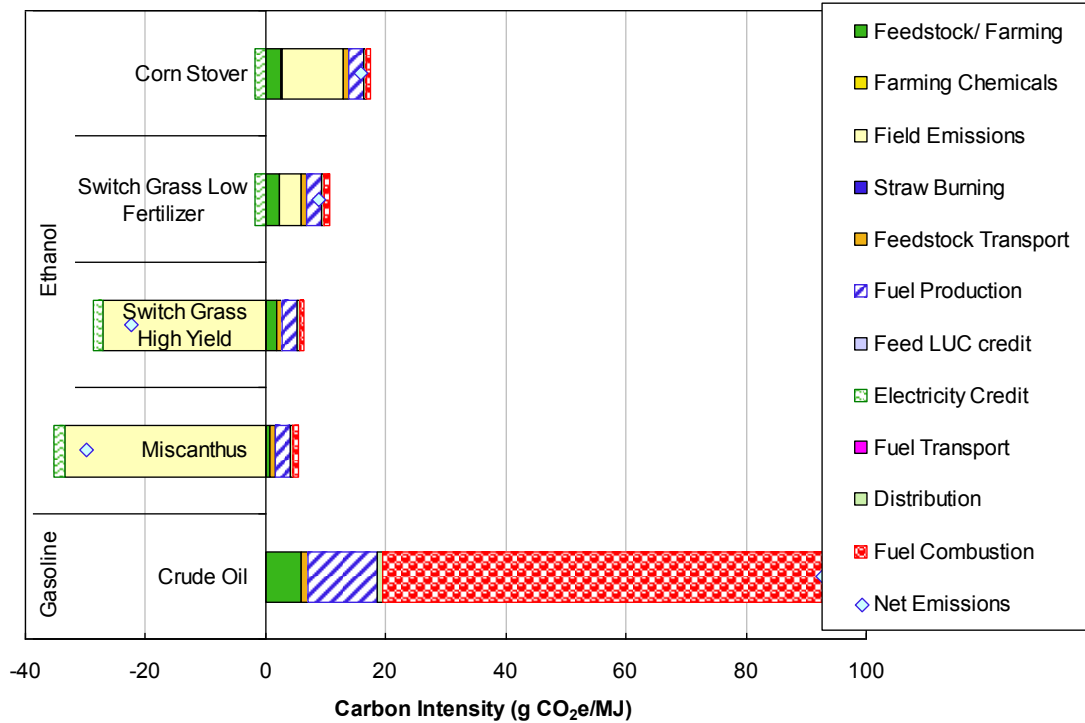


Figure 5.2. Carbon Intensity Results for Cellulosic Ethanol.

The allocation procedure used assigns a credit based on biomass power, which is the procedure under EU Renewable Directive. The California LCFS guidance aims to avoid double crediting, so a similar result would be achieved under the LCFS. The EPA RFS2 shows a credit for cellulosic biofuels, although the aim of the analysis is to identify whether pathways meet a 60% reduction threshold (EPA 2010b).

Other key parameters are the net field emissions. In the case where field emissions are a credit, the net emissions are lower for biorefineries with a low biomass to ethanol yield.

5.3 Electric Power Pathways

The CI results for biomass (switch grass) to electric power are also illustrated in Figure 5.3 and compared to the U.S. average grid mix. The feedstock results (g/ton biomass) are the same as discussed for the cellulosic ethanol pathways. The results are compared to a U.S. average generation mix with GREET default parameters. GHG emissions are proportional to the farming emissions combined with the fuel conversion yield. In the case of power production CH₄ and N₂O emissions from the power plant contribute 20 g CO₂e/kWh of GHG emissions. The emission factors that are the basis for these emissions are uncertain and should be investigated further.



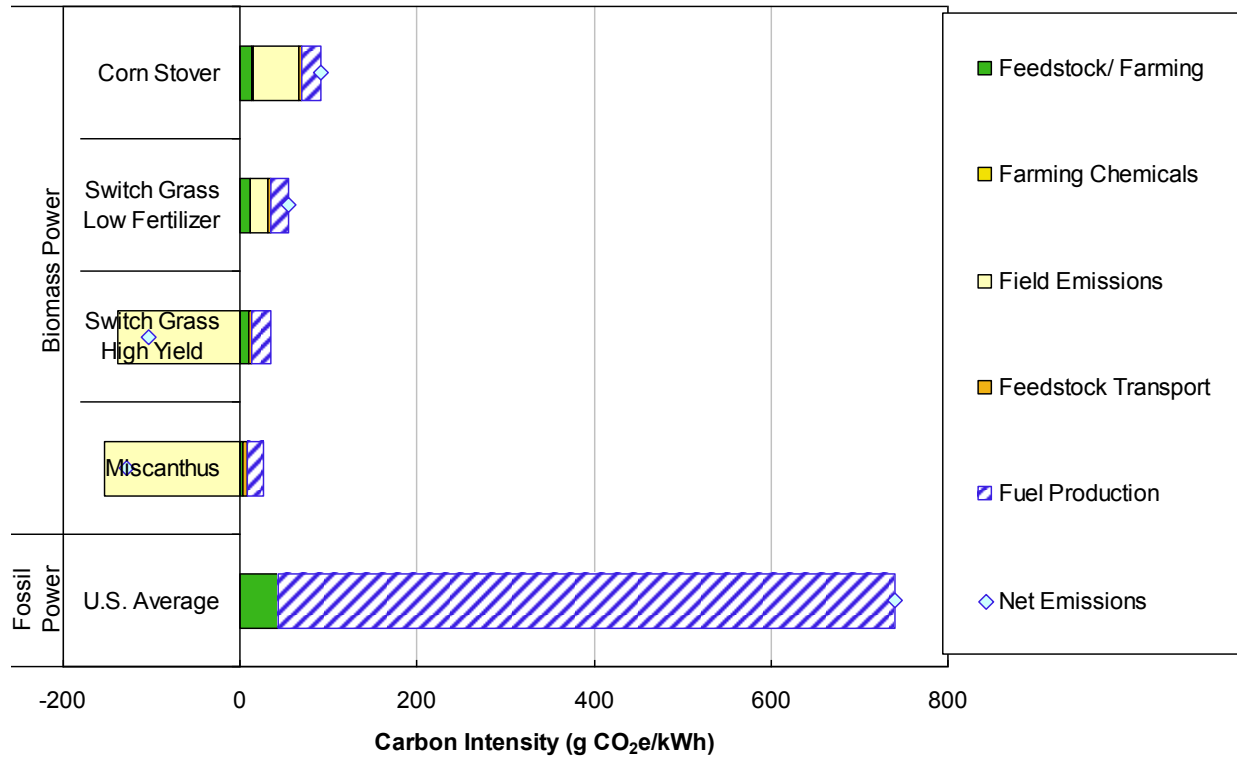


Figure 5.3. Carbon Intensity Results for Electric Power.



6. Conclusions and Discussion

This study examines the GHG emissions from several pathways for biofuel production compared to petroleum fuels. The GREET model parameters are used to calculate a CI result. The life cycle GHG emissions associated with feedstocks and other energy carriers combined with the processing conditions provide indications about the general trends in life cycle GHG emissions.

The life cycle GHG emissions from the fuel pathways examined here depend on many factors including feedstock type and properties, biofuel yield, net electricity consumption, and the fate of carbon through the production of char or capture as CO₂. The implications of the feedstocks and process configurations are discussed below.

6.1 Life Cycle of Feedstock

Fertilizer inputs, farming activity, and field emissions are the primary emission sources from feedstock production. This study provides a framework for monitoring fertilizer and farming activity. Field emissions are the largest source of GHG emissions and these will need to be modeled based on soil conditions. Relating soil carbon index to carbon storage is one option for developing farm level carbon storage estimates. N₂O emissions would need to be modeled based on actual fertilizer application rates.

6.2 Cellulosic Ethanol

The emissions from cellulosic ethanol depend on the following factors:

- Life cycle of the feedstock
- Life cycle of displaced electric power
- Liquids yields

The life cycle of the feedstocks represents a relatively low contribution towards CI. Both residues and energy crops result in GHG emissions below 20 g/MJ of ethanol. Some feedstocks result in negative carbon intensity due to the buildup of soil carbon.

6.3 Power Generation

The emissions from biomass power generation are also result in low GHG emissions for electric power pathways. GHG emissions are below 90 g/kWh. Some feedstocks result in negative carbon intensity due to the buildup of soil carbon.

6.4 Recommendations

The analysis presented in this study examines the CI implications of biomass to ethanol or electric power. The integration of the modeling tool with CSBP objectives has made apparent several suggestions about future activities to improve the model and expand the scope of the effort. A better understanding of the GHG implications of biomass to liquid and electric power pathways can be achieved though the following efforts:



6.4.1

Feedstock Producer Model

- Develop emission and fuel use factors that relate hours of equipment operation to fuel use based on EPA emission models for farm equipment
- Expand analysis to include criteria pollutants with regional detail to estimate direct and upstream fuel cycle emissions associated with farming, energy inputs, biorefinery operations, transport, and vehicles.
- Perform a literature search on soil carbon in order to determine the best approach to relate soil carbon index to carbon storage.
- Develop an empirical relationship between low cost soil carbon index and soil carbon storage.
- Develop a method to assess if indirect LUC applies to biomass projects, how to determine if land is marginal and if any crops are displaced and incorporate applicable iLUC data into the model.
- Expand the analysis to include forestry, agricultural residue, and other feedstocks.
- Develop a regional look up feature to take into account life cycle data including electricity resource mix by eGrid Region and regional DAYCENT data
- Develop life cycle inventory data for chemicals and fertilizers that are not in the current model

Consumer Model

- Expand the biorefinery options to include gasification with FT synthesis and pyrolysis followed by hydro-processing.
- Examine GHG emissions for biomass customer projects based on data from fuel developers to validate default values.
- Assess issues associated with co-producing with fossil fuels and covering with fossil fuels
- Facilitate a discussion on the applicability of biomass power to meet renewable power obligations and low carbon fuel requirements for electric vehicle applications.

Model Function

- The model function and usability can be enhanced with a web based interface. The following section describes a potential approach.

6.5 Web Based Interface

The implementation and maintenance of the GHG emission analysis tool poses several challenges including the following:

- The broad range of CSBP members, farmers, and other stakeholders may not prefer to use a spreadsheet based tool².
- Life cycle data, emission factors, and allocation procedures may evolve over time. Distributing the newest version of a spreadsheet may lead to version control issues.

² Note that GREET has several issues with new versions of excel. Some versions of the model are not compatible with Excel 2007 because the formatting options in the model are require more memory in the new version of Excel.



- Spreadsheet models can be modified and difficult to track and report.
- Updates to spreadsheets are difficult to manage. A spreadsheet could be distributed broadly and use for other certification systems without input from CSBP.

A software version of the GHG tool eliminates some of the disadvantages of a spreadsheet version. A software based tool would provide better control over modifications. Such a tool could also be implemented in a web based program. The web based options provides additional advantages. A web based program could provide all of the functions or the data input sheets shown in Section 4. The user could be guided through data entry with a system of defaults for each fuel pathway.

The calculations should be implemented in the Python web based language. This software language is currently popular for data analysis and provides a good fit with managing life cycle inventory data, data inputs, and the calculations for fuel LCA. The web based approach would enable a better database management of regional detail. Figure 6.1 shows an example of an LCI database generated in Python with a web browser interface. Data inputs would be accomplished with input sheets such as those shown in Figure 6.2. The backend calculations would follow those in the LCM with outputs similar to those in Section 5.



Select direct impact to change

Home > Greet > Direct impacts

Welcome, Ja

Select direct impact to change

Action: Go 0 of 27 selected

<input type="checkbox"/> Year	<input type="checkbox"/> GREET Model	<input type="checkbox"/> Combustion Fuel	<input type="checkbox"/> Equipment Type	<input type="checkbox"/> Formatted tem ghg
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Coal	IGCC Turbine	108,599
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Coal	Industrial Boiler	108,662
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Coal	Utility Boiler	108,600
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Crude Oil	Industrial Boiler	77,909
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Diesel	Commercial Boiler	78,332
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Diesel	Farming Tractor	78,689
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Diesel	Industrial Boiler	78,319
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Diesel	Stationary Reciprocating Engine	78,962
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Diesel	Turbine	78,814
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Gasoline	Farming Tractor	77,814
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Gasoline	Stationary Reciprocating Engine	79,726
<input type="checkbox"/> 2010	CA-GREET (1.8b)	LPG	Commercial Boiler	69,534
<input type="checkbox"/> 2010	CA-GREET (1.8b)	LPG	Industrial Boiler	69,534
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Natural Gas	CC Gas Turbine	58,773
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Natural Gas	Large Gas Turbine	58,773
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Natural Gas	Large Utility Boiler	58,350
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Natural Gas	NG Flaring in Oil Field	59,649
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Natural Gas	Reciprocating Engine	66,887
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<input type="checkbox"/> 2010	CA-GREET (1.8b)	Natural Gas	Small Turbine	58,773
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Natural Gas LPG	Commercial Boiler	69,534
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Natural Gas LPG	Industrial Boiler	69,534
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<input type="checkbox"/> 2010	CA-GREET (1.8b)	Petroleum LPG	Industrial Boiler	69,534
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Residual Oil	Commercial Boiler	85,222
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Residual Oil	Industrial Boiler	85,261
<input type="checkbox"/> 2010	CA-GREET (1.8b)	Residual Oil	Utility Boiler	85,209

27 direct impacts

Figure 6.1. Web Interface Back End, LCI Data Selection



Change direct impact | Django

127.0.0.1:8000/admin/greet/directimpact/9/

Django administration

Home > Greet > Direct impacts > industrial_boiler

Change direct impact

Model Data

Year:

GREET Model:

Combustion Fuel:

Equipment Type:

Denominator Units:

Energy

Total Energy: Fossil Fuels: Coal: Natural Gas: Petroleum:

Emissions

VOC:

CO:

NOx:

PM 10:

PM 2.5:

SOx:

CH4:

N2O:

CO2:

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Figure 6.2. Web Interface Back End, LCI Data Selection Detail



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8. Appendix A. Model Instructions

Life cycle GHG emissions are calculated through several modeling steps. The following steps allow users to use the suite of GHG emission tools.

8.1 Farm Survey

Farm energy and fertilizer inputs are collected in the spreadsheet LCA_-_Biomass Farm Survey v2.xls. The goal is to represent fertilizer inputs and fuel per ton of biomass and document the sources of the data. Fuel use may be difficult to measure directly and can be estimated using the Fuel Use tab. Note the data in this spreadsheet are placeholders and require additional research.

8.2 Field Emissions

DAYCENT runs are summarized in the spreadsheet LCA_-_DAYCENT_Module v7.,xls. The output is also shown in Section 4 of this report. New DAYCENT runs can be added to the spreadsheet to convert DAYCENT runs into g/tonne emissions.

8.3 LCI Data

LCI data for fertilizers, energy carriers, and electric power are generated in the GREET model. The Biomass LCM is configured with GREET data and the LCM will be updated periodically.

8.4 Life Cycle Module

The LCM calculates emissions on a life cycle basis. Inputs shown in Section 4 are combined with LCI data from GREET to calculate emissions on a farm to wheels basis. Emissions can be shown with a functional unit of mmBtu of fuel product, gal of fuel, or tonne of biomass.

Select functional unit, feedstock region, and scenario. The feedstock region determines the LCI data for life cycle components including diesel fuel and electric power.

Scenario Definitions

Feedstock	Corn Stover
Fuel	Ethanol
Functional Unit	mmBtu

Biomass Farming

Feedstock Region	US
Scenario	CS IA
Feedstock	Corn Stover



The LCM is configured with four feedstock scenario data sets. The user **can modify the blue colored cells**. Farm data are updated based on the scenario that is selected using a pull down menu.

Biomass Farming

Feedstock Region	US		CSBP		CSBP		CSBP	
Scenario	CS IA		SG LF	SG hi yield	Miscanthus	CSBP		
Feedstock	Corn Stover		Switch Grass	Switch Grass	Miscanthus	Corn Stover		
Moisture Basis (wt%)	0%		0%	0%	0%	0%		
Fuel Inputs (Feedstock Basis)	Parameter	Units						
Diesel	212,413	Btu/tonne	164,386	126,537	54,795	212,413		
Gasoline	0	Btu/tonne						
Natural gas	0	Btu/tonne						
LPG	0	Btu/tonne						
Total	212,413	Btu/tonne						
Electricity Input			Units					
Electricity	0	Btu _e /tonne	9,817.5	9,817.5	3,272.5	0.0		
Chemical Inputs			Units					
N	1,499	g/tonne	11,443.0	8,553.0	0.0	1,499.0		
Ammonia	1,060	g/tonne	0.0	0.0	0.0	1,059.8		
Urea	316	g/tonne	11,443.0	8,553.0	0.0	316.3		
Ammonium Nitrate	123	g/tonne	0.0	0.0	0.0	122.9		
P ₂ O ₅	0	g/tonne	110.2	110.2	110.2			
K ₂ O	0	g/tonne	220.5	220.5	220.5			
CaCO ₃	0	g/tonne	0.0	0.0	0.0			
Herbicide	0.0	g/tonne						
Atrazine	0	g/tonne						
Metolachlor	0	g/tonne						
Acetochlor	0	g/tonne						
Cyanazine	0	g/tonne						
Glysohphate	0	g/tonne						
Insecticide	0.00	g/tonne						
Land Emissions (g/tonne)	Direct	Indirect						
N content of ag system	1,499	0	11,443	8,553	0	1,499		
N in N ₂ O as % of N in fertilizer and biomass	-18.859%	0.000%	1.51%	1.85%	--	-18.86%		
Field Emissions	0							
CH ₄	-68	0	-514	-367	-84	-68		
N ₂ O	-283	0	173	158	67	-283		
CO ₂	166,647	0	-8,528	-253,931	-285,940	166,647		

Enter biomass transport distances and fuel conversion yields. Fuel conversion yields can be entered in gal/ton or Btu/kWh for power production.



Corn Stover Transport to Fuel Plant

Transport Segment	Mode	As Received		Share	Fuel Economy (mpg)
		Capacity (tonne)	Distance (mi)		
Field to Ethanol Plant	MD Truck	7.3	10	0.0%	6
	HD Truck	22.7	30	100.0%	5
	Rail		100	0%	

Biofuel Production

Select Case

SG EtOH GRT

Yields

Biorefinery Output

Fuel yield	99.21 gal/tonne
Co-Product	Power
Fuel Product	Ethanol

Thermal Energy Inputs

Units

Fuel Share

Btu/tonne

Biomass	83,132 Btu/gal	100%	-8,247,276
Lube Oil	0 Btu/gal	0%	0

Net Electricity

Units

kWh/tonne

Electricity	-2.28 kWh/gal	-226
-------------	---------------	------



LCI data are stored in a database for each energy carriers or input. The LCI data include direct emissions and upstream fuel cycle.

Full Fuel Cycle LCI Database

Fuel:		Corn	Soybeans	Soybean Meal	Diesel	Natural Gas	Natural Gas	Petroleum Liquefied petroleum gas	Urea (CO(NH2)2)	Ammonium Nitrate	Phosphate (P2O5)	Potash (K2O)	Lime (CaCO3)
Equipment:					Farming Tractor	Stationary Reciprocating Engine	Large Utility Boiler	Commercial Boiler					
Denominator Units:		mmBtu	mmBtu	ton	mmBtu	mmBtu	mmBtu	mmBtu	ton N	ton N	ton P2O5	ton K2O	ton
Region:		US	US	US	US	US	US	US	US	US	US	US	US
Total Energy	Total energy	55,723	0	1,057	1,163,019	1,202,159	1,069,596	1,115,079	45,827,773	55,976,401	12,085,187	7,642,107	7,001,347
	Fossil fuels	54,195	0	1,034	1,160,026	1,198,656	69,108	1,112,727	45,258,336	55,142,440	11,575,178	7,089,426	6,450,165
	Coal	7,722	0	121	28,801	35,591	2,451	19,582	2,807,766	4,117,157	2,525,278	2,725,843	2,712,326
	Natural gas	26,337	0	245	55,713	1,067,833	1,062,404	39,703	39,911,987	46,728,360	5,555,515	2,151,270	2,124,580
	Petroleum	20,137	0	668	1,075,513	95,232	4,253	1,053,443	2,538,584	4,296,923	3,494,385	2,212,313	1,613,259
Total Emissions	VOC	4.990	0.000	0.050	115.936	68.385	7.835	10.271	5,486.268	6,923.924	311.562	109.832	72.102
	CO	45.018	0.000	0.203	420.181	361.740	27.994	27.390	5,540.833	7,097.270	1,078.052	579.912	476.595
	NOx	21.804	0.000	0.434	772.551	1,243.516	31.493	126.192	4,377.182	9,149.478	6,666.232	1,698.498	770.323
	PM10	2.403	0.000	0.055	51.786	15.808	4.072	8.745	961.950	4,171.177	1,744.604	605.369	549.052
	PM2.5	1.249	0.000	0.034	46.938	9.830	3.722	5.336	505.823	2,941.592	1,094.371	225.548	184.077
	SOx	10.035	0.000	0.299	20.684	15.298	11.450	11.572	885.492	1,462.527	56,103.109	247.955	69.203
	CH4	5.178	0.000	0.119	107.805	469.647	129.923	96.314	2,428.640	2,814.434	1,280.545	775.414	719.120
	N2O	12.422	0.000	0.113	1.067	1.672	0.380	4.982	13.170	17,840.486	11.418	6.320	5.000
	CO2	4.397	0	80	90,408	73,391	63,318	77,566	1,327,641	3,413,737	891,170	600,559	548,379
	CO2 (inc. VOC and CO)	4,483	0	81	91,429	74,172	63,386	77,641	1,353,447	3,446,470	893,835	601,813	549,353
GHG	8,314	0	117	94,442	86,412	66,747	81,534	1,418,087	8,833,296	929,252	623,082	568,821	
Urban Emissions	VOC	0.069	0.000	0.003	1.223	19.776	0.092	1.541	4.198	5.685	2.717	3.292	2.547
	CO	0.037	0.000	0.004	0.623	0.068	0.881	15.430	21.071	9.503	11.358	11.358	9.540
	NOx	0.107	0.000	0.012	1.891	0.179	0.534	5.475	42.929	58.573	25.002	31.070	25.089
	PM10	0.004	0.000	0.001	0.038	0.007	0.012	0.122	1.481	2.081	1.060	1.227	1.105
	PM2.5	0.004	0.000	0.001	0.035	0.007	0.012	0.110	1.459	2.051	1.056	1.214	1.101
	SOx	0.001	0.000	0.011	0.056	0.002	0.001	0.011	0.435	0.625	0.285	0.383	0.303
Air Toxics	Formaldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Acetaldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1-3, Butadiene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Diesel PM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	PAH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000



Total GHG emissions are calculated in the MOUSE. Each calculation is based on the specific energy combined with LCI data and loss factor.

Fuel Cycle Energy (Btu/mmBtu biofuel) and Emissions (g/mmBtu biofuel)

Pathway Component	Biomass Farming		Feedstock Transport		Fuel and Electricity				Biofuel Production	
	Fuel and Electricity	Field Emissions	Medium Duty Truck	Heavy Duty Truck	Biomass Boiler	Biogenic Credit	Residual Oil Boiler	Electricity	Calcium Oxide (CaO)	CO ₂ from CaO
Process	Diesel Tractor	Field Emissions	Diesel	Diesel	Biomass Boiler	Biogenic Credit	Residual Oil Boiler	Electricity	Calcium Oxide (CaO)	CO ₂ from CaO
Process Loss Factor	5.34308	5.34308	5.34308	5.34308	1.00000	5.34308	5.34308	5.34308	5.34308	5.34308
Cumulative Loss Factor per Fuel Pathway Component	5.34308	5.34308	5.34308	5.34308	1.00000	5.34308	5.34308	5.34308	5.34308	5.34308
Feedstock Use Factor	0.001	0.001	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Units	tonne biomass/gal fuel	tonne biomass/gal fuel	tonne biomass/gal fuel	tonne biomass/gal fuel						
Process Specific Energy	212,413	1	1	1	9,577	9,577	0.0	0.00	0.00	0.00
Units	Btu Diesel/tonne				Btu/kWh	Btu/gal	Btu oil/gal	Btu/gal	g CaO/gal	g CaO/gal
Specific Energy	0.037	0.172	0.172	0.172	2.807	2.807	0.000	0.000	0.000	0.000
Units	mmBtu/mmBtu	tonne/mmBtu	tonne/mmBtu	tonne/mmBtu	mmBtu/mmBtu Biofuel	mmBtu/mmBtu Biofuel	mmBtu/mmBtu Biofuel	mmBtu/mmBtu Biofuel	ton CaO/mmBtu Biofuel	ton CaO/mmBtu Biofuel
Fuel Pathway Step Toggle	1	1	1	1	1	1	1	1	1	1
Fuel Cycle Energy (Btu)	227,139	0	0	965,272	14,997,272	0	0	0	0	0
Fossil fuels	226,554	0	0	962,653	0	0	0	0	0	0
Coal	5,625	0	0	11,860	0	0	0	0	0	0
Natural gas	10,881	0	0	91,346	0	0	0	0	0	0
Petroleum	210,049	0	0	859,449	0	0	0	0	0	0
Fuel Cycle Emissions (g)	VOC	22,642	0.000	0.000	13,109	80,100	0.000	0.000	0.000	0.000
CO	82,062	0.000	0.000	35,972	1,151,791	0.000	0.000	0.000	0.000	0.000
NO _x	150,880	0.000	0.000	115,130	1,145,957	0.000	0.000	0.000	0.000	0.000
PM10	10,114	0.000	0.000	8,545	1,298,749	0.000	0.000	0.000	0.000	0.000
PM2.5	9,167	0.000	0.000	5,464	649,374	0.000	0.000	0.000	0.000	0.000
SO _x	4,040	0.000	0.000	27,140	61,489	0.000	0.000	0.000	0.000	0.000
CH ₄	21,054	-62,831	0.000	103,739	474,664	0.000	0.000	0.000	0.000	0.000
N ₂ O	0.208	-259,926	0.000	1,783	63,288	0.000	0.000	0.000	0.000	0.000
CO ₂	17,657	153,222	0	76,070	1,778,956	-1,782,318	0	0	0	0
CO ₂ (Incl. VOC and CO)	17,856	153,222	0	76,168	1,781,016	-1,782,318	0	0	0	0
GHG	18,445	74,193	0	79,293	1,811,743	0	0	0	0	0



Appendix E

Marketing Strategy and Promotional Materials

CSBP BRAND STRATEGY

April 18, 2012

Greg Veerman

Principal/Executive Creative Director

Astronaut Brand Studio



AGENDA

1. Purpose
2. Meet Astronaut
3. Notes on Brand
4. What We Did
5. What We Learned
6. Analysis
7. Messages + Positioning
8. The Big Idea
9. Creative Studies
10. Next Steps





POET
Energy Inspired™



Determination is our renewable energy.

With so much at stake, endurance and the will to achieve a critical in tackling our country's energy challenges.

Fortunately determination is a renewable resource. In this movement, everyone needs to generate it.

At POET, we know progress doesn't come easy. But we can measure their success through major economic, cultural and environmental gains. We can also see it in the stories our technologies are opening: the bounty of cellulosic ethanol.

Those achievements didn't come easy. But we can measure their success through major economic, cultural and environmental gains. We can also see it in the stories our technologies are opening: the bounty of cellulosic ethanol.

The key to this next generation fuelcell is in our hands. Although many dream of the abundance of cellulosic ethanol, fewer realize that combined ethanol technology delivers the most reliable way to get there.

Let's stay strong as we work our way to energy independence. Like any great change, determination isn't easy. But it is worth it.

POET. Energy Inspired.



POET HAS ETHANOL PLANTS IN OPERATION ACROSS THE UNITED STATES WITH A MORE DIVERSE CAPABILITY FOR A TOTAL PRODUCTION CAPACITY OF 1.3 BILLION GALLONS OF CELLULOSE ETHANOL AND A MILLION TONS OF HIGH PROTEIN ANIMAL FEED. THAT REPRESENTS AN INVESTMENT IN THE AMERICAN ECONOMY THAT HAS GENERATED THIRTYTHREE MILLION JOBS, REDUCED OUR NATION'S DEPENDENCE ON FOREIGN OIL BY MILLIONS OF BARRELS PER DAY, PUMPED MILLIONS OF DOLLARS INTO RURAL ECONOMIES. THE BENEFITS DON'T STOP THERE. OUR ETHANOL IS CARBON NEUTRAL. WE'VE TOOK GREENHOUSE GAS EMISSIONS TO THE NEXT GENERATION OF WORLD-CLASS CELLULOSE ETHANOL.

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Tweets

Accelerase: RT @agladis: Cargill extending bio refinery concept to mentor the Bear N. (03-05-2011)
Accelerase: Our company just released our main website. We like the upgrade. Have a. (28-04-2011)
Accelerase: Com ethanol policy under attack in California <http://bit.ly/HYUQD> #ethanol... (27-04-2011)

Biofuels News

Aurora Algae's demonstration opens for business in Argentina. (04-25-2011)
Cellulose reaches 80 tons of biomass per acre in Hawaiian algae trial. (04-05-2011)
NO board OK's \$775k for sunflower, carrot bio diesel process... (04-05-2011)

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SIoux FALLS GREEN DRINKS

Sioux Falls Green Drinks is a weekly event for local green businesses. It's a chance to network, share ideas, and learn more about the local green economy. The date, time & location of the next event is listed on the website.



CSBP BRAND STRATEGY: 04.18.12



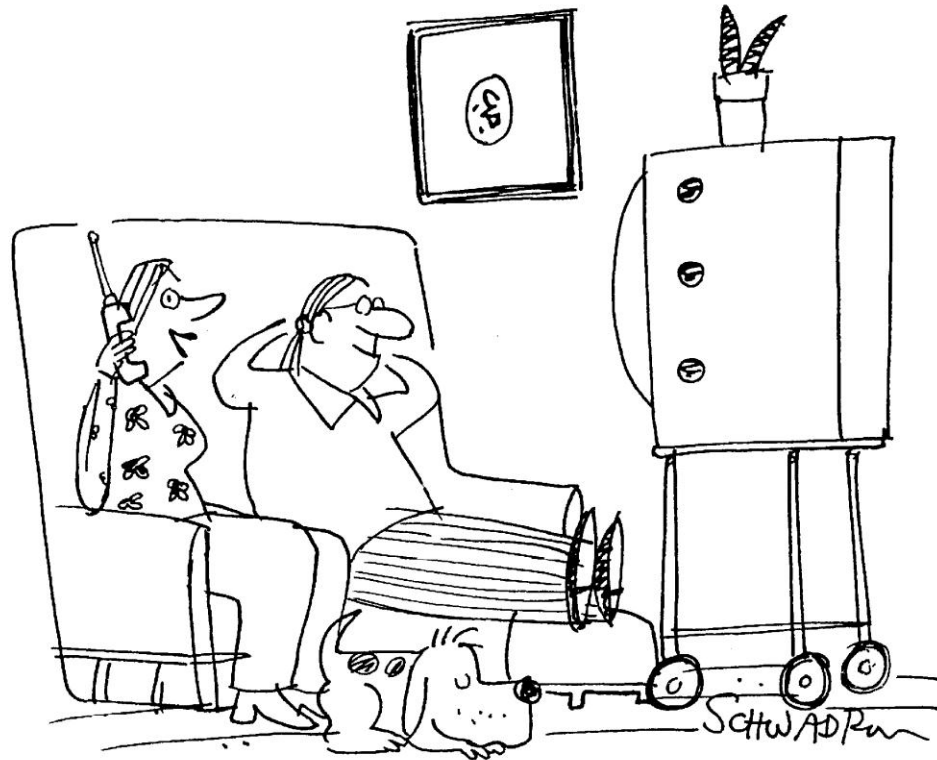
astronaut

astronautstudio.com

PURPOSE

1. Brand strategy + Tactical plan
2. A roadmap for inspiring, durable communications
3. Based on reality
4. Based on an insight
5. Messages + Positioning
6. A Big Idea: unifies and drives all communications
7. Develop a communications plan for launch and the long term





"NOT MUCH. ROGER AND I ARE JUST SITTING AROUND,
LETTING OURSELVES BE TARGETED BY ADVERTISERS."



NOTES ON BRAND

What do we mean by brand?

Goods and services exist in the real world.

Brand exists in the mind.

Sum of every touch-point.





CSBP BRAND STRATEGY: 04.18.12



NOTES ON BRAND

Make it easy to buy.

Make it easy to sell.

Create value.



WHAT WE DID

Research

- Interviews

- Reviewed alt. standards

- Brand/communications audits

Analysis

- What does it all mean?

- Message development

- The Big Idea

Translation

- Preliminary Creative

- Communications Plan



WHAT WE LEARNED

- Multi-stakeholder representation
- Producer + Consumer dimensions
- Principles + Best Practices
- Scalability
- Transparency
- Definition of sustainability
- Full scope of production issues:
 - resource management + soil + biodiversity + air quality + GHG
 - social well-being
 - economic opportunity



WHAT WE LEARNED

- **CSBP: Proactive in its DNA**
- **A lot of personal investment**
- **A lot of personal growth**
- **Agreement on concept(s) of sustainability**
- **Confidence and pride in the Standard**
- **Frustration with impasse**
- **Tension, uncertainty**
- **Desire to get along, do the right thing**



WHAT WE LEARNED

- **Emphasis on science**
- **Need for flexibility/adaptability built-in**
- **Growers are in the front seat**
- **Consumers are in the driver's seat**
- **Growers/land owners need a signal**
- **Consumers need to know there are parties willing to commit**
- **Two hands on a piano**



WHAT WE LEARNED: PERSPECTIVES

There's a lot of distrust that's been built up over many, many years. CSBP has been very good saying "we're not here to hurt you, we're here to help."

Where CSBP has an advantage: for the first time in American agriculture, an organization went out to industry, to seed companies, to environmental groups with a baseline of trust and said "let's see what we learn and adjust from there."

Is the initial burden going to be on farmers? Yes. Although the end users will be the drivers... agronomy is not their traditional business. There's got to be a way to say to the farmer: this is your chance to get out ahead of this.



WHAT WE LEARNED: PERSPECTIVES

There are people at the table who are truly interested in developing a collaborative, consensus-based way forward. There are some who are interested in getting their own way.

I would think the science-based change in perspective has been true for a lot of people. I have to believe the political side of it is also true for others, too.

I admit I was apprehensive, because it's such a diverse group but it's been a lot of fun. I've broadened my horizons. I've been impressed by how well people work together. It doesn't mean we always agree but we work well together.



WHAT WE LEARNED: PERSPECTIVES

I really appreciate hearing different perspectives, especially the grower's. I did not understand or appreciate the proprietary nature of some of the data we're asking growers to provide.

It's a first attempt to get a lot of people's voice into a new production system. People that are not traditionally engaged in how the [agriculture] industry is shaped.

For the most part a lot of those folks have broken down perceptions that I have — that they're whacko, that they want everything pristine. My perception of those folks was shaped by the popular media — and ag has its own cross to bear: haven't done a good job breaking down others' perceptions either.



WHAT WE LEARNED: PERSPECTIVES

To me the most important audience is the people already around the table. If they and their organizations buy into this, then it will be a success.

We go out to dinner; it builds trust.

It's been a joy. We may have a hard day of conversations but we can go out for dinner. The personal dynamics are the biggest thing. I would like to think that other feel this way too.

Our greatest strength is our honest approach to developing the standard. We're saying "we're open, we asked the hard questions." Transparency.



WHAT WE LEARNED: PERSPECTIVES

I didn't think it was going to take this long. I had envisioned a tool growers could take out and use to see what they need to do. It's become a very complex standard, something most growers won't be able to get certified without outside help.

I don't want growers to think they will be punished if they don't comply. This is not a method to reveal their weaknesses. It is an evolving standard; it will be flexible depending on the feedback we get from implementation.

I did not appreciate the proprietary nature of some of the data we're asking growers to provide. Another thing I did not appreciate before I joined is the categories of endangered species, categories of land and how it's classified.



WHAT WE LEARNED: PERSPECTIVES

I think that one of the most important contributions is from our growers. Bill Belden has brought a lot of perspective; I like that he's always keeping us grounded. I've learned a lot about the ecosystem considerations — biodiversity, air, soil... it's been pretty interesting.

We have united intentions and I was really grateful to understand key NGO perspectives — we all want to do it right.

In trying to please everyone, do we please no one? Is it too complicated?

It's going to be a dynamic membership, and the standard is going to be dynamic. Let's make sure we recognize it's not carved in stone.



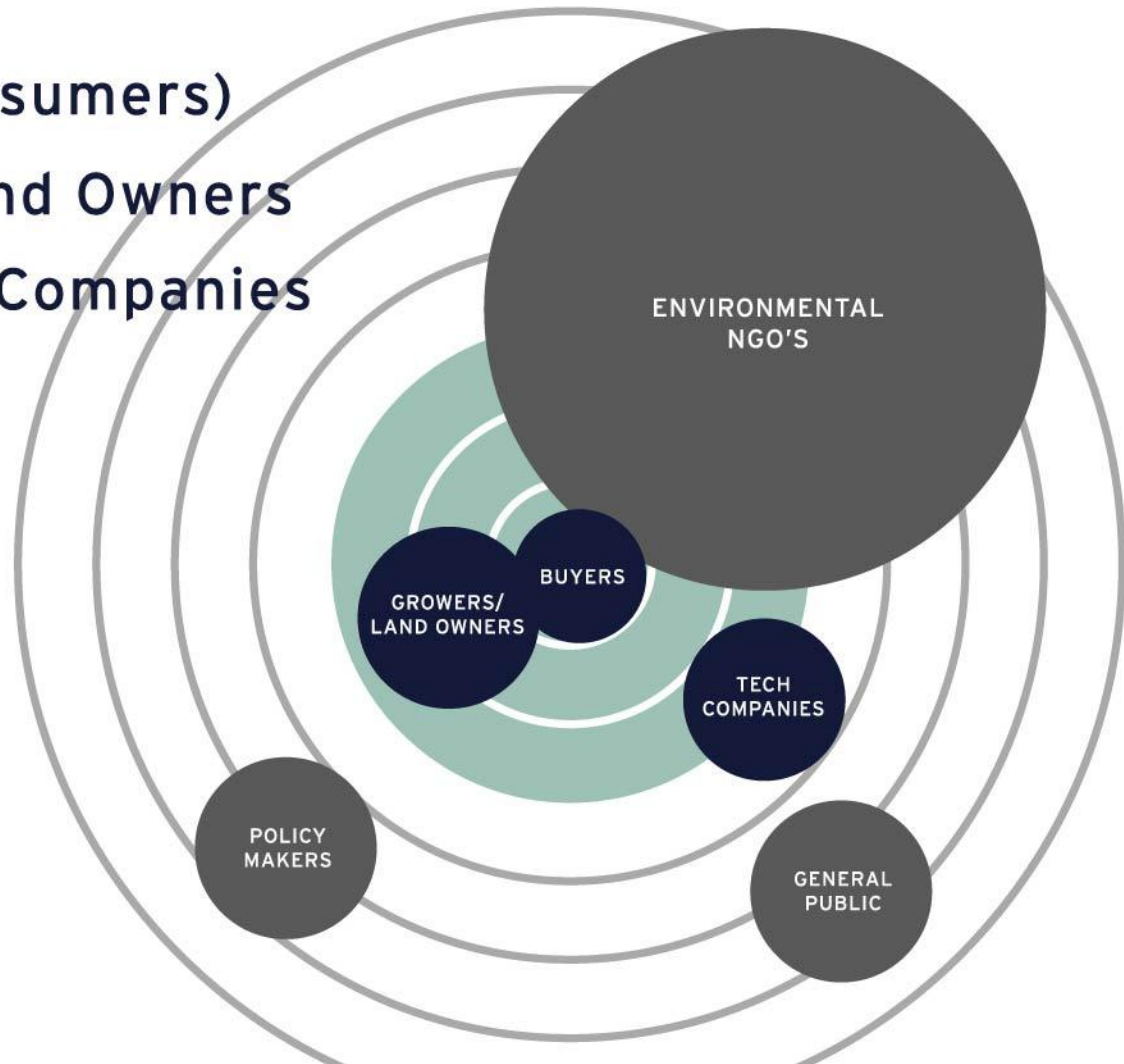
ANALYSIS

1. **Solid product. Great story.**
2. **The “Who” is as important, if not more, than the “What.”**
3. **Credibility is not the end: it’s the minimum ante.**
4. **The true ends: *Respect, Security, Alliance, Opportunity, Sustainability.***
5. **Must tailor messages by category/audience.**
6. **The opportunity to make an impression is great.**
7. **Two key audiences stand out: consumers + growers/land owners**



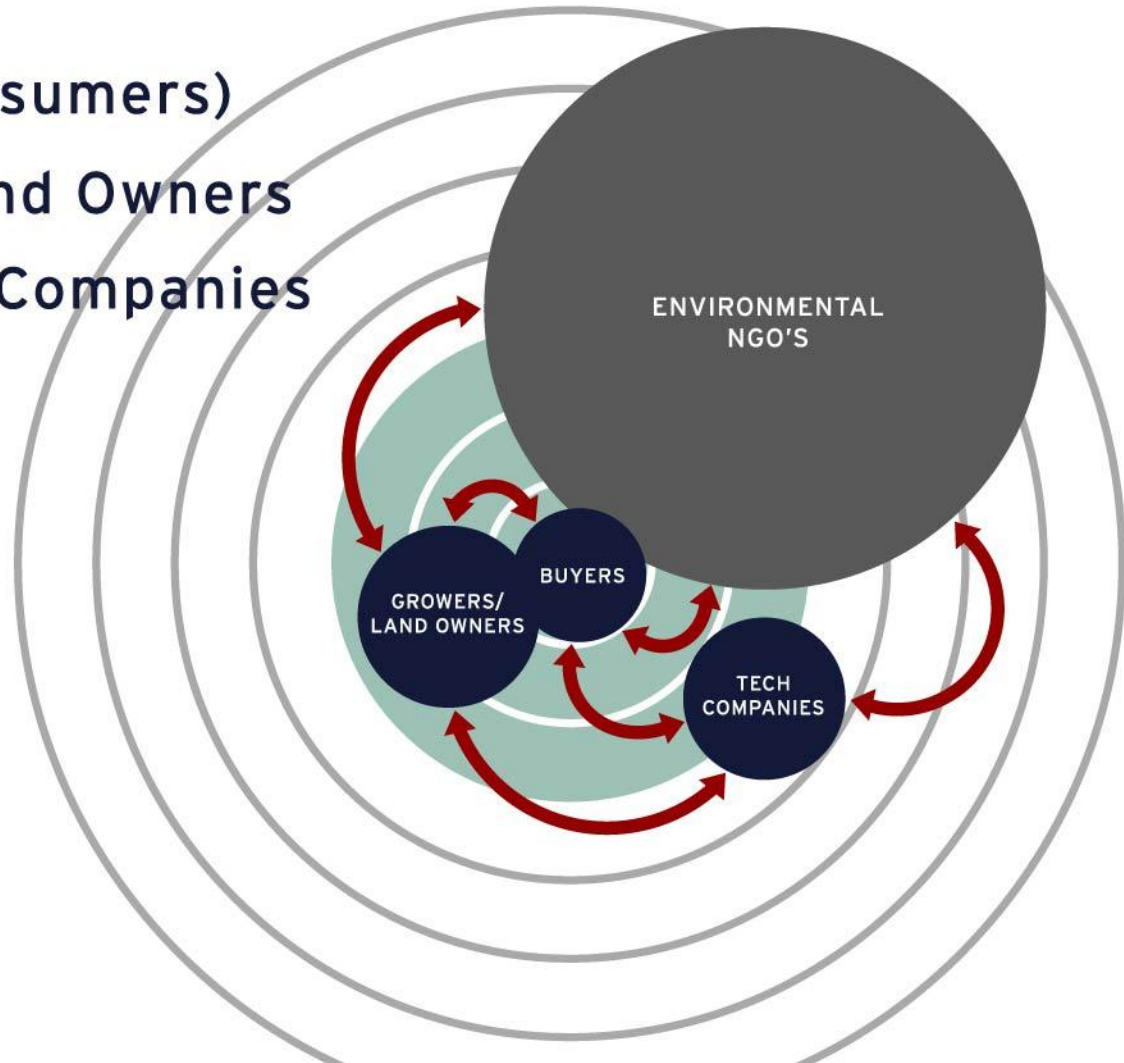
TARGET DEMOS (TACTICAL)

1. Buyers (Consumers)
2. Growers/Land Owners
3. Technology Companies



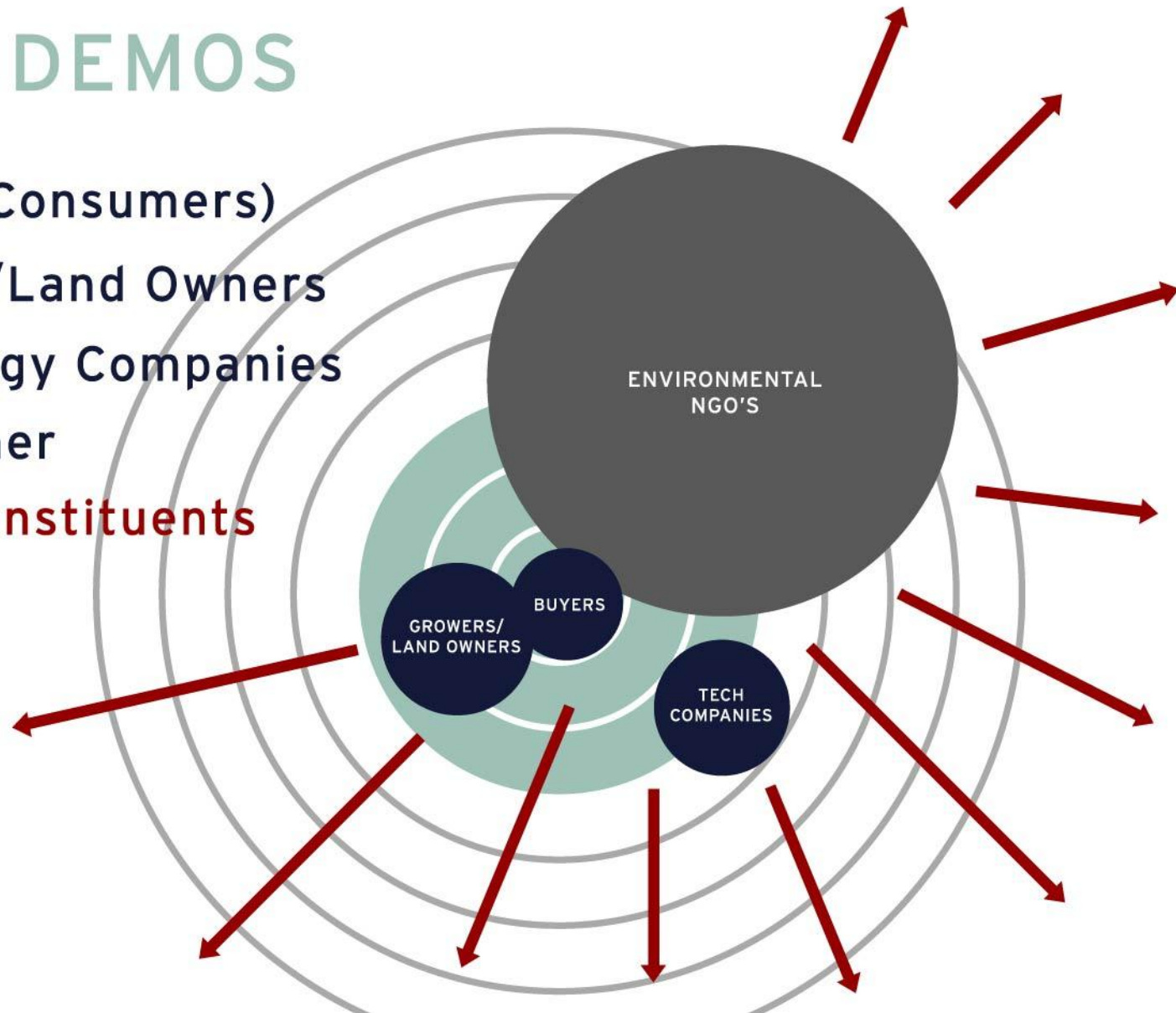
TARGET DEMOS

1. Buyers (Consumers)
2. Growers/Land Owners
3. Technology Companies
4. Each Other



TARGET DEMOS

1. Buyers (Consumers)
2. Growers/Land Owners
3. Technology Companies
4. Each Other
5. Other Constituents



WHAT'S IN IT FOR ME? MESSAGE ARCHITECTURE: BY AUDIENCE

TWO TRACKS:

1. AS A GROUP
2. AS INDIVIDUALS



WHAT'S IN IT FOR ME? MESSAGE ARCHITECTURE: BY AUDIENCE

TWO TRACKS:

1. AS A GROUP: Global, Exterior, Broad
2. AS INDIVIDUALS: Narrow, By Categories, Interior (to each)



WHAT'S IN IT FOR ME?

GROWERS/
LAND
OWNERS

BUYERS/
CONSUMERS

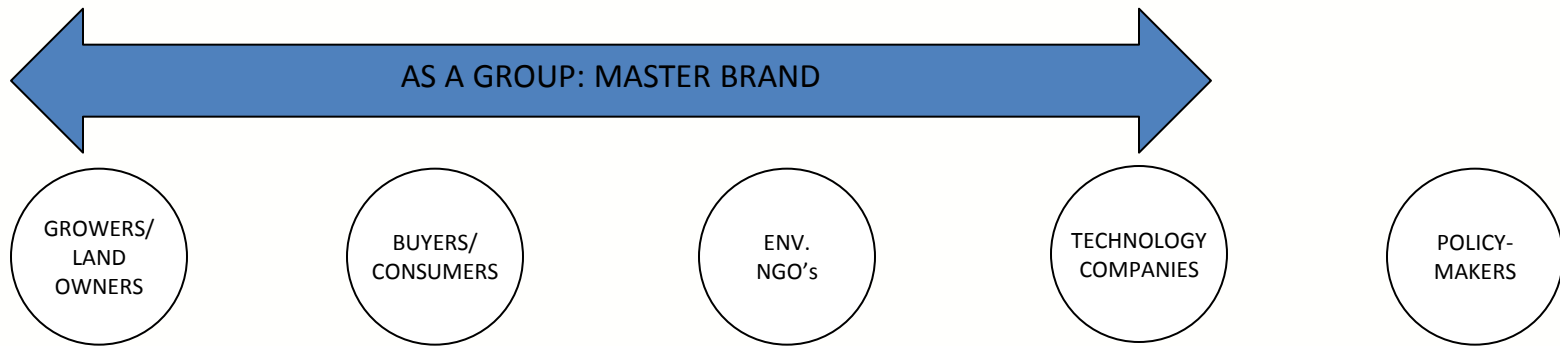
ENV.
NGO's

TECHNOLOGY
COMPANIES

POLICY-
MAKERS



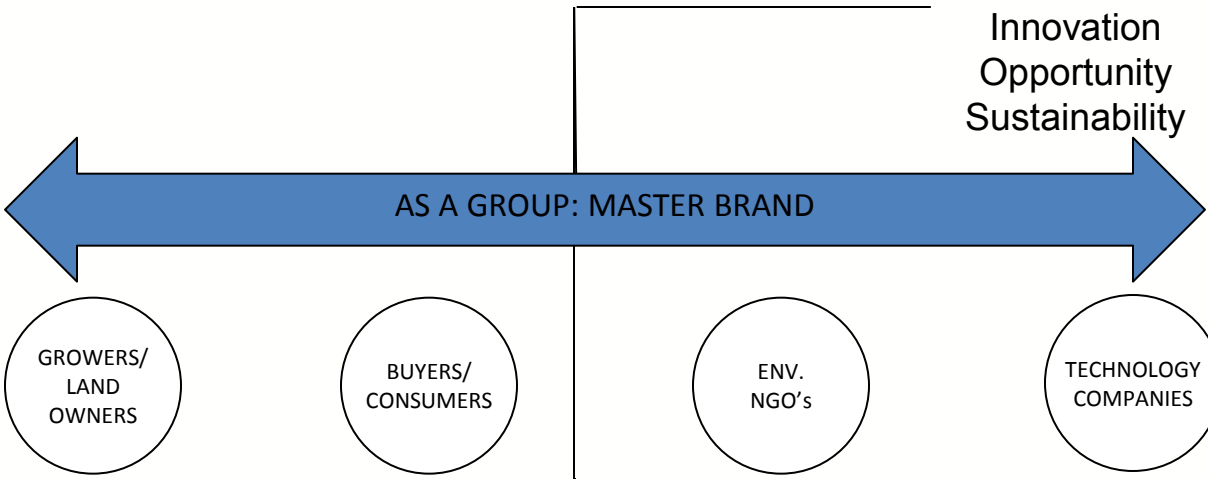
WHAT'S IN IT FOR ME?



WHAT'S IN IT FOR ME?

Credibility
 Respect
 Security
 Alliance
 Innovation
 Opportunity
 Sustainability

THE BIG IDEA

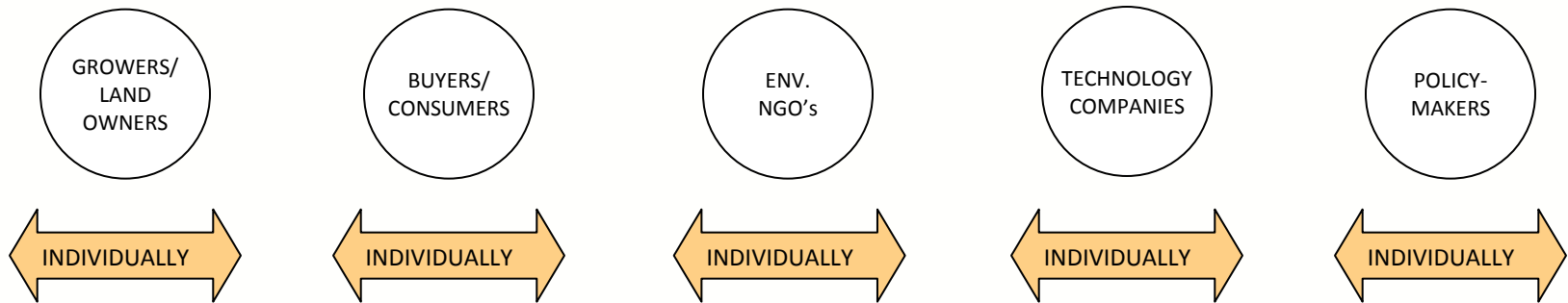


GLOBAL MESSAGE PLATFORM

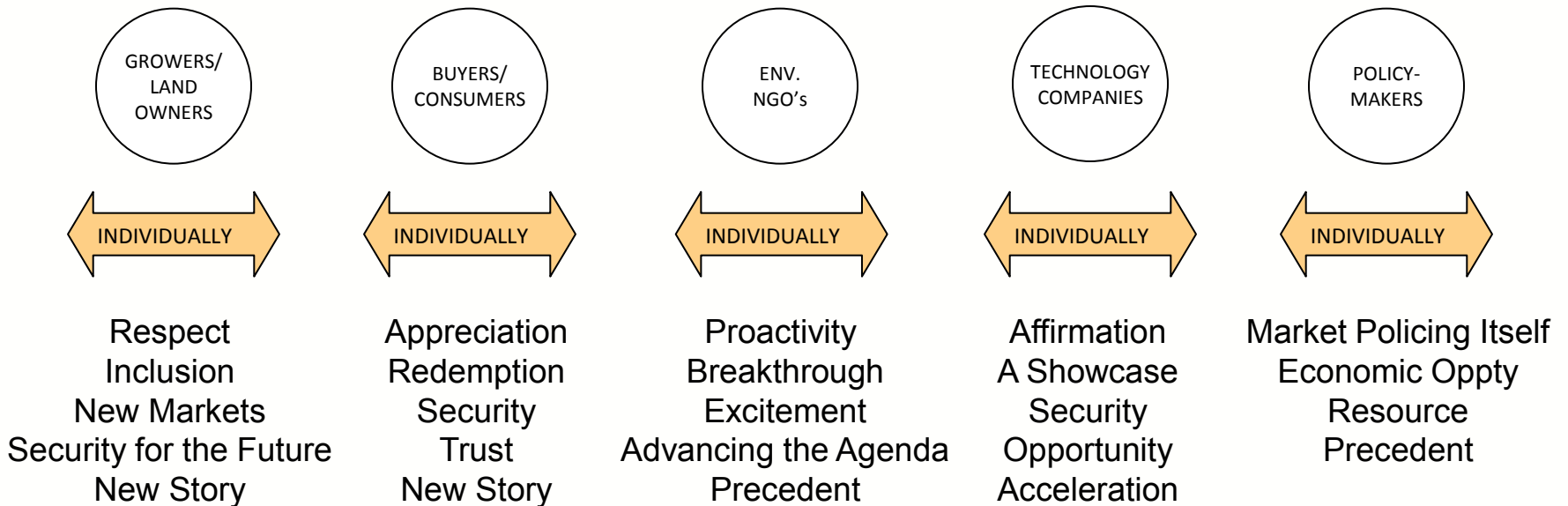
1. *This standard is rooted in sound science, best practices, reflects a breadth of input from across a diverse and inclusive field*
2. *We have witnessed/learned from other industries and sectors as they developed their own certification standards*
3. *The sector needs to agree on standards before they are imposed on us. This is about getting out ahead of the curve; better to lead than follow.*
4. *We're doing more than our job: we're innovating. This is good for everyone*
5. *Doing our part to support America's energy independence.*



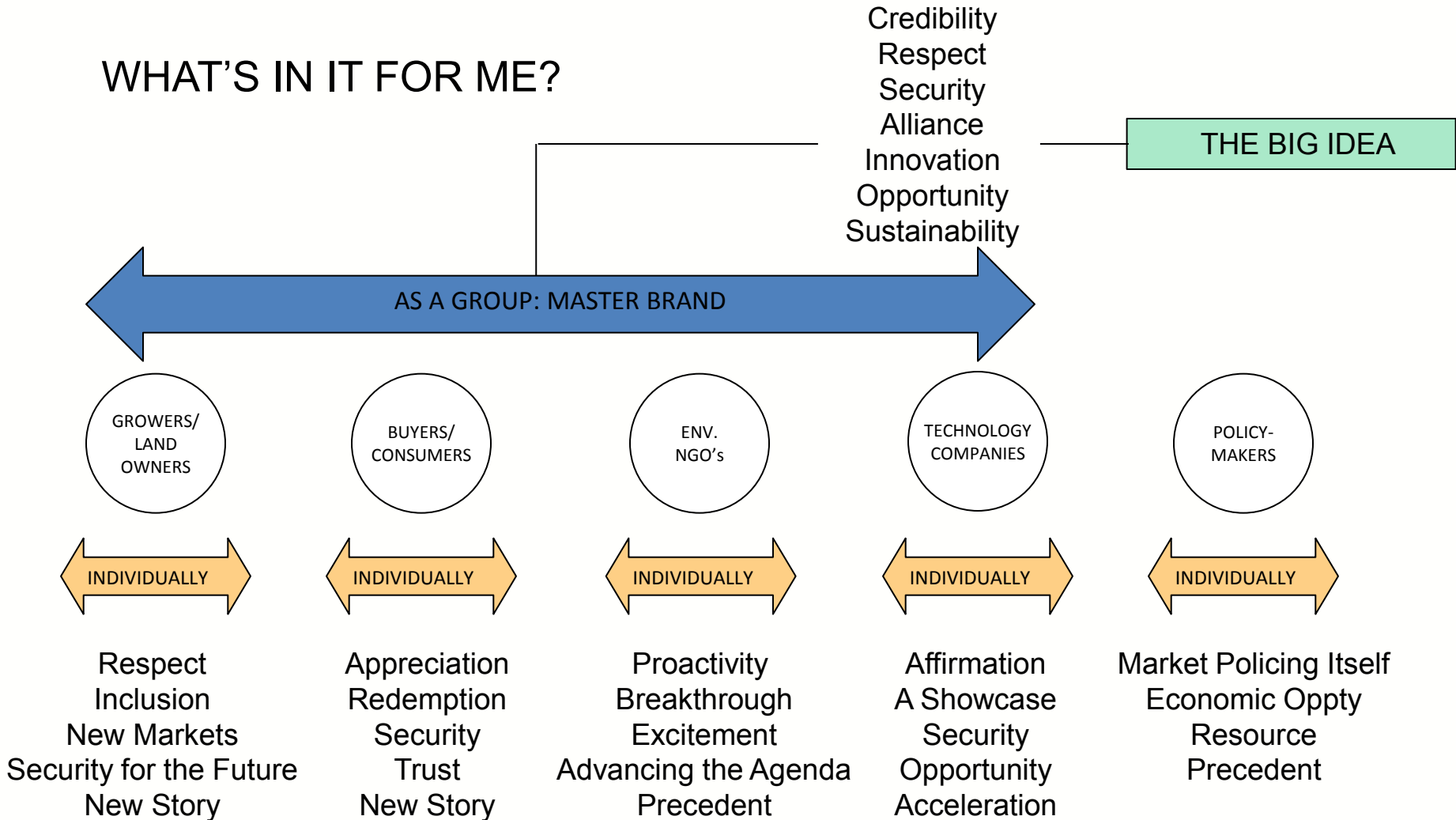
WHAT'S IN IT FOR ME?



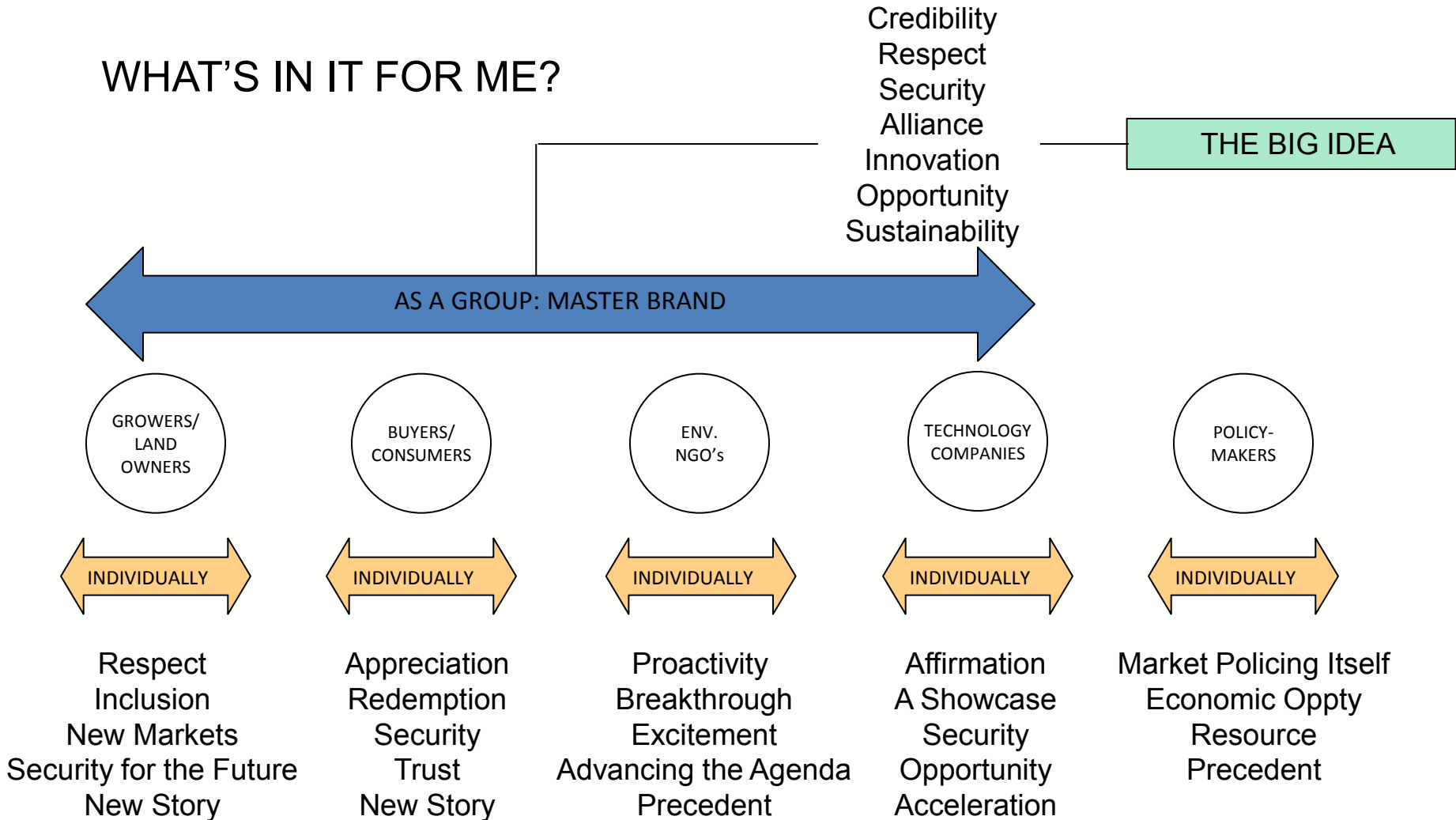
WHAT'S IN IT FOR ME?



WHAT'S IN IT FOR ME?



WHAT'S IN IT FOR ME?



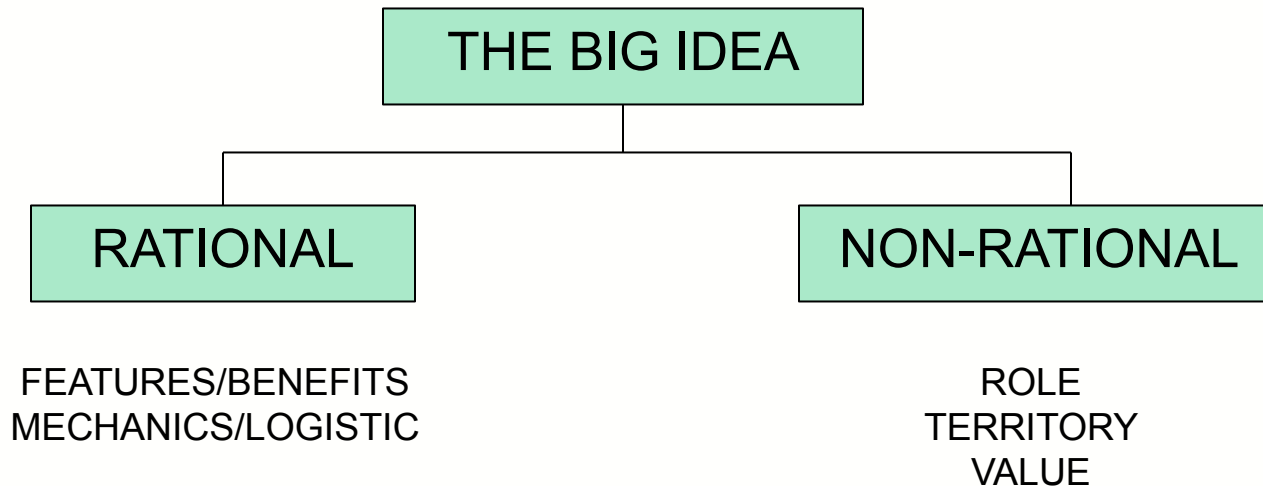
THE RIGHT MESSAGE, THE RIGHT AUDIENCE, AT THE RIGHT TIME

- We will tailor messages depending on the audience and channel.
- We're driving toward a "Big Idea" that holds it all together.

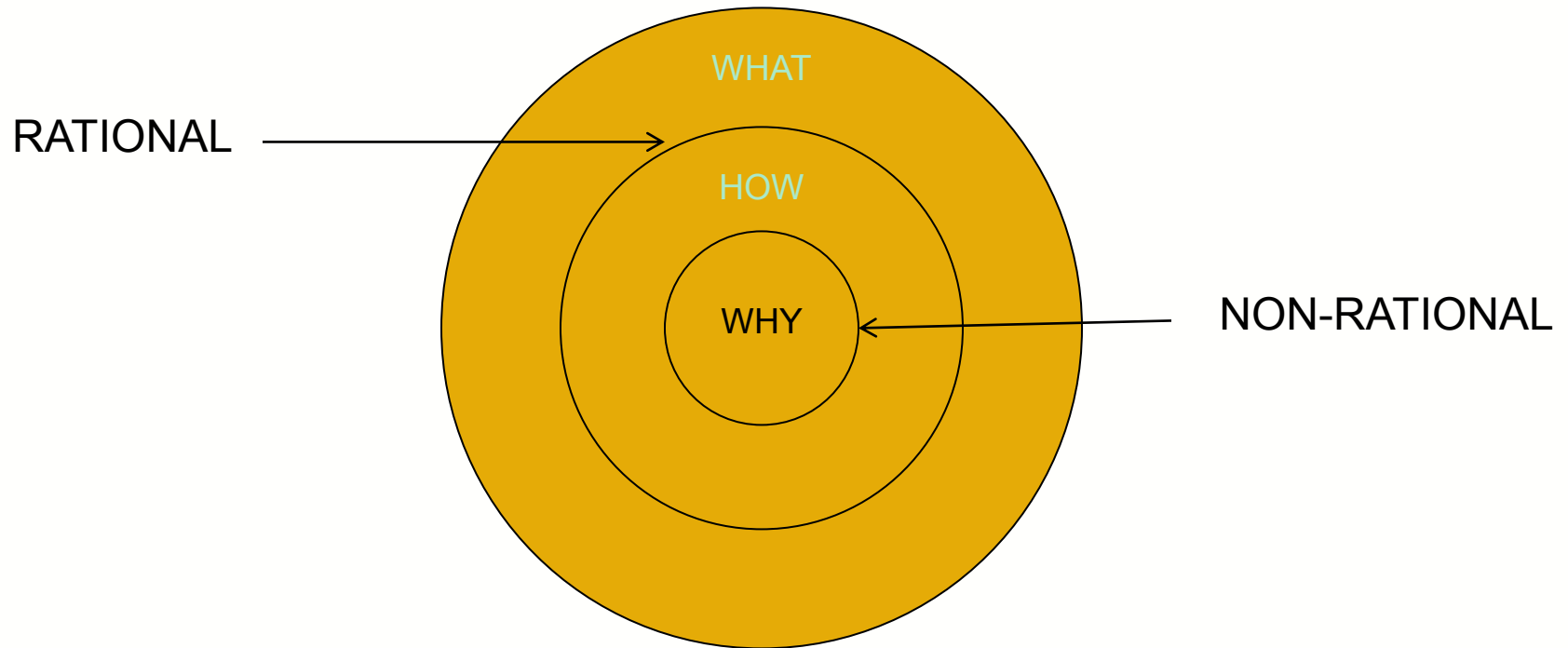


WHAT'S IN IT FOR ME?

MESSAGE ARCHITECTURE: BY MESSAGE



MOVEMENTS START WITH “WHY.”



THE BIG IDEA





**STRONGER
TOGETHER**

THE BIG IDEA HOLDS THIS TOGETHER:

RATIONAL

FEATURES

Process/history
Participants/contributors
Science-based metrics
Best Practices
Principles
Producer + Consumer
dimensions
Scalability
Definition of sustainability
Transparency
Addresses full scope of
production issues:

- resource management
- soil
- biodiversity
- etc.

BENEFITS

Credible
Vetted
Proactive (addresses future
scrutiny
Path to new markets:
domestic
overseas (Europe)
Delivers an excellent story
Creates platform for
participation/inclusion
Confidence
New allies

NON-RATIONAL

TERRITORY

A Movement
Humanity
Hope
Understanding
New Friends
Community & Family
Richness, substance
A place where you belong
A better world for us and our
children

Every movement must have a
call to action



EVERY MOVEMENT HAS A CALL TO ACTION



GROW TOGETHER

CSBP BRAND STRATEGY: 04.18.12

181



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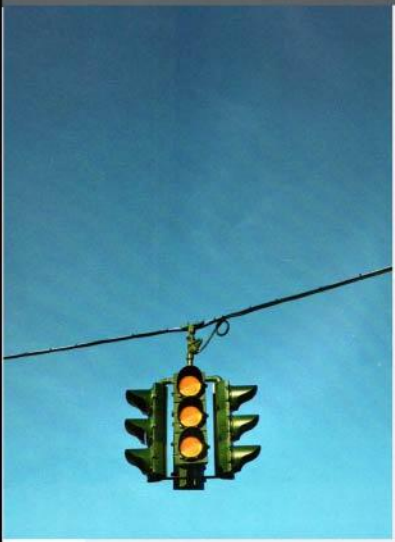
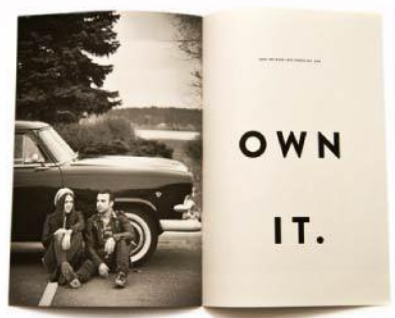
astronautstudio.com

GREAT. WHAT DOES IT LOOK LIKE?

AG + FORESTY + TECHNOLOGY +
ENVIRONMENTALISM
MEETS
FAST COMPANY







CSBP BRAND STRATEGY: 04.18.12



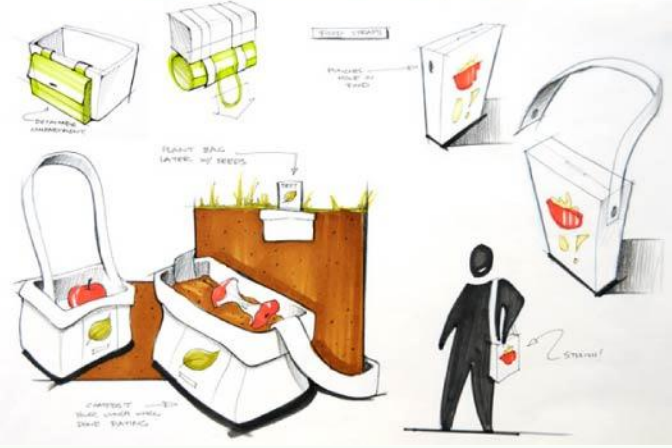
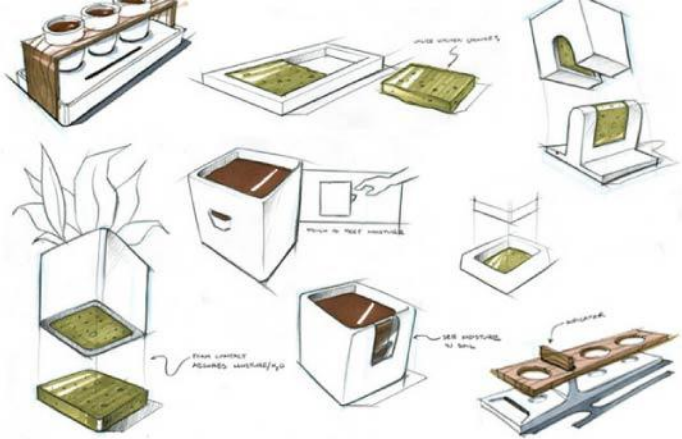


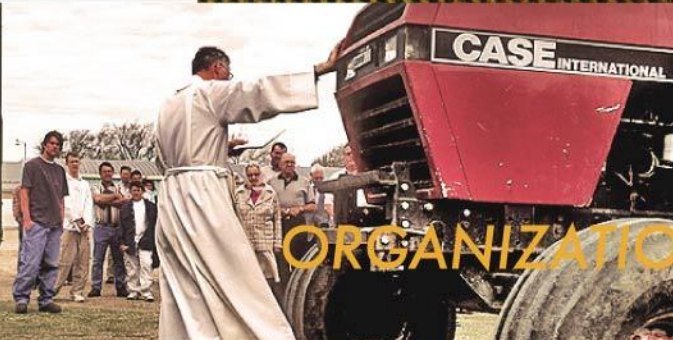
CSBP BRAND STRATEGY: 04.18.12



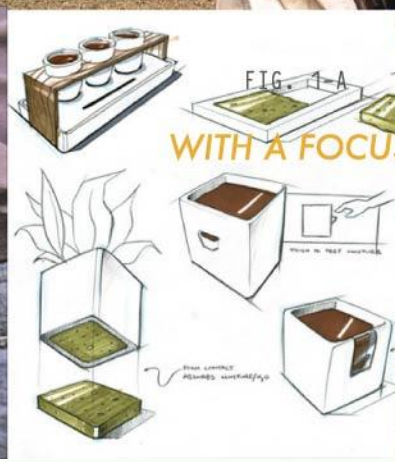
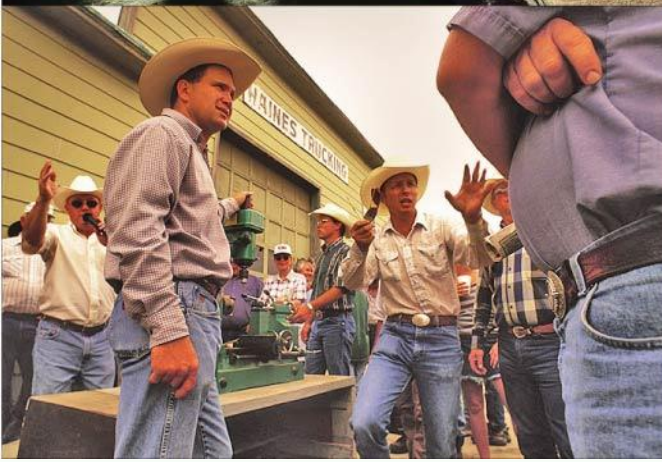
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ORGANIZATIONS



GROW TOGETHER

948

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Morbi lacinia augue in ligula auctor non auctor ligula tincidunt. Aenean venenatis elementum lectus, ut auctor ante tempor eu. Phasellus nec lorem ligula. Mauris sodales

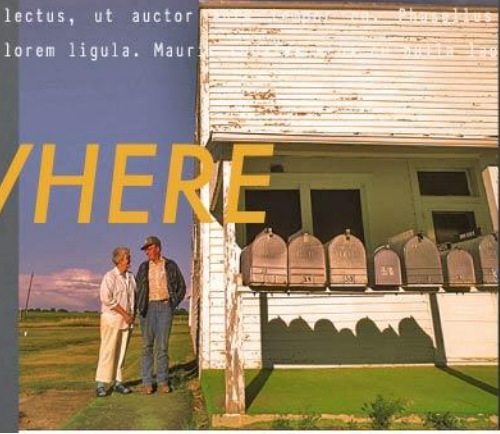


Lorem ipsum dolor sit amet, consectetur adipiscing elit. Morbi lacinia augue in ligula auctor non auctor ligula tincidunt. Aenean venenatis elementum lectus, ut auctor ante tempor eu. Phasellus nec lorem ligula. Mauris sodales



Push-Button Telephone

dialing an old rotary phone was a laborious, time-intensive task. Your house could burn down before you finished cranking out the number for the fire department. In the late 1940s, switchboard operators already had a more efficient push-button system that used tones instead of electrical impulses to signal each digit. So Bell Labs engineers set out to adapt that system for customers, gutting a Western Electric 302 tabletop rotary, they introduced a set of ten 2-inch metal rods. Pressing a button produced a specific reed, producing a unique sound. Thirty-five test units were deployed to phone company employees' homes in Muskegon, Michigan, but the yearning that was a bust. Moving or bumping the phone would pop the reeds, and any static on the line—or even talking—while dialing caused interference. Push-button phones didn't become consumer-ready until 1963, when solid-state electronics replaced the reeds, generating faultproof digital tones.



FALL
GEAR
2009

43 OF THE YEAR'S COOLEST PRODUCTS, TESTED AND RATED.





GREAT. WHAT'S NEXT?

1. Communications Plan in Production
2. Launch
3. Narrow, Target Campaigns
4. On-going, Long-term Campaigns
5. Traditional/Social Media + Public Relations
6. Leverage Internal CSBP Personnel
7. Commit to Launch with Strength
8. Much to Accomplish (Tactics) by June



CONCLUSION

- Wonderfully productive process
- Insight: the “who” is as important as the “what”
- Insight: credibility is the minimum ante + much high level messages to take to market
- Global message platform
- Tailored messages
- A Big Idea: Stronger Together
- Strong visual foundation for executing tactics
- Communications plan is in development
- Question is what can this group commit to?



LET'S TALK!

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@AstronautStudio

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Contact: John Heissenbuttel
Executive Director, CSBP
hnrc@volcano.net
209/296-4889

CSBP Launches First U.S. Standard for Sustainable Biomass Production

(WASHINGTON, June 12, 2012) The Council on Sustainable Biomass Production (CSBP) -- the first organization to develop a cellulosic biomass standard specifically designed for use in the United States -- announced today the release of the first consensus version of the CSBP Standard (attached).

CSBP focuses on ensuring that the projected large amounts of biomass needed to support the growing bioeconomy are produced sustainably, and that the resulting energy produced from that biomass is also produced sustainably. “This is an exciting day for CSBP and US bioenergy,” says Jody Endres, assistant professor at University of Illinois and current chair of the CSBP. “Our diverse set of members have been able to agree that in order to grow a biomass-based energy program in the U.S. and for export markets, it must be done responsibly and sustainably. We actively have been solving environmental, social and economic challenges through a certification standard that any farmer can adopt.”

The CSBP is a broad-based, multi-stakeholder program developing a U.S. standard and educational materials to help growers and energy producers alike ensure sustainable production of a biomass-based energy industry. The standard has been built through a process of consensus among environmental, economic and social members.

The growers’ cooperative, Show Me Energy, based in Centerview, Missouri will be the first major organization to use the CSBP standard. Steve Flick, Board Chairman of Show Me Energy, says “We are very pleased to be part of the development of a sustainability standard that makes sense for biomass producers in the U.S. and especially honored to be the first user of the standard.” Show Me Energy producers represent 26 thousand acres of bio-diverse native grass mixture committed to the sustainable production of biomass.

The CSBP is supported through contributions by its members and grants from the U.S. Department of Energy and the U.S. Department of Agriculture’s Natural Resource Conservation Service. The organization is actively seeking additional participation from a full range of stakeholders interested in biomass production and use for energy. The CSBP will release detailed implementation guidance for participants over the next few months.



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08

CSBP BRAND STRATEGY
COMMUNICATIONS PLAN
MEDIA DESCRIPTION
DRAFT 03
05.15.12

PHASE I.: LAUNCH

Astronaut recommends that the CSBP launch its new brand strategy by applying the full weight of its resources (financial, intellectual and time) to a very narrow set of deliverables in the immediate term.

The following is a description of those assets.

The group should apply the highest possible level of production quality to this small number of media tactics with the intent of rolling them out in early September, 2012 – soon after the Labor Day holiday but before the harvest season and in advance of several key forestry trade shows and industry events.

This implies a creative development and production process that starts no later than June, 2012.

The purpose of a strong, concentrated approach to a few media tactics is three-fold:

1. To leverage the greatest value from CSBP's limited resources as quickly as possible without compromising quality;
2. To launch the brand with power through high-quality content and aesthetics;
3. To establish a phased approach to developing and rolling out media tactics, campaigns and efforts over the next 12 to 18 months that will help build awareness and drive the many on-the-ground recruitment and educational activities the CSBP will need to undertake.

WEBSITE:

The website is the most important core communications platform for the brand as a whole and as an information resource – not to mention as a hub to connect CSBP stakeholders. This makes it the centerpiece of all content that must be developed to explain and promote the Standard and this new brand.

It also represents the first effort to communicate (and market) the standard and what it represents (Stronger Together). It is the primary vehicle to launch the brand. For this reason we should not underestimate the investment in resources required to finally build out the messages the group has developed and outlined in the brand strategy. Because the site is the centerpiece of the CSBP effort, and because the Standard itself is complex, the website is the main focus of our launch effort. A strong, robust, user-friendly web site is simply the wisest use of CSBP.

If the CSBP develops its site well, it will help establish immediate credibility that will translate into every future communications deliverable. It will also make those deliverables a little easier to produce.

The site should be more than a static electronic “brochure.” It should provide for updatable, sharable content, including news, blog posts, video, photography and connectivity to the major social media platforms. It needs to be a living resource that can be updated with content that is easy to share, along with future campaign media that appeal to the disparate parties with a stake in the Standard.

Finally, the site represents our key opportunity to differentiate the CSBP standard from other certification programs both in terms of substance and style.

VIDEO TESTIMONIALS:

To deliver on the brand strategy’s “Stronger Together” focus, it’s essential to unite the diverse perspectives of the many stakeholders who have helped craft the CSBP standard. We will produce six (6) or seven (7) testimonials from current CSBP stakeholders/members who can offer perspectives on the mechanics of the Standard, their own personal experience collaborating with the group and more.

These testimonials will be posted on the website and can be used in other venues, such as live presentations. This brings up two other important considerations for using video as a central communications tactic.

First, video helps drive search engine results online. One 2011 study found, for instance, that video content outperforms text-based content by a factor of 50 in online searches. Second, from the perspective of the viewer, video is low-investment content. That is, it’s much easier for a visitor to click a button and learn about complex ideas through the motion picture than to read long form copy.

Moving forward, video can be a central communications tool both on- and offline to telegraph the CSBP brand, recruit members and explain the many particulars of the standard.

SMALL “POCKET-BROCHURE” GUIDE TO THE STANDARD

The CSBP needs to produce at least one print media piece that members and advocates can take into the field – to tradeshow, conferences, business meetings and to growers and landowners for face-to-face meetings.

This “Pocket Guide” is where the rubber meets the road: it must translate in simple, graphically rich terms the complexities and nuances of the Standard. We think this initial tool should be focused on the opportunities and requirements for growers and landowners. But its potential is to also serve as a recruitment tool for both growers, consumers, technology companies and even policymakers.

This piece can answer those agendas with strong design and thoughtful, compelling copywriting. In keeping with the recommendations of the CSBP Brand Strategy, this piece must both inspire and educate.

Although the content may be lengthy, the physical dimensions of this piece need to be small enough to fit into a coat pocket. It needs to be user friendly and impossible to discard.

One benefit to including this deliverable in the initial package of launch communications is that its content will be tied directly to that which we develop for the website. They are complimentary. That said, the actual creative presentation, or execution, of that content will be different in this print piece than online.

PHOTOGRAPHY + ILLUSTRATION

CSBP needs to produce or acquire high-end photography to launch the visual dimension of the brand. This could be a one-time cost but is important to bear in mind as the group anticipates development of any visual media. Likewise, illustration will be an excellent means to demonstrate certain aspects of the CSBP Standard. All photography and illustration should follow the visual standards set in the CSBP Brand Strategy.

PUBLIC RELATIONS

In many regards, a strong public relations effort may be the most important communications tool to roll out the CSBP brand with strength. For the immediate term, a basic package of public relations services will compliment the traditional media fundamentals we produce for the launch.

We recommend the CSBP identify three or four potential members who can represent a “face” for the organization in a variety of categories. Ideally there should be one single point of contact between the organization and the media. For the long term, for the purposes of communicating with specific trade media, we suggest designating one personality from each of the major industry categories represented in the CSBP – ag/forestry, energy production, environmental NGO’s and technology companies.

As with our traditional communications tactics, PR effort for the launch should be narrowly focused: media training for those key individuals and outreach to the most important publications, bloggers and influencers in the four or five categories of

stakeholders (ag, forestry, energy, environmental media, technology). This will be a closed-ended engagement. A more open-ended effort can commence in later phases.

ESTIMATED SEPTEMBER LAUNCH COSTS \$112,000

Estimate is for Agency services only: does not include printing, shipping/mailing, web hosting, travel, meals or other third-party hard costs; estimate does not include taxes if applicable.

PHASE II.: INTEGRATED 2013 AWARENESS CAMPAIGN

In the aftermath of the September Brand Launch, in the fall and early winter of 2012, the CSBP should prep for the next phase of communications: a 2013 Awareness Campaign.

This second phase should feature a more aggressive combination of traditional media, social media and public relations – but with a distinct beginning and ending.

This second phase should also include larger, more aspiration print literature targeting prospects and energy companies (consumers) as well as growers.

The integrated campaign should include:

- print advertising in key trade publications + niche media channels
- online advertising in trade and environmental channels
- Facebook/Google ads
- A rich, social media campaign featuring videotaped roundtable discussions between diverse stakeholders from each member category (ag/forestry, energy companies, environmental NGO's, technology companies, etc.)
 - *Details of this concept can be delivered in a separate creative treatment document: it is meant to combine different media, especially video, in a shareable format*
- Expanded Public Relations supporting social media campaign
- Speaker/presentation opportunities at key winter ag conferences

ESTIMATED 2013 INTEGRATED CAMPAIGN COSTS \$150,000 - \$250,000

Estimate is for Agency services only: does not include printing, shipping/mailing, web hosting, travel, meals or other third-party hard costs; estimate does not include taxes if applicable.

Appendix F

Antares Group & Scientific Certification Systems Field Testing Findings

**APPENDIX A:
CSBP Checklist, Scoring Tool, and IRMP Template with Instructions**



Self-Assessment Checklist

CSBP Draft Standard

INSTRUCTIONS:

This booklet is used by both growers and auditors. Complete all questions and tables in Worksheets 1-9. Please include supporting documentation as requested and whenever appropriate. List document or file name in Column E.

Additional information is found on the Instructions tab.

WORKSHEETS:

Farm Input	# pages
Field	1
1 Integrated Resource Management Plan	1
2 Soil	2
3 Biological Diversity	2
4 Water	4
5 Air Quality, Emission, and Energy	6
6 Socio-Economic Well-Being	1
7 Legality	3
8 Transparency	1
9 Continuous Improvement	1
Total:	23

SIGNATURE:

As an authorized Applicant representative, I hereby affirm

Company: _____

Name: _____

Signature: _____

Date: _____

Integrated Resource Management Planning

Farm Name
Producer Name
City, State

Date

Background

Please provide background information describing your operations, management strategies, and goals as a biomass producer.

Please provide answer here....

Soil Principle

Biomass production shall maintain or improve soil quality by minimizing erosion, enhancing carbon sequestration, and promoting healthy biological systems and chemical and physical properties.

What do you do in your operation to monitor soil nutrient levels, conserve soil, and maintain productivity under a NRCS conservation plan to guide management decisions and reduce loss to air and water? What are your goals in doing this?

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Biological Diversity Principle

Biomass production shall contribute to the conservation or enhancement of biological diversity, in particular native plants and wildlife.

How do you assess wildlife habitat on your operation with regard to vegetation cover, threatened and endangered species, or species identified in state wildlife action plans? How does your assessment affect your planning and management activities? What would you like to

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Water Principle

Biomass production shall maintain or improve surface water, groundwater, and aquatic ecosystems.

How do your management plans affect water on and around your farm operation? What do you do to assess and implement practices that conserve water, reduce runoff and erosion, and improve water quality? What are your goals in implementing these practices?

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Air Quality/Emissions Principle

Cellulosic bioenergy shall reduce GHG emissions as compared to fossil-based energy. Emissions shall be estimated via a consistent approach to life cycle assessment.

How do your management plans affect air quality? What steps do you take to reduce air emissions and improve air quality? What goals do you hope to achieve by implementing these practices?

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Socio-Economic Principle

Biomass production shall take place within a framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders (including land owners, farm workers, suppliers, bioenergy producers, and the local community), and ensures compliance with labor laws and human rights.

How do your management plans affect the socio-economic environment on your operation? How are laborers treated fairly and provided a safe work environment? How do these practices contribute to the goals on your operation?

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Legality Principle

Biomass production shall comply with applicable federal, provincial, state, and local laws, ordinances, and regulations.

How do you consider legality in our management planning? What steps do you take to ensure that your operation follows all applicable local, state, and federal laws? What are your goals in doing so?

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Transparency Principle

Production of certified biomass shall be transparent.

How do your management plans enhance the transparency of your operation? What steps do you take to accomplish this? Please explain.

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Continuous Improvement Principle

Biomass production practices and outcomes shall continuously improve based on the best available science.

What steps are included in your management planning that foster continuous improvement? Can you provide an example of continuous improvement on your operation?

Please provide answer here....

Are there other practices that you implement to help you achieve these objectives that go above and beyond the goals of the standard?

Please provide answer here....

Producer		Supporting Document (file name)	Criterion / Indicator	Level	Auditor		Evidence for Compliance
Yes	No / PC				Yes	No / PC	
	N/A						
		INTEGRATED RESOURCE MANAGEMENT PLAN					
		9.2.S2 Good Agricultural Practices					

Producer		Supporting Document (file name)	Criterion / Indicator	Level	Auditor		Evidence for Compliance
Yes	No / PC				Yes	No / PC	
			1.3				
			1.3.S1				
				Silver			
			1.3.S2				
				Silver			
			1.3.S3				
				Silver			
			1.3.S4				
				Silver			
				Silver			
			1.3.S5				
				Silver			

Other Comments

Producer		Please explain why.	Criterion / Indicator	Level	Auditor		
Yes	No / PC				N/A	Yes	No / PC
			2.1.G1				
			Soil function and productivity				
			Have you established comprehensive management planning and implementation of practices to improve soil function and productivity? (Include copy of management plan, if applicable.)	Gold			
Other Comments							

Yes	Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
	No / PC	N/A				Yes	No / PC	
				3.1				
				3.1.S1				
					Silver			
					Silver			
					Silver			
					Silver			
				3.1.S2				
					Silver			
					Silver			
					Silver			
				3.1.S3				
					Silver			
				3.1.S4				
					Silver			
				3.1.G1				
					Gold			

Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
Yes	No / PC				Yes	No / PC	
			3.1.G2				
				Gold			
			3.1.G3				
				Gold			
				Gold			
				Gold			
			3.2				
			3.2.S1				
				Silver			
				Silver			
				Silver			
				Silver			
			3.2.S2				
				Silver			
			3.2.S3				
				Silver			
				Silver			
				Silver			

Yes	Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
	No / PC	N/A				Yes	No / PC	
					Silver			
			Does your Integrated Resource Management Plan include protocols for the biomass crop prior to cultivation that includes, where applicable: - Conservation practices, or chemical, cultural or physical control methods, for removal of plants or pests that represent a significant risk of establishment outside the production system, including assistance to owners or managers of neighboring properties to respond if spread occurs?		Silver			
			Land Conversion	3.3				
			<i>Promote the conservation of native ecosystems by limiting land conversion activities to lands that do not support important conservation objectives.</i>					
			Documentation of vegetation category	3.3.S1				
			Have you documented the vegetation types on your farm, as of January 1, 2008?		Silver			
			Lands eligible for conversion	3.3.S2				
			Have you shifted the intensity of land management?		Silver			
			If you answered yes above, did this change in the intensity of land management Qualify for Future Management in accordance with the matrix in Appendix C?		Silver			
			Protection of known communities	3.3.S3				
			If present on your lands, do you protect known globally and state ranked G1-G3 / S1-S3 species and communities?		Silver			
			Do you support inventory of lands where there could be a lack of information and OR a need for surveys and other information gathering?		Silver			

Other Comments

Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
Yes	No / PC				Yes	No / N/A	
			4.1				
			4.1.S1				
				Silver			
				Silver			
				Silver			
				Silver			
				Silver			
			4.1.S2				
			4.1.S3				
				Silver			
				Silver			
			4.1.S4				
				Silver			
			4.1.S5				
				Silver			
				Silver			

Yes	Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
	No / PC	N/A				Yes	No / PC	
					Silver			
					Silver			
				4.1.S6				
					Silver			
					Silver			
					Silver			

Yes	Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
	No / PC	N/A				Yes	No / N/A	
				4.1.S7				
					Silver			
					Silver			
				4.1.S8				
					Silver			
				4.1.G1				
					Gold			
				4.1.G2				
					Gold			
				4.1.G3				
					Gold			
				4.1.G4				
					Gold			
				4.1.G5				
					Gold			
				4.1.G6				
					Gold			

Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
Yes	No / PC				Yes	No / PC	
	N/A		WATER			N/A	
			Do you take steps necessary (either through reduced application or additional mitigation measures) to achieve a score of low or medium risk on the NRCS Phosphorus Index?	Gold			

Yes	No / PC	N/A	Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
						Yes	No / PC	
				4.2	Water Quantity			
					<i>Irrigation and water management practices do not deplete the quantity of surface or ground water.</i>			
				4.2.S1	Irrigation Plan			
					Can you provide annual documentation of compliance with and updates to a water management plan that ensures efficient use of water in irrigation practices?	Silver		
					Does your water management plan include a strategy to maximize efficiency in irrigation systems and reduce water use where possible?	Silver		
					Does your water management plan include re-use of treated wastewater where possible?	Silver		
					Have you adopted conservation practices related to water management?	Silver		
					Does your operation conform to local or regional water allotments, if required?	Silver		
				4.2.S2	Legal compliance			
					Can you demonstrate compliance with local water laws?	Silver		
				4.2.S3	Preventing depletion			
					Have local water authority determined that ground or surface water is being depleted faster than it is being naturally replenished?	Silver		
					If so, have you acquired existing water rights for any new irrigation, rather than securing new water rights from the local water authority?	Silver		
				4.2.S4	Use rights			
					Did you hold legally valid use rights for irrigation water before commencement of biomass production or have rights been subsequently acquired through legal means? Please provide documentation of compliance with local water laws as prescribe by the local water board, irrigation district or similar at right.	Silver		
				4.2.S5	Irrigation/Salinity			
					Can you demonstrate that salinity of your soil is within acceptable parameters for the crop produced?	Silver		
					If soil salinity exceeds acceptable parameters, have you taken action to bring soil salinity into acceptable parameters?	Silver		
				4.2.S6	Maximum water use per acre			
					Do you measure water use in a way that allows calculation of acre-feet of water applied per acre of cropland?	Silver		

Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
Yes	No / PC				Yes	No / PC	
			WATER Do you ensure that water use per acre of cropland is consistent with the water use rates of the most efficient irrigation technology available in the area for the same or similar crops? Please provide documentation.	Silver			
			If specific circumstances warrant the use of other irrigation methods, please provide satisfactory documentation of the rationale and demonstrate that water is being used in the most efficient manner reasonable given the circumstances.	Silver			
			Water Savings Does your operation use only short-term irrigation for establishment of perennial crops, or no irrigation at all?	Gold			
			Has your operation achieved a net reduction in water use, either on their operation or within an irrigation district? Please provide documentation, including quantity of net reduction and units.	Gold			
			Can you demonstrate that unused water is returned to the environment according to the relevant laws and procedures?	Gold			
			Aquatic Ecosystems Preserve or enhance the functions and services of aquatic ecosystems.				
			IRMP Have you addressed the impact(s) of your operation on aquatic ecosystem health within the watershed in the IRMP? Are you implementing the IRMP to address the impact(s) of your operation on aquatic ecosystem health within the watershed?	Silver			
			Stream Impacts Have you adopted conservation practices considered sufficient to avoid negative impact on local stream flows and stream channel morphology, flood storage and conveyance capacity, and in-stream habitat conservation practices?	Silver			
		Program participant adopt conservation practices considered sufficient to avoid negative impact on local stream flows and stream channel morphology, flood storage and conveyance capacity, and in-stream habitat conservation practices.	4.3.S3				

Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
Yes	No / PC				Yes	No / PC	
		Program participant adopt conservation practices that maintain or enhance the local stream temperatures which promote aquatic ecosystems.	4.3.S4	Silver		N/A	
		Program participant does not increase the risk of hypoxia in downstream environments. (This indicator will be assumed to be met if silver level water quality indicators are met.)	4.3.S5	Silver			
219		Program participant prevents negative impact on local wetlands through adoption of conservation and appropriate management practices.	4.3.G1	Silver			
		Have you ensured that you do not directly impact or make changes to hydrology that result in the drainage, filling, or degradation of any wetland that is not considered "prior converted" or drained prior to passage of the 1985 Food Security Act's "Swampbuster" provision?	Management practices	Silver			
		Do you apply management practices demonstrated through research to improve the structure and function of aquatic ecosystems?		Gold			

Other Comments

Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
Yes	No / N/A				Yes	No / N/A	
			5.1				
			5.1.S1				
			5.1.S2	Silver			
			5.1.S3	Silver			
			5.1.S4	Silver			
			5.1.S5	Silver			
			5.1.S6	Silver			

Other Comments

Yes	Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
	No / PC	N/A				Yes	No / PC	
				SOCIO-ECONOMIC WELL-BEING				
			Does the contract include a provision that workers shall not be required to work more than 12 consecutive hours in a 24- hour period?		Silver			
			Does the contract include a provision that workers are provided a minimum of 24 consecutive hours rest (one day off) for every six consecutive days of work?		Silver			
			Does the contract specify that if an employee is underperforming, you will provide the employee an opportunity to improve their performance before terminating employment?		Silver			
			Workplace improvements					
			Do you provide opportunities for employees to make suggestions for workplace improvements?		Silver			
			Environment, Health and Safety (EHS)					
			<i>Program participant shall ensure that biomass production activities are conducted in a manner that protects the health and safety of employees.</i>					
			Compliance with laws and regulations					
			Do you maintain documentation of compliance with all federal, state and local occupational health and safety laws and regulations? Please provide documentation.		Silver			
			Training					
			If you hire workers please answer the following questions:					
			Do you keep records of training for health and safety in the workplace?		Silver			
			Do all employees, including seasonal employees, receive health and safety information in a language they understand?		Silver			
			Do all full time employees receive health and safety training and get updated training at least every 5 years?		Silver			
			Do all employees using potentially dangerous chemicals and machinery receive appropriate training?		Silver			
			Are supervisors trained in emergency procedures and provided information about who to contact in case of emergency and location of emergency kits?		Silver			
			Hazardous Materials Protection					
			Do you provide employees handling highly toxic chemicals with adequate protective clothing, appropriate safety equipment, and filtered air respirator systems and/or positive pressure cabs?		Silver			
			Accidents and injuries					
			Do you ensure that employees are prepared to handle injuries and chemical spills?		Silver			
			Do employees have access to well-stocked first aid kit at each work site?		Silver			

Yes	Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
	No / PC	N/A				Yes	No / PC	
					Silver			
					Silver			
				6.3.S5	Silver			
				6.3.S6	Silver			
				6.4				
				6.4.S1				
				6.5				
				6.5.G1				
					Gold			
					Gold			
					Gold			
					Gold			
					Gold			

Other Comments

Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
Yes	No / PC				Yes	No / N/A	
			7.1				
			7.1.S1		0	0	0
				Silver			
			7.1.S2				
				Silver			

Other Comments

Producer		Please explain why.	Criterion / Indicator	Level	Auditor		Evidence for Compliance
Yes	No / PC				Yes	No / PC	
			8.1				
			8.1.S1				
					0	0	0
				Silver			
			8.1.G1				
				Gold			

Other Comments

Farm Name
 Producer Name
 City, State

Report generated on: 10/5/2011

Principle Area	Applicable Questions	Score	
		Silver	Gold
Soil	13	0%	0%
Biological Diversity	27	0%	0%
Water	52	0%	0%
Air Quality-Emissions	6	0%	-
Socioeconomic	36	0%	0%
Legality	2	0%	-
Transparency	2	0%	0%
Continuous Improvement	9	0%	0%

Silver 0%
 Gold 0%

Indicator	Description	Yes	No	N/A	No. of Applicable Questions	Score	Compliant?
Soil Principle						0%	
2.1.S1	Soil assessment and monitoring	0	0	0	1	0%	
2.1.S2	Soil nutrient and conservation planning	0	0	0	3	0%	
2.1.S3	Residue removal	0	0	0	1	0%	
2.1.S4	Compaction	0	0	0	3	0%	
2.1.S5	Road construction	0	0	0	1	0%	
2.1.S6	Erosion	0	0	0	2	0%	
2.1.S7	Soil carbon	0	0	0	1	0%	
2.1.G1	Soil function and productivity	0	0	0	1	0%	
Biological Diversity Principle						0%	
3.1.S1	Assessment of wildlife habitat	0	0	0	4	0%	
3.1.S2	Habitats and their wildlife values	0	0	0	2	0%	
3.1.S3	Rare, threatened and endangered wildlife and biodiversity	0	0	0	1	0%	
3.1.S4	Control of non-crop invasive species	0	0	0	2	0%	
3.1.G1	Enhance native and other priority wildlife habitat	0	0	0	1	0%	
3.1.G2	Use of natural ecological processes	0	0	0	1	0%	
3.1.G3	Non-crop invasive species	0	0	0	3	0%	
3.2.S1	Assessment of invasiveness	0	0	0	4	0%	
3.2.S2	Avoiding Introduction of Invasive Feedstock Species	0	0	0	1	0%	
3.2.S3	Crop spread	0	0	0	3	0%	
3.3.S1	Documentation of vegetation category	0	0	0	1	0%	
3.3.S2	Lands eligible for conversion	0	0	0	2	0%	
3.3.S3	Protection of known communities	0	0	0	2	0%	

Indicator	Description	Yes	No	N/A	No. of Applicable Questions	Score	Compliant?
Water Principle						0%	
4.1.S1	Water Quality Management Plan	0	0	0	5	0%	
4.1.S2	Erosion and sediment and runoff control	0	0	0	1	0%	
4.1.S3	Use of wastewater for irrigation	0	0	0	2	0%	
4.1.S4	Trace elements in biosolids	0	0	0	1	0%	
4.1.S5	Nitrogen and Phosphorus	0	0	0	4	0%	
4.1.S6	Pesticide Management	0	0	0	3	0%	
4.1.S7	Pesticide Use	0	0	0	2	0%	
4.1.S8	Waste Disposal	0	0	0	1	0%	
4.1.G1	Management practices more rigorous than conservation practices	0	0	0	1	0%	
4.1.G2	Pesticide Use	0	0	0	1	0%	
4.1.G3	Pesticide Use	0	0	0	1	0%	
4.1.G4	Precision agriculture	0	0	0	1	0%	
4.1.G5	Nitrogen	0	0	0	2	0%	
4.1.G6	Phosphorus	0	0	0	2	0%	
4.2.S1	Irrigation Plan	0	0	0	5	0%	
4.2.S2	Legal compliance	0	0	0	1	0%	
4.2.S3	Preventing depletion	0	0	0	2	0%	
4.2.S4	Use rights	0	0	0	1	0%	
4.2.S5	Irrigation/Salinity	0	0	0	2	0%	
4.2.S6	Maximum water use per acre	0	0	0	3	0%	
4.2.G1	Water Savings	0	0	0	3	0%	
4.3.S1	IRMP	0	0	0	2	0%	
4.3.S2	Stream Impacts	0	0	0	1	0%	
4.3.S3	Stream temperature	0	0	0	1	0%	
4.3.S4	Hypoxia	0	0	0	1	0%	
4.3.S5	Wetlands	0	0	0	2	0%	
4.3.G1	Management practices	0	0	0	1	0%	
Air Quality-Emissions Principle						0%	
5.1.S1	Yield	0	0	0	1	0%	
5.1.S2	Inputs	0	0	0	1	0%	
5.1.S3	Land management practices	0	0	0	1	0%	
5.1.S4	Soil carbon	0	0	0	1	0%	
5.1.S5	Harvest and handling	0	0	0	1	0%	
5.1.S6	Transportation	0	0	0	1	0%	

Indicator	Description	Yes	No	N/A	No. of Applicable Questions	Score	Compliant?
Socioeconomic Principle						0%	
6.1.S1	Fair Labor Standards Act	0	0	0	9	0%	
6.2	Fair treatment of workers	0	0	0	2	0%	
6.2.S1	Grievance procedures	0	0	0	2	0%	
6.2.S2	Employment contract	0	0	0	4	0%	
6.2.S3	Workplace improvements	0	0	0	1	0%	
6.3.S1	Compliance with laws and regulations	0	0	0	1	0%	
6.3.S2	Training	0	0	0	5	0%	
6.3.S3	Hazardous Materials Protection	0	0	0	1	0%	
6.3.S4	Accidents and injuries	0	0	0	4	0%	
6.3.S5	Sanitation	0	0	0	1	0%	
6.3.S6	Insurance against workplace injury	0	0	0	1	0%	
6.4.S1	Freedom of association	0	0	0	1	0%	
6.5.G1	Additional benefits	0	0	0	4	0%	
Legality Principle						0%	
7.1.S1	Knowledge of law	0	0	0	1	0%	
7.1.S2	Ensuring compliance	0	0	0	1	0%	
Transparency Principle						0%	
8.1.S1	Release of summary reports	0	0	0	1	0%	
8.1.G1	Outreach and education	0	0	0	1	0%	
Continuous Improvement Principle						0%	
9.1.S1	Changes to Standard	0	0	0	1	0%	
9.2.S1	Improve performance	0	0	0	1	0%	
9.2.S2	Good Agricultural Practices (GAP)	0	0	0	4	0%	
9.2.G1	Expansion of public scientific knowledge	0	0	0	3	0%	



Integrated Resource Management Plan

Farm Name
Producer Name
City, State

Background

Please provide answer here....

Figure 1 – Map of Farm Name boundaries and biomass fields

Soil Principle

Biomass production shall maintain or improve soil quality by minimizing erosion, enhancing carbon sequestration, and promoting healthy biological systems and chemical and physical properties.

Please provide answer here....

Farm Name does the following to maintain or improve soil health:

-
-
-
-
-
-
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-
-
-
-
-



-
-
-

Additional Practices – Soil Principle

Please provide answer here....

Biological Diversity Principle

Biomass production shall contribute to the conservation or enhancement of biological diversity, in particular native plants and wildlife.

Please provide answer here....

Farm Name does the following to maintain or improve biological diversity:

-
-
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-
-

Additional Practices – Water Principle

Please provide answer here....

Air Quality/Emissions Principle

Cellulosic bioenergy shall reduce GHG emissions as compared to fossil-based energy. Emissions shall be estimated via a consistent approach to life cycle assessment.

Please provide answer here....

Farm Name does the following to reduce air emissions and enhance air quality:

-
-
-
-
-
-
-



Additional Practices – Air Quality/Emissions Principle

Please provide answer here....

Socio-Economic Principle

Biomass production shall take place within a framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders (including land owners, farm workers, suppliers, bioenergy producers, and the local community), and ensures compliance with labor laws and human rights.

Please provide answer here....

Farm Name does the following to sustainably distribute socioeconomic opportunity for and among all stakeholders and to ensure compliance with labor laws and human rights:

-
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-
-



Legality Principle

Biomass production shall comply with applicable federal, provincial, state, and local laws, ordinances, and regulations.

Please provide answer here....

Farm Name does the following to ensure that its operations comply with applicable laws, ordinances, and regulations:

-
-

Additional Practices – Legality Principle

Please provide answer here....

Transparency Principle

Production of certified biomass shall be transparent.

Please provide answer here....

Farm Name does the following to ensure that its operations are transparent:

-
-

Additional Practices – Transparency Principle

Please provide answer here....

Continuous Improvement Principle

Biomass production practices and outcomes shall continuously improve based on the best available science.

Please provide answer here....

Farm Name does the following to continuously improve its operations:

-
-
-
-



- ○
- ○
- ○
- ○
- ○
- ○
- ○

Additional Practices – Continuous Improvement Principle

Please provide answer here....

The drive path letter must be “F:” for the IRMP to update when the checklist is filled out.

How to change the drive letter of a flash drive to link the IRMP to the Checklist

1. Open the Control Panel
2. Select Administrative Tools
3. Select Computer Management
4. Select Storage
5. Open “Disk Management”
6. Right Click the name of the flash drive that is being changed.
7. Select “Change Drive Letter and Paths...”
8. Click “Change”
9. Select “F” from the drop-down
10. Click OK
11. Click OK

If you want the IRMP to update as the checklist is being populated, you must open the checklist prior to opening the IRMP.

APPENDIX B:
Revised Draft Standard with Modifications Shown

COUNCIL ON SUSTAINABLE
BIOMASS PRODUCTION



**~~DRAFT PROVISIONAL~~ STANDARD
FOR SUSTAINABLE PRODUCTION OF AGRICULTURAL BIOMASS**

~~July 29, 2011~~April 6, 2012

Version 2.1

This version includes all changes accepted by the Council at its meeting in April 2011 and additional modifications the Council charged the Producer Work Group to address.

COUNCIL ON SUSTAINABLE
BIOMASS PRODUCTION



1 THE CSBP PROGRAM

Being Revised by the Implementation Work Group

2 PRINCIPLES IN BRIEF

CSBP expects that growers will consider how best to meet environmental, economic, and social objectives by selecting feedstocks and production systems that optimize the balance between improving yields, reducing inputs, limiting footprints, supporting biodiversity, and maintaining long term site productivity based on local conditions.

Maximizing production on lands dedicated to producing biomass and having additional lands with other primary [and](#) uses provide supplementary biomass can help address the multiple demands for land resources in a sustainable way. Optimizing agricultural productivity (e.g., selecting feedstocks that balance interdependent goals of maximizing yields and minimizing input requirements based on local conditions) while limiting impacts to the environment can create profitable and sustainable agricultural systems, and help minimize the footprint required to support the growth of a large-scale industry of low carbon bioenergy.

The following principles express the key elements of sustainable biomass production and serve as the framework for the criteria and indicators of the standard.

1 INTEGRATED RESOURCE MANAGEMENT PLANNING

The preparation of and adherence to a complete management plan is considered the foundation for fulfillment of the standard and essential to ensuring that a grower can deliver on the multiple requirements for sustainable production and areas for continuous improvement.

PRINCIPLE: *Biomass production shall be based on an integrated resource management plan that shall be completed, monitored and updated to address [the environmental risks associated with current and future production](#) [changing objectives and annual surveillance audits of the CSBP Producer and Consumer Standards](#), appropriate to the scale and intensity of the operation.*

2 SOIL

This principle recognizes that soil stability is vital, and that soil fertility and organic matter are critical to the sustainable production of food, feed, fiber, and fuel.

PRINCIPLE: *Biomass production shall maintain or improve soil quality by minimizing erosion, enhancing carbon sequestration, and promoting healthy biological systems and chemical and physical properties.*

3 BIOLOGICAL DIVERSITY

The conservation of biological diversity is a critical component of sustainability at the field/stand level as well as at the landscape level. This principle articulates the expectation that growers will deploy management systems in their operations that maintain or enhance biodiversity.

PRINCIPLE: *Biomass production shall contribute to the conservation or enhancement of biological diversity, in particular native plants and wildlife.*

4 WATER

This principle recognizes the vulnerability of both the available water supply and the quality of available water. Biomass production should not contribute to the depletion of ground or surface water supplies. When irrigation is necessary, the most efficient irrigation technology appropriate to the circumstance should be used.

PRINCIPLE: *Biomass production shall maintain or improve surface water, groundwater, and aquatic ecosystems.*

5 AIR QUALITY AND EMISSIONS

One fundamental objective of biomass-based bioenergy systems is to mitigate GHG emissions, providing a low-carbon energy alternative to fossil fuels. This principle embraces full life cycle assessment (LCA) as the primary tool for ensuring substantive reduction in GHG emissions.

PRINCIPLE: *Cellulosic bioenergy shall reduce GHG emissions as compared to fossil-based energy. Emissions shall be estimated via a consistent approach to life cycle assessment.*

6 SOCIO-ECONOMIC WELL-BEING

CSBP embraces a tripartite vision of sustainability, focusing on practices and products that are environmentally, socially, and economically sound. This principle speaks to the need for sustainable distribution of socio-economic benefit to the various participants in biomass and bioenergy production systems. A sustainable commercial model benefits from the support of wealth creation in local communities.

PRINCIPLE: *Biomass production shall take place within a framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders (including land owners, farm workers, suppliers, bioenergy producers, and the local community), and ensures compliance with labor laws and human rights.*

7 LEGALITY

Compliance with all legal requirements by a grower is a minimum expectation for the standard.

PRINCIPLE: *Biomass production shall comply with applicable federal, state, and local laws, statutes, and regulations.*

8 TRANSPARENCY

The interactions of a participant with stakeholders must be conducted in a transparent manner while protecting commercially sensitive information and maintaining intellectual property.

PRINCIPLE: *Production of certified biomass shall be transparent.*

9 CONTINUOUS IMPROVEMENT

CSBP is committed to a process of continued assessment of the usefulness of the standard's practices to ensuring the desired sustainability outcomes. The standard will be updated periodically, incorporating scientific results that reveal better practices that are commercially viable. Growers are also expected to continuously improve performance as guided by annual certification audits and [adherence](#) to IRMP.

PRINCIPLE: *Biomass production practices and outcomes shall continuously improve based on the best available science.*

3 ~~DRAFT~~ PRINCIPLES, CRITERIA, AND INDICATORS FOR AGRICULTURE

1 PRINCIPLE 1 - INTEGRATED RESOURCE MANAGEMENT PLANNING (IRMP)

Biomass production shall be based on an integrated resource management plan that shall be completed, implemented, monitored and updated to address ~~the environmental risks associated with current and future production objectives of the CSBP standard~~, appropriate to the scale and intensity of the operation.

1.1 ASSESSMENT

~~Conduct an assessment~~Participants use a complete assessment or conduct an initial assessment to support the informed decisions regarding resource goals and land management options during the development and implantation for the IRMP.

1.1.1 BASELINE INFORMATION

~~At a minimum, Program p~~Participants compiles and evaluates baseline information on existing conditions within the biomass crop production area proposed for certification ~~to inform decisions about resource goals and land management options.~~

IMPLEMENTATION: Assessments ~~typically include involve~~ gathering key information regarding on the Participant's operational and planning effects on soil, biodiversity, and water. Typically this information includes crop production, soils, natural vegetation cover, rare species and communities, existing wildlife habitats and aquatic ecosystems, and past and current land and water conservation activities. This information may pertain solely to the area proposed for certification or to a larger planning landscape that provides context for the area of interest. ~~Given an understanding of expectations for certification, an assessment shall identify local factors that may influence options for biomass production as well as opportunities for integrating biodiversity conservation and wildlife habitat considerations into production goals.~~

Through the IRMP assessment the Participant evaluates risks to the environment from their existing operation and changes in operational scope or intensity. If environmental safeguards cannot be demonstrated, additional planning is needed and more in-depth assessments are required. In addition to changing scope or intensity, if the Participant's operations have inadequate conservation safeguards for high ecological values, then these higher environment risks must be addressed in IRMP objectives and planning. Participants that demonstrate Good Agricultural Practices (GAP) and conservation safeguards may avoid conducting detailed environmental assessments of baseline conditions.

For further indicators and implementation guidance regarding assessment, see the following:

- 2.1.1 Soil Assessment and Monitoring
- 3.1.1 Assessment of Wildlife Habitat
- 3.1.4 Control of Non-Crop Invasive Species
- 3.2.1 Assessment of Invasiveness
- 3.2.3 Crop Spread
- 4.1 Water Quality (Integrated Resource Management Planning)
- 4.2 Water Quantity (Integrated Resource Management Planning)
- 4.4.3. Aquatic Ecosystems (Integrated Resource Management Planning)
- 4.9.2.2 Good Agricultural Practices (GAP)

1.2 OBJECTIVES

~~Identify management objectives~~The IRMP includes objectives specific to the biomass production area that addresses each of the CSBP Standard principles.

1.2.1 ESTABLISH OBJECTIVES

Comment [A/S1]: Need to be updated

~~Program p~~Based upon the initial assessment and/or subsequent IRMP reviews, ~~Participants, using information developed during the assessment processes,~~ determine/identify their priorities and describes management objectives ~~and/or~~ options for the biomass production area proposed for certification, ~~and for production, When applicable, Participants address~~taking into account landscape factors ~~within the IRMP as appropriate.~~

IMPLEMENTATION: All applicable certification criteria and indicators of the CSBP sStandard shall ~~bear~~ be addressed as appropriate for the ~~area proposed for certification~~biomass production area and the scale and intensity of the operation, ~~at either the silver or gold level. The As~~ program pParticipant's objectives ~~priorities~~ are established, ~~after considering the unresolved~~ significant issues and opportunities ~~for improvement as determined by the self-assessment or auditing process~~related to sustainability of biomass production and conservation of biodiversity and wildlife habitat. Certification indicators provide a structure for evaluating management practices, to identify potential conflicts, and to optimize achievement of management objectives. Explore opportunities to avoid, minimize, or mitigate environmental impacts during this phase.

For further indicators and implementation guidance regarding establishment of management objectives, see the following:

- 4.2.1.1 Soil Assessment and Monitoring
- 4.2.1.2 Soil Nutrient and Conservation Planning
- 4.3.1.3 Rare, Threatened, and Endangered Wildlife and Biodiversity
- 4.3.1.4 Control of Non-Crop Invasive Species
- 4.3.2.3 Crop Spread
- 4.4.1 Water Quality (Integrated Resource Management Planning)
- 4.4.2 Water Quantity (Integrated Resource Management Planning)
- 4.4.3. Aquatic Ecosystems (Integrated Resource Management Planning)
- 4.9.2.2 Good Agricultural Practices (GAP)

Comment [A/S2]: Update

1.3 MANAGEMENT OPERATIONS PLAN

Develop and implement a plan. Using baseline information to develop IRMP objectives, Participants develop and implement an operations plan to achieve the IRMP objectives.

For further indicators and implementation guidance regarding establishment of management objectives, see the following:

- 4.2.1.1 Soil Assessment and Monitoring
- 4.2.1.2 Soil Nutrient and Conservation Planning
- 4.3.1.3 Rare, Threatened, and Endangered Wildlife and Biodiversity
- 4.3.1.4 Control of Non-Crop Invasive Species
- 4.3.2.3 Crop Spread
- 4.4.1 Water Quality (Integrated Resource Management Planning)
- 4.4.2 Water Quantity (Integrated Resource Management Planning)
- 4.4.3. Aquatic Ecosystems (Integrated Resource Management Planning)

Comment [A/S3]: Update

1.3.1 MANAGEMENT OPERATIONS PLANNING

Program pParticipants develops specific land-management actions, including corrective action plans and land-based action plans for each mapped biomass production area, soil type, and vegetation cover type within the area proposed for certification.

IMPLEMENTATION: Depending upon the scope of the plan, management actions may be described for a larger planning landscape. Corrective Action Plans are specifically directed at fulfilling the auditing system's non-conformities and opportunities for improvement. At a minimum, the operations plan includes a timeline for implementation and a monitoring element to ensure management objectives are accomplished.

1.3.2 IMPLEMENTATION

~~Program pParticipant develops a timetables to implement management actions, such as Corrective Action Plans, and establishes a corresponding system for documenting implementation.~~

~~IMPLEMENTATION: The IRMP should include timetables for implementing specific sustainable practices and an audible system for documenting implementation. Opportunities for improvement and corrective action plans will have correspondingly detailed and specific managerial actions.~~

Comment [DN4]: Moved into 1.3.1.

Type of documentation TBD.

1.3.3 MONITORING

~~Program participant continually monitors specific management practices in order to ensure that management objectives are being met.~~

Comment [DN5]: Moved to Monitoring and Review

~~IMPLEMENTATION: Program Participants annually monitor practices utilized in the operation and can document the effectiveness of those practices identified in Indicator 1.3.5S2. Year to year the producer will address areas of nonconformity within the timetables specified.~~

~~ADAPTIVE MANAGEMENT~~

~~Based on the results of monitoring and other available information, Program participant identify changing conditions and modify the operations plan and/or IRMP to address these changing conditions.~~

~~IMPLEMENTATION: To Participants monitor and document the results of implementation over time, the operations plan shall identify relevant crop and natural resource measures and other indicators, including those used in the standard to assess achievement of certification criteria. The program Participants also shall use those measures to identify improvement opportunities and to adjust the management plan accordingly.~~

1.3.4.1.3.2 MONITORING AND REVIEW

~~Participants continually monitor specific management practices in order to ensure that management objectives are being met. Management plans are comprehensively reviewed by Participants at least every five years and updated as needed.~~

~~IMPLEMENTATION: Participants annually monitor specific management practices utilized in the operation and can document, at the appropriate property and management unit level, the effectiveness of those practices identified. Year to year the producer will address areas of nonconformity within the timetables specified. Every five years Participants demonstrate a comprehensive review process. Program Participants can demonstrate the review process in the operation identifying sustainable production achievements and areas for improvement in the operation. Based on the results of monitoring and other available information, Participants identify changing conditions and modify the operations plan and/or IRMP to address these changing conditions. Participants monitor and document the results of implementation over time. The operations plan identifies relevant crop and natural resource measures and other indicators, including those used in the standard to assess achievement of certification criteria. Participants use those measures to identify improvement opportunities and to adjust the management plan accordingly.~~

Required documentation TBD.

2 PRINCIPLE 2 - SOIL

Biomass production shall maintain or improve soil quality by minimizing erosion, maintaining or enhancing soil carbon and nutrients at appropriate levels, sequestration, and promoting healthy biological systems and chemical and physical properties.

2.1 MAINTAIN OR IMPROVE SOIL HEALTH

~~2.1 Minimize erosion and maintain soil carbon and nutrients at appropriate levels, as well as the overall physical, chemical and biological properties of the soil. Minimize erosion and maintain soil carbon and nutrients at appropriate levels, as well as the overall physical, chemical and biological properties of the soil. Appropriate to the scale and intensity of the biomass production area and when applicable, Participants include provisions in the IRMP and operations plan that maintain or improve soil health.~~

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2.1.1 SOIL PRODUCTIVITY AND CONSERVATION ASSESSMENT AND MONITORING PLANNING

Appropriate to the scale and intensity of the biomass production area and when applicable, Participants include provisions in the IRMP and operations plan that maintain or improve soil health. Program Participants assesses and monitors, at the appropriate property level, nutrient levels of the soil or plants, and soil capabilities guide management decisions.

(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 Management Plan.)

IMPLEMENTATION: Soil assessment shall be conducted at the ~~level of the area appropriate property and management unit~~ proposed for certification and include use of data from soils maps where available. Soils shall be tested ~~annually~~ periodically for organic matter, ~~and for~~ nitrogen, phosphorus, and other nutrients relevant to local resource concerns. Management decisions shall be based on soil capabilities in selection of species or crops, appropriate cultural practices, expected yields, and erosion control.

~~2.1.2~~ **SOIL NUTRIENT AND CONSERVATION PLANNING**

~~Program p~~Participants conserves soil and maintains its productivity through an integrated resource management plan. ~~Nutrients shall be managed to reduce loss off site to air and water.~~

~~(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 Management Plan.)~~

IMPLEMENTATION: Agricultural program participants shall use planning protocols supported by the Natural Resource Conservation Service (NRCS) Conservation Planning process.

~~Nutrients shall be managed to reduce loss to air and water.~~

Comment [DN6]: This is covered in the IRMP, Principle 1

~~2.1.32.1.2~~ **RESIDUE REMOVAL**

~~The use of agricultural and forest residues shall not be at the expense of long-term soil productivity stability, health and organic matter content.~~ Program pParticipants retains biomass materials required for erosion control and soil fertility.

IMPLEMENTATION: ~~The use of agricultural and forest residues shall not be at the expense of long-term soil stability, health and organic matter content.~~ The Participant must demonstrate conservation measures to mitigate soil erosion and conserve long-term soil fertility.

~~2.1.42.1.3~~ **COMPACTION**

~~Program p~~Participants identify techniques and soils vulnerable to compaction and uses appropriate methods to reduce compaction if necessary and to maintain site productivity.

IMPLEMENTATION: ~~The Participant must demonstrate knowledge of the factors that contribute to soil compaction and demonstrate the use of Good Agricultural Practices that minimize soil compaction and maintain soil structure.~~ to be developed

~~2.1.52.1.4~~ **ROAD CONSTRUCTION IN FIELD, ON-FARM, OR FOREST TRAVEL**

Program participant limits, as appropriate to maintain soil structure and water quality, field travel zones or paths as needed to meet management objectives.

IMPLEMENTATION: Temporary field travel zones or travel paths should be used when practical and consistent with management objectives, and should be closed and rehabilitated when operations are complete. ~~If rutting, erosion, or compaction occurs, temporary travel zones and paths should be closed or rehabilitated.~~

~~2.1.62.1.5~~ **EROSION**

Program participant shall use practices that minimize erosion on biomass acres

IMPLEMENTATION: ~~For a~~ Agricultural biomass operations should score less than or equal to T on RUSLE-II, with recognition of variances for extreme weather events or upgrades to on-farm conservation system or by applying -USDA "conservation practices," and "conservation systems," or other effective soil conservation practices that meet erosion control objectives. ~~state or local as prescribed by state or local authorities.~~

~~2.1.72.1.6~~ **SOIL CARBON**

~~Program p~~Participants maintains or improves soil carbon levels for the biomass production area.

IMPLEMENTATION: Producers Participants will periodically test soil organic matter; ~~a zero or positive score on the Soil Conditioning Index shall be considered an adequate proxy for maintaining or improving soil carbon content.~~

3 PRINCIPLE 3 – BIOLOGICAL DIVERSITY

Biomass production shall contribute to the maintenance or enhancement of biological diversity, in particular native plants and wildlife.

3.1 BIODIVERSITY

Ensure that biomass production systems support native biodiversity both on-site and at an eco-regional level.

3.1.1 ASSESSMENT OF VEGETATION TYPES AND WILDLIFE HABITAT

To support effective management planning, ~~program participants~~ assesses vegetation cover types and wildlife habitats on ~~enrolled~~ ~~are~~ ~~biomass production areas, and~~ associated incidental areas ~~owned or controlled by the Participant~~ and, where credible data are available, across the landscape. ~~The Participant prevents negative impacts on local wildlife habitat through adoption of conservation and management practices.~~

(Component of Principle 1: Integrated Resources Management Planning, 1.1 Assessment.)

IMPLEMENTATION: Specifications for assessment ~~s are dependent upon the operational risk to the environment.~~ The assessment shall be appropriate to the scale of the area proposed for certification and intensity of the operation and conducted prior to the commencement of site-disturbing operations. ~~The assessment must be conducted during the "enrollment period."~~ The prior condition of vegetation and habitat shall be considered in both the assessment and management planning. The assessment shall include, but not necessarily be limited to, information on known occurrences of rare, threatened, and endangered species and communities (RETSC)¹ and, important wildlife species and habitats identified in state wildlife action plans. ~~(For assistance program participants should contact their State fish and wildlife agency's private lands division, State Natural Resources Conservation Service, state US Fish and Wildlife Service, office University Extension Wildlife specialists/staff, Wildlife Conservation Organizations, or private wildlife consultants.)~~ Findings of the assessment shall be documented and incorporated into planning and management activities. ~~The degradation or removal of nesting, bedding, or critical habitat needed for rare, threatened, and endangered wildlife is not permitted. Removal of woody vegetation or other perennial vegetation may be permitted on a limited scale if RETSC are not present and if Good Agricultural Practices can be demonstrated to prevent soil erosion and water contamination. Changes in the scope or the intensity of the Participant's operation must be documented as required in 3.3.1. See Continuous Improvement 9.2.1.~~

3.1.2 HABITATS AND THEIR WILDLIFE VALUES

~~Program participants~~ develops and implements practices that contribute to the conservation of native vegetation and native wildlife and minimize the effects of their operations on wildlife habitat.

IMPLEMENTATION: Practices to be adopted ~~are~~ appropriate to ~~the~~ scale of the operation and effect on the resource. ~~;~~ Agricultural cropping systems shall conserve habitat of native wildlife and plants significant to maintenance of biological diversity. Program participants shall utilize diversity of feedstock within a stand as appropriate to provide structural habitat that supports native wildlife.

Agricultural operations shall avoid harvesting during wildlife nesting, calving, fawning, and brood-rearing seasons by adhering to local primary nesting and fawning/calving season dates. Program participants shall retain sufficient vegetative cover for wildlife inhabiting their biomass fields (e.g. leaving stubble on the field, leaving strips of unharvested biomass, and/or other effective practices). Disruptive mechanical operations (such as, but not limited to, mowing, ~~dis~~king, and harvesting) shall be timed to minimize impacts on wildlife, especially during critical reproduction and migratory periods.

3.1.3 RARE, THREATENED, AND ENDANGERED WILDLIFE AND BIODIVERSITY

~~Program participant~~ develops and implements practices to protect rare, threatened and endangered wildlife and biodiversity appropriate to the scale and intensity of the operation.

(Component of Principle 1: Integrated Resource Management Planning, 1.2 Objectives, and 1.3 Management Plan.)

IMPLEMENTATION: Management plans shall include measures needed to protect rare, threatened and endangered species ~~(see footnote * above)~~ as well as biodiversity. Plans and activities shall be developed in consultation with resource agencies, conservation organizations, biomass consumer or expert professionals (who may be employees of the program participant), and shall include mapping, cataloging, and monitoring of biodiversity elements, as well as the design and adoption of set-asides, buffers, corridors, conservation management treatments, or other appropriate strategies to achieve conservation objectives identified in the IRMP and biodiversity protection.

3.1.4 CONTROL OF NON-CROP INVASIVE SPECIES

¹ Rare, threatened and endangered species and communities shall include species listed as endangered or threatened by the US Endangered Species Act; species and communities considered critically imperiled, ~~or~~ imperiled, or vulnerable by NatureServe and Natural Heritage programs; and important wildlife species and habitats identified in regional, state, or national conservation plans (e.g., state wildlife action plans, conservation organization eco-regional conservation plans).

Comment [A/S7]: Only 3.1.1 requires "Assessment"

Comment [MH8]: Moved to Guidance

Program participants recognize the risks associated with non-crop invasive species and adopts conservation practices related to control of non-crop invasive species (e.g., those not intentionally planted) on biomass production acres. If invasive species are observed, program participant includes in the IRMP a strategy to manage them.

(Component of Principle 1: Integrated Resource Management Planning, 1.2 Objectives, and 1.3 Management Operations Planning.)

IMPLEMENTATION: ~~Council to provide guidance to effectively plan and implement measures to comply with this indicator. Participant demonstrates participation in state or local invasive assessment programs, quarantine, cooperative extension programs' continuous education programs, national association of conservation districts, or native plant societies.~~

3.2 SPECIES AND CULTIVARS

Program participant adheres to appropriate conservation practices, crop developer recommendations, and federally-mandated requirements, where applicable, for species or cultivars being deployed.

3.2.1 ASSESSMENT OF INVASIVENESS

Program participant does not utilize species that are known to be invasive or are potentially invasive in the relevant eco-region. Prior to planting, an assessment is completed by a suitable 3rd party (e.g., crop developer, academic scientist, government agency).

(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment.)

IMPLEMENTATION: The following decision methodology will be used to determine whether a species is known to be invasive or potentially invasive in the target region.

- A feedstock crop would be "known to be invasive" in the target region if it appears on a list for that target region compiled by a scientifically credible national, state, or county authority, and would therefore not be eligible for certification.
- A feedstock crop will not require assessment for invasiveness if the crop has been grown at a reasonable scale for similar purposes in the target region and not been found to be invasive.
- ~~If the crop is not "known to be invasive" in the target eco-region, but has not previously been grown in the target region or is a variety that includes characteristics beyond the known range of the species, then it will be evaluated to determine if it is "potentially invasive" in the target region. Such evaluation may include a published, peer reviewed, and validated tool (at this time, the Australian Weed Risk Assessment is the only such tool available) or other methods provided that the input data and results are scientifically credible and are made generally available for review. If the results of the assessment determine that the crop is not potentially invasive, it is eligible for certification. See Continuous Improvement 9.2.1.~~
- ~~If the results of the assessment determine that the crop is potentially invasive, additional protocols, still to be determined, will be required to determine whether the feedstock is eligible for certification in target region. This will include evaluating the crop for invasiveness using carefully controlled field trials in the target region.~~

Comment [MK9]: Moved to Guidance

3.2.2 AVOIDING INTRODUCTION OF INVASIVE FEEDSTOCK SPECIES

Avoiding Introduction of Invasive Feedstock Species

~~Participants a~~Avoid introduction or production of an energy crop that is potentially invasive in the target region and that may disrupt biodiversity on an eco-regional scale.

IMPLEMENTATION: ~~An important role in avoiding the introduction of invasive species is that of the seed or cultivar developer and feedstock consumer specifying which crops should be grown.~~ A crop will not be deemed to be "introduced" if it is already in production at a reasonable scale in the target region for similar purposes (e.g., biomass production for pulp), and not been found to be invasive.

3.2.3 CROP SPREAD

Program participant includes, in the Integrated Resource Management Plan, protocols for the biomass crop prior to cultivation that includes, where applicable:

- Adoption of conservation practices that limit potential for the spread of the crop, including:
 - Harvest, transportation, equipment cleaning, and storage protocols (e.g., steps to limit seed dispersal during transport).

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- Chemical or cultural control methods to ensure crop removal at the conclusion of production.
- Conservation practices, or chemical, cultural or physical control methods, for removal of plants or pests that represent a significant risk of establishment outside the production system, including assistance to owners or managers of neighboring properties to respond if spread occurs.

(Component of Principle 1: Integrated Resource Management Planning, 1.2 Objectives, and 1.3 Management Plan.)

IMPLEMENTATION: Where adoption of conservation practices do not prevent the establishment of a crop or its genetic material outside the production area; control methods taken by the responsible party fail to remediate the invasion of plants or genetic material within two growing seasons; and the invasion is considered problematic to the neighboring landowner/ leaseholder or to the integrity of natural ecosystems, CSBP certification will be revoked.

3.3 LAND CONVERSION

Promote the conservation of native ecosystems by limiting land conversion activities to lands that do not support important conservation objectives.

3.3.1 DOCUMENTATION OF VEGETATION CATEGORY

Program participant has documented the vegetation category as of January 1, 2008, of all lands in each contiguous ownership/leasehold where they are seeking certification.

IMPLEMENTATION: Program participants shall identify cover as of January 1, 2008 in their IRMP and document production history and vegetative cover since that date. Documentation includes the acreage of biomass crops, non-biomass crops, and non-croplands under the Participant's control. Special attention is required when agricultural operations that have cleared non-crop vegetation after January 1, 2008

(Phase 2 and 3 tasking will identify what public imagery growers will use to verify this indicator.)

3.3.2 LANDS ELIGIBLE FOR CONVERSION

Program participant only shifts the intensity of land management in accordance with the matrix in Appendix C.

IMPLEMENTATION: ~~To be field tested in Phase 2 and 3 Tasks with guidance from Council~~ The eligibility classifications in Appendix C are designed primarily for high carbon and high environmental quality forestlands, rangelands, or wildlife habitats that were recently cleared.

3.3.3 PROTECTION OF KNOWN COMMUNITIES

~~Program Participants protect~~ known globally-ranked and state-ranked G1-G23² / S1-S3 species and communities, and regionally recognized species and communities. ~~and~~ Participants supports inventory of lands where there could be a lack of information and a need for surveys and other information gathering.

~~Note: Global (G) ranks for standard national classification concepts provided by NatureServe. State (S) ranks for community types provided by state Natural Heritage programs.~~

IMPLEMENTATION: ~~To be field tested in Phase 2 and 3 Tasks with guidance from Council~~ The Participants demonstrate that the IRMP objectives, management strategies, concrete actions, and timetables are put into action. risk-n

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IMPLEMENTATION: Participants document the control agents use in operations and the application practices.

4 PRINCIPLE 4 - WATER

Biomass and bioenergy production shall maintain or improve surface water, groundwater and aquatic ecosystems.

4.1 WATER QUALITY

Maintain or improve surface and ground water quality.

4.1.1 WATER QUALITY MANAGEMENT PLAN

Program participant complies with a water management plan that addresses impacts to water quality, or complies with an existing plan meeting these objectives, (including pollution prevention, control and mitigation, and fertilizer, pesticides, biosolids and waste water disposal treatments).

(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 ~~Management-Operation Plan.~~)

IMPLEMENTATION: The ~~Plan-IRMP addresses water quality risk and the management practice to avoid water contamination. Examples of compliance include~~ customizing application rates and timing of plant nutrients or pesticides, ~~the use of visual based on results from~~ soil and plant responses to applications, and the tools and resources ~~tissue testing conducted as~~ recommended by the NRCS.

~~IMPLEMENTATION:~~ In cases where the participant does not apply manure, the participant shall have an up-to-date IRMP that addresses nutrient management planning, pesticide application (runoff and drift control) for their entire operation. In cases where the participant applies manure, an up-to-date Comprehensive Nutrient Management Plan (in accordance with NRCS FOTG) is also required. Plan should be based on university extension recommendations unless conditions on site differ significantly from the assumptions on which extension recommendations are based.

4.1.2 EROSION AND SEDIMENT AND RUNOFF CONTROL

Program participant adopts conservation practices and tillage systems related to erosion control.

IMPLEMENTATION: Program participants demonstrate the use of practices suggested in USDA Conservation Practices, suggestions in the farm USDA Conservation Plan for erosion control or comparable Federal/State conservation agencies recommendations.

4.1.3 USE OF WASTEWATER FOR IRRIGATION

Program participant tests wastewater (or receives documentation of testing conducted by provider) and treats waste water as needed before using it for irrigation.

IMPLEMENTATION:

- Wastewater may be applied for irrigation, consistent with nutrient management planning.
- Wastewater must be tested before application. Growers shall secure documentation of testing by the water provider or shall have the water tested themselves.
- Animal wastewater must be tested for N, P, and TSS.
- Wastewater from municipal sources shall be tested for N, NO3, P and TSS.
- Wastewater from industrial sources must undergo a complete chemical profile, to include metals, ions, organics, and volatiles.

4.1.4 TRACE ELEMENTS IN BIOSOLIDS

~~Program P~~participants ~~use apply only biosolids that have been screened for heavy metal contaminants to the property tests sludge and manure for heavy metals on a quarterly basis.~~

IMPLEMENTATION: Participants document biosolid application on operations and maintain records from testing.

4.1.5 NITROGEN AND PHOSPHORUS

The Program Participant preserves nitrogen ~~and phosphorus~~ on site for plant uptake through plant tissue indicators or judicious soil sampling. Potential nitrogen ~~and phosphorus~~ runoff shall be dealt with in conjunction with Indicator 2.1.S2 Soil Nutrient and Conservation Planning and 4.1.S1 Water Quality Management Planning, to avoid ground and surface water contamination.

IMPLEMENTATION: Through periodic soil sampling, accurate yield monitoring, and following prescriptive soil sample recommendations, plant tissue testing, or color metric analysis; the producer demonstrates a working knowledge of nutrient uptake from their production. Coupled with conservation practices modeled and deployed through the USDA "conservation practices" or "conservation systems", a producer can demonstrate the ability to impact plant utilization while avoiding water pollution.

4.1.6 PHOSPHORUS

~~The Program Participant preserves phosphorus on site for plant uptake through plant tissue indicators or judicious soil sampling. Potential phosphorus runoff shall be dealt with in conjunction with Indicator 2.1.S2 Soil Nutrient and Conservation Planning and 4.1.S1 Water Quality Management Planning, to avoid ground and surface water contamination.~~

~~IMPLEMENTATION: Through periodic soil sampling, accurate yield monitoring, and following prescriptive soil sample recommendations, plant tissue testing, or color metric analysis; the producer demonstrates a working knowledge of nutrient uptake from their production.~~

Coupled with conservation practices modeled and deployed through the USDA “conservation practices” or “conservation systems”, a producer can demonstrate the ability to impact plant utilization while avoiding water pollution.

4.1.64.1.7 PESTICIDE MANAGEMENT

Program participant adopts pest and disease management methods that effectively control outbreaks of pests, diseases, ~~and fire, and introduction of invasive plants~~ while not harming human health or the environment.

IMPLEMENTATION: Integrated Pest Management (IPM) shall be used when practical. Regardless of use of IPM, pest management methods shall include:

- where possible, use of least-toxic and narrow-spectrum pesticides to achieve management objectives
- application of pesticides in compliance with label requirements
- application of pesticides in accordance with conservation practices
- ~~provision of equipment and training to employees and contractors for the safe application,~~
- ~~storage of pesticides, and response to hazardous spills.~~
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If biological control agents are used, they are applied by trained workers using proper equipment. Their use will be documented, monitored and strictly controlled in accordance with state and national laws and internationally-accepted scientific protocols.

4.1.74.1.8 PESTICIDE USE

Program participant identifies sources of concern and mitigates potential pesticide impacts.

IMPLEMENTATION: The identified areas of concern shall be protected with:

- erosion control measures and,
- correct timing of chemical applications or,
- when risk ratings on the Natural Resources Conservation Service Windows Pesticide Screening Tool (NRCS' WIN-PST) are intermediate or greater.

4.1.84.1.9 WASTE DISPOSAL

Program participant disposes of agricultural chemicals, containers, and liquid or solid non-organic wastes, including fuel and oil, off-site and in compliance with federal and state laws in a manner that is not harmful to the environment.

IMPLEMENTATION: Program participants shall document waste disposal methods and activities on their farm.

4.2 WATER QUANTITY

Irrigation practices do not deplete the quantity of surface or ground water.

4.2.1 IRRIGATION PLAN

Program participant provides annual documentation of compliance with and updates to a water management plan that ensures efficient use of water in irrigation practices.

(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 Management Plan.)

IMPLEMENTATION: Irrigation plans must include:

- a strategy to maximize efficiency in irrigation systems and reduce water use where possible. Re-use of treated wastewater where possible.
- conservation practices related to water management shall be adopted
- conforms to local or regional water allotment plan(s).

4.2.2 LEGAL COMPLIANCE

Program participant uses for irrigation only water for which they held legally valid use rights before commencement of biomass production or rights that have been subsequently acquired through legal means.

IMPLEMENTATION: Participant will identify the water authority that has oversight of the irrigation rights on the lands under his or her biomass production. Participants will provide evidence of annual compliance with the rules of the water body.

Comment [A/S10]: Field testing hasn't had the opportunity to do detailed due diligence with a grower whom has production under irrigation

4.2.3 PREVENTING DEPLETION

In areas where the local water authority determines that ground or surface water is being depleted faster than it is being naturally replenished, program participant acquires existing water rights for any new irrigation, rather than securing new water rights from the local water authority, that would increase ground or surface water depletion rates.

IMPLEMENTATION: Participants shall provide a copy of their irrigation permits and provide evidence of compliance ~~must include:~~

- areas with depleted water supplies are identified by state designations or local designations where applicable
- new irrigation in areas with depleted water supplies can only be done if it is offset by a reduction elsewhere in the irrigation district, unless the irrigation is just done for perennial crop establishment purposes for one or two years.

4.2.4 USE RIGHTS

Program participant demonstrates compliance with local water laws.

IMPLEMENTATION: Program participant shall provide documentation of compliance of local water laws as prescribed by the local water board, irrigation district or similar.

4.2.5 IRRIGATION/SALINITY

Program participant demonstrates that salinity of soil is within acceptable parameters for the crop produced.

IMPLEMENTATION: If soil salinity exceeds acceptable parameters, program participants shall take action to bring soil salinity into acceptable parameters. One method to consider is NRCS Salinity and Sodic Soils Management (Practice code 610).

4.2.6 MAXIMUM WATER USE PER ACRE

Program participant measures water use in a fashion that allows calculation of acre-feet of water applied per acre of cropland and ensures that water use per acre of cropland is consistent with the water use rates of the most efficient irrigation technology available in the area for the same or similar crops.

IMPLEMENTATION: Water recycled within an operation should only be counted as being applied once.

Where specific circumstances warrant the use of other irrigation methods, program participants shall provide satisfactory documentation of the rationale and demonstrate that water is being used in the most efficient manner reasonable given the circumstances. In their assessment of the appropriateness of alternative irrigation methods, auditors may consider groundwater levels, soil type, topography, existing permits, water source, use of recycled water, use of irrigation to deliver fertilizers or pesticides, and other relevant factors.

4.3 AQUATIC ECOSYSTEMS

Preserve or enhance the functions and services of aquatic ecosystems.

4.3.1 AQUATIC ECOSYSTEM MANAGEMENT PLAN

Program participant complies with an integrated resource management plan and for operations on forestland, program participant complies with state forest practice regulations and implements best management practices that addresses the potential negative impacts of operation on aquatic ecosystem health within the watershed.

(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 ~~Management~~Operation Plan.)

IMPLEMENTATION: Participants identify and map the watershed that the Participant's biomass acres drain into wetlands, blue-line streams, riparian zones, and streamside conservation zones shall be mapped. If the watershed is impaired, Participants, at a minimum, identify the watershed's current impediment and prescribed operational limitations.~~{to be developed}~~

4.3.2 STREAM FLOW

Program participant adopt conservation practices considered sufficient to avoid negative impact on local stream flows and stream channel morphology, flood storage and conveyance capacity, and in-stream habitat conservation practices.

IMPLEMENTATION: If the watershed is impaired or impacted by the Participants' operations, Participants provide management practices and desired future conditions.~~{to be developed and include NRCS TR1737-15; A User Guide to Assessing Proper Function and Condition}~~

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4.3.3 STREAM TEMPERATURE

Program participant adopts conservation practices and for operations on forestland, program participants implement State forest regulations and best management practices considered sufficient to avoid negative impact on local stream temperature.

IMPLEMENTATION: Participants describe and demonstrate operational limitations or conservation practices for biomass acres on temperature impacted streams.~~{to be developed}~~

4.3.4 HYPOXIA

Program participant does not contribute to increasing the risk of hypoxia in downstream environments. ~~{This indicator will be assumed to be met if silver level water quality indicators are met.}~~

IMPLEMENTATION: Participants describe and demonstrate operational limitations and conservation practices for biomass acres that minimize hypoxia if the watershed is impaired for nitrate.~~{to be developed}~~

4.3.5 WETLANDS

Program participant prevents negative impact on local wetlands through adoption of relevant conservation and appropriate management practices.

IMPLEMENTATION: Program participants shall not directly impact or make changes to hydrology that result in the drainage, filling, or degradation of any wetland that is not considered "prior converted" or drained prior to passage of the 1985 Food Security Act's "Swampbuster" provision.

5 PRINCIPLE 5 - AIR QUALITY AND EMISSIONS

Bioenergy shall reduce GHG emissions as compared to fossil-based energy. Emissions shall be estimated via a consistent approach to life cycle assessment.

5.1 AIR QUALITY

Program participant provides data needed for the biofuel or biopower producer to conduct a life cycle assessment (LCA) that accurately reflects emissions from the production and pre-conversion processing of biomass on the acres under consideration for certification.

5.1.1 YIELD DATA

Program participant provides accurate and complete yield data on the farm production.

IMPLEMENTATION: Yield will be reported on an as delivered basis (yield in weight and percent moisture) or as stated on contract documents between the Participant and the Consumer; e.g. As specified in the production contract.

5.1.2 PRODUCTION INPUTS

Program participant provides accurate production inputs (fertilizer, pesticides, fuel) utilized in biomass production.

IMPLEMENTATION: At a minimum, Participants provide the date applied, amount and type of nutrient amendments, and chemistry (product name and active ingredient per unit or production) applied to their biomass production acres.~~{to be developed}~~

5.1.3 PLANTING AND TILLAGE

Program participant provides accurate, planting methods, and tillage practices.

IMPLEMENTATION: At a minimum, Participants provide the name or type or equipment and the number of passes each tillage fertilization, spraying, or planting tools take during the establishment of their biomass acres. Participants provide an estimated fuel usage for each equipment choice for each operation (gallons per acre or gallons per hour).~~{to be developed}~~

5.1.4 SOIL CARBON AND ORGANIC MATTER

Program participant provides accurate data related to emissions resulting from soil carbon depletion or organic matter test results.

IMPLEMENTATION: At a minimum, Participants provide documentation of the soil organic matter as determined on the latest soil tests taken from their biomass production acres. MDS=soil organic matter test results.~~{to be developed}~~

5.1.5 HARVESTING, COLLECTION, HANDLING, PROCESSING, AND STORAGE

Program participant provides accurate harvesting, collection, handling, processing, and storage of biomass practices.

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Comment [DN11]: Does not address Land Conversion with the specified criteria

Comment [A/S12]: Round 2 and 3 Field testing is compiling a list of documents a grower can and should provide as proof of production inputs that can verify inputs and yield information from biomass production

IMPLEMENTATION: At a minimum, Participants provide the name or type of equipment and the number of passes each on farm collection, harvesting, road siding, stacking, or processing tool takes during the harvesting of their biomass acres. [to be developed]

5.1.6 TRANSPORTATION

Program participant provides accurate transportation data for biomass production.

IMPLEMENTATION: At a minimum, Participants provide the name or type of transportation equipment and the number of passes or miles of each known event associated with the biomass acres or production or the delivery of the biomass while under the care custody or control of the Participant. [to be developed]

6 PRINCIPLE 6 – SOCIOECONOMIC WELLBEING

Biomass feedstock production shall take place within a **business** framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders; (including land owners, farm workers, suppliers, biorefiners, and local community), ensures compliance or improves upon all applicable **Federal and State** labor and human rights laws, and provides for decent working conditions and terms of employment.

6.1 COMPLIANCE WITH LABOR LAWS

Ensure that human rights and labor laws are respected in biomass production fields.

6.1.1 FAIR LABOR STANDARDS ACT

Program participant demonstrates employee protection that is compliant with or exceeds the Fair Labor Standards Act (FLSA) and all other federal and state labor laws.

IMPLEMENTATION: Employers shall ~~maintain and provide d demonstrate employee protection ocumentation of compliance with the Fair Labor Standards Act (FLSA) provisions~~ concerning minimum wage and overtime pay; health, retirement and leave benefits; equal opportunity hiring; safety and health in the workplace; fair youth employment; and, union rights, among others, unless state law requires greater employee protection.

6.2 FAIR TREATMENT OF WORKERS

All workers shall receive fair treatment.

6.2.1 GRIEVANCE PROCEDURES

Program participants with 10 or more full time employees (including seasonal workers) have a management policy that provides a mechanism for employees to raise concerns, safety issues, or grievances without fear of termination or any other reprisal, and inform workers of the policy at the time of hire or adoption of the policy.

IMPLEMENTATION: Program participant can demonstrate a system for the operation that provides a platform for employee grievances without fear of reprisal.

6.2.2 EMPLOYMENT CONTRACT

Employer provides workers with a written agreement (e.g., employment contracting) describing the terms of hire.

IMPLEMENTATION: Participants can demonstrate a written agreement (e.g. employment contract) regarding hiring, firing, working hours, and vacation time. Participants demonstrate compliance with local, state, and federal labor contract laws.

IMPLEMENTATION: Participants demonstrate compliance with local, state, and federal labor contract laws. The contract must include the following provisions:

the employer shall not require workers to work more than 12 consecutive hours in a 24-hour period
workers are provided a minimum of 24 consecutive hours rest (one day off) for every six consecutive days of work
specify that if an employee is underperforming, employer will provide employee an opportunity to improve their performance before terminating employment

6.2.3 WORKPLACE IMPROVEMENTS

Program participant provides opportunities for employees to make suggestions for workplace improvements.

IMPLEMENTATION: Program participant can demonstrate a system to provide an opportunity for employee suggestions and a sample of suggestions in the previous year.

Comment [DN13]: These may not be appropriate for the industry

6.2.4 FREEDOM OF ASSOCIATION

Employer respects the right of workers to associate freely in the workplace and, if desired, organize among themselves to negotiate working conditions.

IMPLEMENTATION: Verified through private interviews employers and/or with employees, or written policies and procedures.

6.3 ENVIRONMENT, HEALTH, AND SAFETY

Program participant shall ensure that biomass production activities are conducted in a manner that protects the health and safety of employees.

6.3.1 COMPLIANCE WITH LAWS AND REGULATIONS

Employer maintains and provides documentation of compliance with federal, state, and local occupational health and safety laws and regulations.

IMPLEMENTATION: Participants demonstrate compliance with OSHA and applicable federal, state, or local laws or regulations. ~~{to be developed}~~

6.3.2 TRAINING

Employer maintains and provides documentation that employees are trained for health and safety in the workplace.

IMPLEMENTATION:

- All employees, including seasonal employees, receive health and safety information, in a language they understand.
- All full time employees receive health and safety training and get updated training at least every 5 years.
- All employees using potentially dangerous chemicals and machinery have received appropriate training.

Supervisors are trained in emergency procedures and all provided information about who to contact in case of emergency and location of emergency kits.

6.3.3 HAZARDOUS MATERIALS PROTECTION

Employer provides and employees use adequate protective clothing, appropriate safety equipment, and filtered air respirator systems and/or positive pressure cabs for workers handling highly toxic chemicals.

IMPLEMENTATION: Program participants can document the purchase of Hazardous Materials Protection for employees or identify the location of the equipment on the premises evidence of worker education.

6.3.4 ACCIDENTS AND INJURIES

Employees are prepared to handle injuries and chemical spills.

IMPLEMENTATION:

- Employees have access to well-stocked first aid kit at each work site.
- Employees are trained in emergency response procedures.
- Appropriate to the size of operation, procedures, materials, and training to address spills of hazardous materials are maintained.

6.3.5 SANITATION

Employer provides clean drinking water and clean latrines with handwashing stations to workers.

IMPLEMENTATION: Program participants can provide records that document employee access to sanitation devices and clean drinking water for employees.

6.3.6 INSURANCE AGAINST WORKPLACE INJURY

Employer provides workers compensation and disability insurance for all full time employees.

IMPLEMENTATION: Program participants can provide evidence of insurance policies documenting the purchase of insurance products to cover workplace injury situations.

6.4 FREEDOM OF ASSOCIATION

Workers may organize and associate freely, including for negotiating working conditions.

6.4.16.3.7 FREEDOM OF ASSOCIATION

Employer respects the right of workers to associate freely in the workplace and, if desired, organize among themselves to negotiate working conditions.

IMPLEMENTATION: ~~Verified through private interviews with employees.~~

7 PRINCIPLE 7 – LEGALTY

Biomass production shall comply with applicable federal, state, and local laws, statutes and regulations.

7.1 KNOWLEDGE OF LAWS

Program participant and employees are knowledgeable about and comply with laws, statutes, and regulations applicable to their operation.

7.1.1 KNOWLEDGE OF LAWS

Program participant, employees, and relevant contractors are able to demonstrate working level awareness and knowledge of the laws, statutes, and regulations that apply to their ownership / leasehold and operation.

IMPLEMENTATION: [to be developed]

7.1.2 ENSURING COMPLIANCE

Program or processes to ensure compliance with applicable laws, ordinances, and regulations are in place.

IMPLEMENTATION: Program participants will provide evidence of any pending litigation or action by a local, state, or federal regulatory agency against the operation.

8 TRANSPARENCY

Production of certified biomass shall be transparent.

8.1 PUBLIC ACCESS

Make results of certification audits and general information related to producing sustainable biomass available to the public.

8.1.1 PUBLIC TRANSPARENCY

Program participant promotes transparency by allowing the Council to release summary certification audit reports that do not contain any proprietary data to the public upon request. CSBP will in no circumstance disclose failure of a producer to meet the Standard. (CSBP will not require public disclosure of proprietary information or information protected by intellectual property laws.)

IMPLEMENTATION: Written acknowledgement of how the CSBP standard summary is providing public knowledge of the operation. (CSBP has not decided which information will be publicly released or it will do so.)

9 CONTINUOUS IMPROVEMENT

Biomass producers and fuel developers will continuously improve practices and outcomes based on the best available science and appropriate grower development benchmarks.

9.1 COMPLIANCE

Comply with all changes made to the standard over time.

9.1.1 PARTICIPANT COMPLIANCE

Program participant complies with changes to the standard within the specified compliance period.

IMPLEMENTATION: Producer will demonstrate compliance with non-conformity with the standard.

9.2 REVIEW AND IMPROVEMENTS

The CSBP Standard and Participants demonstrate efforts to improve the environmental outcomes, agricultural practices, environmental approaches and social outcomes to the operation.

9.2.1 STANDARD REVIEW

Participants participate in periodic reviews of the CSBP Standard.

IMPLEMENTATION: Participants provide feedback and engage in periodic review of the CSBP Standard.

Comment [MK14]: Moved to 6.2.4. above

Formatted: Normal

~~9.2.19.2.2~~ **IMPROVE PERFORMANCE**

Program participant demonstrates efforts to improve environmental performance based upon monitoring programs and actions to address any non-conformances identified during certification audits.

IMPLEMENTATION: Program participant complies with the time table of the IRMP and addresses nonconformity issues within the time frame specified.

~~9.2.29.2.3~~ **GOOD AGRICULTURAL PRACTICES (GAP)**

Program participant demonstrates adoption of good agriculture practices through the use of "Best Agriculture Practices", Integrated Pest Management to improve performance to the operation.

IMPLEMENTATION: Examples of areas program participants can demonstrate use of good agricultural practices:

- Chemical, nutrient or manure application, on farm storage practices and disposal of hazardous waste materials.
- Integrated pest and disease management
- Usage of agriculture chemicals and germplasm according to Federal, State and Local Law and other Treaty Obligations (~~Appendix E~~)

Comment [A/S15]: Does this need to be broadened?

4 GLOSSARY

Aggregator: any individual or organization that combines biomass from multiple individual producers for sale to a bioenergy facility.

Agriculture: all facilities and equipment engaged in growing crops and raising animals. (Department of Energy)

Aquatic ecosystems: a basic ecological unit composed of living and non-living elements interacting in an aqueous environment. (U.S. Fish and Wildlife Service)

Assessment: [a written evaluation to determine baseline conditions for establishing a structured approach to improving the performance regarding this Standard. The initial assessment involves both the Participant and the independent auditor.](#)

Bioenergy: energy produced from biomass (electricity; liquid, solid, and gaseous fuels; and heat). (Cornell University College of Agriculture and Life Sciences)

Biological diversity (biodiversity): the variety and abundance of life forms, processes, functions, and structures of plants, animals, and other living organisms, including the relative complexity of species, communities, gene pools, and ecosystems at spatial scales that range from local through regional to global. (Helms)

Biofuel: Biomass converted to liquid or gaseous fuels such as ethanol, methanol, methane, and hydrogen. (National Renewable Energy Laboratory)

Biomass: organic matter intended for conversion into bioenergy or other bioproducts, including dedicated fuel crops, crop residues, purpose-grown wood, forestry residues, and native vegetation. (CSBP specific definition)

Biopower: the use of biomass to generate electricity; system technologies include direct-firing, co-firing, gasification, pyrolysis, and anaerobic digestion. (National Renewable Energy Laboratory)

Biorefinery: a facility that integrates biomass conversion processes and equipment to produce fuels, power, and chemicals from biomass. (National Renewable Energy Laboratory)

Conservation Practice: an agricultural management practice that have been determined by the Natural Resource Conservation Service as an effective method to address resource concerns, either alone or in combination with other practices. Conservation practices are not equivalent to “best management practices.” In many cases, there are multiple conservation practice options that growers might consider for development of a resource conservation system to address a resource concern.

Certification Body (CB): [a CSBP-authorized auditing firm body to provide independent assessments of the Participant's operations regarding the compliance to this Standard](#)

Corrective Action Plan (CAP): [a written plan submitted to a certification body in response to non-conformities raised by the certification body's auditor, describing corrective and preventive actions taken, and plan of action.](#)

Criterion: A category of conditions or processes by which biomass production can be assessed; characterized by a set of related indicators which are monitored periodically. (adapted from Forest Stewardship Council)

Cultural Vegetation: vegetation with a distinctive structure, composition, and development determined by regular human activity. Cultural vegetation has typically been planted or treated, and has relatively distinctive physiognomic, floristic, or site features when compared to natural vegetation. Distinctive physiognomic and structural attributes typically include one or more of the following:

- a) Dominant herbaceous vegetation that is regularly-spaced and/or growing in rows, often in areas with substantial cover of bare soil for significant periods of the year, usually determined by tillage or chemical treatment.
- b) Dominant vegetation with highly-manipulated growth forms or structure rarely found as a result of natural plant development, usually determined by mechanical pruning, mowing, clipping, etc.
- c) Dominant vegetation comprised of species not native to the area that have been intentionally introduced to the site by humans and that would not persist without active management by humans.

Due Date of Response: [All timeframes for response begin from the date the final Audit report is emailed. Most audit response are due within thirty \(30\) days, unless otherwise stated in the Audit report. Please note that failure to respond to the audit findings within the specified timeframe may result in suspension of certification status.](#)

Eco-region: a relatively large unit of land or water containing a distinct assemblage of natural communities sharing a large majority of species, dynamics, and environmental conditions. (WWF)

Ecological Society of America (ESA): a nonpartisan, nonprofit organization of scientists founded in 1915 to promote ecological science by improving communication among ecologists; raise the public's level of awareness of the importance of ecological science; increase the resources available for the conduct of

Comment [MH16]: A different authorization body

Comment [MH17]: Is this the number convention that we will use - I support this one

ecological science; and ensure the appropriate use of ecological science in environmental decision making by enhancing communication between the ecological community and policy-makers. (www.esa.org)

Ecosystem services and resources: goods and services that are traditionally viewed as free benefits to society, or "public goods," including wildlife habitat and diversity, water filtration, carbon storage, and scenic landscapes. (USDA Forest Service)

Edge of field management: a management practice, usually in the form of a forest or grass buffer, that protects the environment from adverse impacts associated with intense agricultural production. (Dabney, Moore, and Locke, *Integrated Management of in-Field, Edge-of-Field, and after-Field Buffers*)

Energy crop lands: land used to grow crops that are specifically grown to produce some form of energy.

Environment, Health and Safety (EHS): broad set of regulations or procedures to ensure acceptable working conditions.

Extensive management: low level of management, with little human intervention, to improve yield per acre. (US Forest Service)

Fair Labor Standards Act (FLSA): establishes minimum wage, overtime pay, recordkeeping, and youth employment standards affecting employees in the private sector and in Federal, State, and local governments. (Department of Labor)

The Federal Geographic Data Committee (FGDC): an interagency committee that promotes the coordinated development, use, sharing, and dissemination of geospatial data on a national basis. (www.fgdc.gov)

Field management: fields and forest stands are distinct management units within the contiguous ownership where conformance with the CSBP standard can be established and biomass produced from the certified unit can be distinguished from adjacent units.

Fragile ecosystems and landscapes: Native ecosystems characteristic of locations where environmental extremes (substrates, climates) severely constrain biotic composition, rates of succession are very slow, recovery from human disturbance is very slow (several decades-to-centuries) or poorly understood, and environments are documented as being particularly susceptible to invasion by non-native species when disturbed by humans. (NatureServe) Greenhouse gas (GHG) emissions: releases of gases that trap heat in the atmosphere, contributing to climate change. These gases include carbon dioxide (CO₂), methane, and chlorofluorocarbons (CFSs). Greenhouse gases (GHGs) are often measured in equivalents to carbon dioxide (CO₂-e) as CO₂ is the most prevalent GHG.

Greenhouse gas (GHG) emissions: releases of gases that trap heat in the atmosphere, contributing to climate change. These

gases include carbon dioxide (CO₂), methane, and chlorofluorocarbons (CFSs). Greenhouse gases (GHGs) are often measured in equivalents to carbon dioxide (CO₂-e) as CO₂ is the most prevalent GHG.

Good Agricultural Practices: TBD

Group certification: an arrangement by which biomass production management units (i.e., fields or forest stands) owned or managed by a number of distinct legal entities (group members) may be evaluated and subsequently certified within the scope of a single certificate. (adapted from Forest Stewardship Council)

Incidental areas: idle lands that are not used for forage or crop production immediately adjacent to (e.g., hedgerows) or within (e.g., watercourses, wetlands) agricultural fields or forest management units.

Indicators: a quantitative or qualitative variable that can be measured or described, and which provides a means of judging whether biomass production complies with the requirements of a criterion. (adapted from Forest Stewardship Council)

Indirect land use change: land use change likely to have indirectly resulted from changing patterns in land management practices in another location. There is a wide range of opinion concerning the extent to which increased use of land to grow crops for biofuels is resulting in more conversion of forests to crop production in order to make up for land taken out of crop production to grow biomass.

Integrated Resource Management Plan: a comprehensive and detailed plan that outlines management goals and objectives for a designated area of land, based on consideration of all of the resources on that land and that may be impacted by activities on that land, and that specifies the practices that will be used to achieve management objectives.

Intensive management: utilizing practices and production methods to maximize production per acre.

Invasive species: plants, animals, and microbes not native to a region, which when introduced either accidentally or intentionally cause economic or environmental harm or harm to human health. (USDA National Agricultural Library, <http://agclass.nal.usda.gov/>)

Landowner priorities: the primary goals a landowner has for their ownership.

Life cycle assessment (LCA): a technique to assess the environmental aspects and potential impacts associated with a product, process, or service, by: compiling an inventory of relevant energy and material inputs and environmental releases; evaluating the potential environmental impacts associated with identified inputs and releases; interpreting the results to help you make a more informed decision. (EPA)

Management component: a specific part of agricultural and/or forestry management, including: input management, field/stand management, harvest, incidental area treatment, carbon cost, and field/stand access.

Management objectives: the specific aims a landowner or manager seeks to achieve through management plans and practices.

Management options: different practices or programs that may be used to achieve management objectives.

Management practices: specific activities, measures, courses of action, or treatments used to achieve management objectives.

Mitigation: 1. action taken to alleviate potential adverse effects of natural or human-caused disturbances 2. compensation for damage done – note in this usage, in-kind mitigation is replacement of a lost resource with one similar (stream for stream or species for species), while out-of-kind is replacement of one kind with another (lake for stream or one species for another).

Narrow spectrum pesticide: a selective [pesticide](#) (usually an [insecticide](#)) that is toxic to one or a few [species](#) or species groups —*synonym* selective pesticide. Contrast with [broad-spectrum pesticide](#) (a nonselective [pesticide](#) - usually an [insecticide](#) -that is toxic to many [species](#)).

Natural Heritage programs: state-level programs that manage site-specific and species/ecosystem-specific information on priority species and ecosystems identify which species and ecosystems are priorities for conservation effort; build and maintain a database for priority species and ecosystems; and share the information with others so that it can be used for environmental assessments and conservation planning purposes. (Washington State Department of Natural Resources)

Natural/native ecosystems and lands: Vegetation where ecological processes primarily determine species and site characteristics; that is, vegetation comprised of a largely spontaneously growing set of plant species that are shaped by both site and biotic processes. Natural vegetative forms recognizable physiognomic and floristic groupings that can be related to ecological site features. Human activities influence these interactions to varying degrees (e.g., logging, livestock grazing, fire, introduced pathogens), but do not eliminate or dominate the spontaneous processes. (NatureServe)

NatureServe: a non-profit conservation organization whose mission is to provide the scientific basis for effective conservation action; represents an international network of biological inventories-known as natural heritage programs or conservation data centers-operating in all 50 U.S. states, Canada, Latin America, and the Caribbean. (www.NatureServe.org)

Natural Resources Conservation Service (NRCS): a program of the U.S. Department of Agriculture to help America's private land

owners and managers conserve their soil, water, and other natural resources. NRCS provides technical and financial assistance for many conservation activities. (www.nrcs.usda.gov)

Natural Resources Conservation Service Windows Pesticide Screening Tool (WIN-PST): a pesticide environmental risk screening tool that NRCS field office conservationists, extension agents, crop consultants, pesticide dealers and producers can use to evaluate the potential for pesticides to move with water and eroded soil/organic matter and affect non-target organisms. (Natural Resource Conservation Service)

New Information Request (NIR): [a written request by a certification body to provide additional information to determine compliance with specific requirements. It is possible that a new non-conformity may result from the evaluation of new information submitted.](#)

Non-Conformity (NC): [receiving a non-conformity means that a the program is not compliant with a specific requirement of the CSBP Standard. A non-conformity requires Corrective Action Plan \(CAP\) and demonstrates implementation of the CAP by submitting documentary and/or photographic evidence. A certification decision cannot be issued before this step is completed.](#)

Opportunity for Improvement (OFI): [receiving an OFI indicates an area in which an improvement is recommended but not required by the certifying body. A Corrective Action Plan is not required.](#)

Nutrient Management Plan: the overall conservation system that addresses all aspects of an animal feeding operation to help ensure that both agricultural production goals and natural resource concerns dealing with nutrient and organic by-products and their adverse impacts on water quality are achieved. A CNMP incorporates practices to utilize animal manure and organic by-products as a beneficial resource. (Natural Resource Conservation Service, <http://www.nrcs.usda.gov/technical/afo/pdf/CNMPFactSheet.pdf>; Texas State Soil and Water Conservation Board)

Program participant: a biomass producer who enrolls in the CSBP program to achieve third-party certification for meeting the CSBP Standard for sustainable biomass production.

Renewable Fuel Standard (RFS): U.S. law that directs EPA to promulgate regulations ensuring that applicable volumes of renewable fuel are sold or introduced into commerce in the United States annually. RFS regulations apply to refiners, blenders and importers and set forth a phase-in for renewable fuel volumes beginning with 9 billion gallons in 2008 and ending at 36 billion gallons in 2022. The proportion of cellulosic biofuels that must be sold rises from 100 million gallons in 2010 to 16 billion gallons in 2022.

Restored lands: lands that through human intervention or natural processes once again exhibit some or all natural ecosystem characteristics.

RUSLE2 (T score): Revised Universal Soil Loss Equation, which estimates soil loss from rill and interrill erosion caused by rainfall on cropland (rill and interrill erosion is the removal of layers from the land surface by the action of rainfall and runoff); used to predict the long-term average rate of rill and interrill erosion for several alternative combinations of crop system and management practices. T score refers to soil loss tolerance, the amount of soil that can be replenished annually through soil forming processes, and usually varies from 1-5 tons per acre per year, depending on the soil type. RUSLE2 calculates the average annual soil loss (A) based on factors of climate, soil, slope length, slope steepness, cover management and support practice. This value is compared with T to determine whether the system is sustainable from a soil loss perspective. (<http://www.ia.nrcs.usda.gov/news/factsheets/RUSLE2FactSheet.html>)

Self-assessment: an evaluation of management practices against a set of criteria and indicators conducted by the landowner or land manager.

Semi-natural vegetation / lands: typically encompasses vegetation types where the species composition and/or vegetative growth forms have been altered through anthropogenic disturbances such that no clear natural analogue

is known, but they are a largely spontaneous set of plants shaped by ecological processes.

Silviculture: the science, art, and practice of establishing and tending forest stands to produce forest stands with the desired composition, constitution and growth rate. (USDA National Agricultural Library)

Socio-economic well-being: the social and economic health, stability, and vitality of a community.

Soil Conditioning Index (SCI): a qualitative tool that predicts the effects of management systems on soil organic matter as one of three outcomes - organic matter decline, organic matter increase, or organic matter equilibrium. The index considers organic material (biomass) produced and returned to the soil, the influence of climate on organic matter decay, the influence of tillage, and the influence of erosion. (NRCS)

Sustainability: Adopting practices and developing products that are environmentally, socially and economically sound, and that can meet present needs without compromising the ability of future generations to meet their needs.

Un-fragmented habitat block: an undeveloped area that is not impacted by roads or development (Maine Department of Transportation)

Add Phosphorus Index

5 APPENDIX A: EXPERTS CONSULTED IN THE DEVELOPMENT OF THE DRAFT STANDARD

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6 APPENDIX C: LAND CONVERSION – Draft Approach

The table below presents a draft approach developed by CSBP to address the limits to and opportunities for intensifying land management while qualifying for silver certification under CSBP. It is the result of a collaborative effort by CSBP members, but *should not* be read to mean that every member agrees with the full content of this appendix. For many on the Council, this is a pivotal issue, requiring additional exploration and discussion. As a result, all or portions of this Appendix are subject to revision based on additional study.

Introduction

CSBP presents a four category approach to land classification, for the purposes of defining qualifying land conversion. These categories utilize the national vegetation classification* system developed by NatureServe, the Ecological Society of America, and federal agency partners, and adopted as the U.S. federal standard for vegetation description by the Federal Geographic Data Committee (FGDC 1997, 2008) (see glossary). The basic land classification system defines natural, semi-natural and cultural vegetation classifications for all lands in the U.S. (see definitions below). The CSBP draft approach further divides lands into the following four categories:

- A) Un-Managed vegetation (“natural”)
- B) Managed vegetation (“semi-natural”): Extensively managed forest or non-forest lands
- C) Managed vegetation (“semi-natural”): Intensively managed semi-natural forest and non-forest lands
- D) Cultural vegetation planted with native species, exotic species, and short-rotation woody crops

Overview of Approach

Landowners³ initiate consideration for enrollment in CSBP by defining and documenting an initial vegetation classification for their lands, A) – D) (first column in the table below), and by identifying the management history and practices of lands, as of January 1, 2008 (second column in the table below). Once documented, lands may intensify land management practices and move one level of management intensity down the table, and qualify for CSBP silver certification. CSBP members disagree, however, as to whether lands should be able to move from C) to D) and still qualify for silver certification. Some members suggest that lands in a natural or semi-natural state of any type can be more intensively managed, but it would be unsustainable, according to CSBP’s definition (see glossary), if acreages were allowed to move to native or exotic species cultural vegetation. Other members believe that moving from C) to D) represents a reasonable intensification of management practices that should be allowed within the definition of sustainability under the standard. Therefore, two options are presented in yellow as bracketed and unresolved. [If the Participant’s forest certifications program provides a classification scheme for land conversion eligibility, these requirements will be reviewed, approved, or rejected by the CSPB-accredited certification body.](#)

For the provisional standard, landowners should protect G1-3 imperiled and vulnerable species (see definitions below). This means: a) they are important components of biodiversity, and b) while lands associated with the species can be managed, consistent with the protection of these species, communities and their habitat, there should not be intensification of production on lands associated with G1-3 biodiversity to the next land classification in all of the A-D categories. During field testing, CSBP will assess whether additional land area is required to be added to the “assumed area occupied” associated with Natural Heritage Points in order to assess the costs of addressing G3 sites and conserve biodiversity within the context of intensified biomass production. Some are concerned that the assumed area of impacts in the NatureServe Analysis are significantly understated. On the ground experience indicates that the acreage impacted by G-3 and S1-3 species may be an order of magnitude higher than what is assumed in the report.

For the provisional standard, the G4G5-S1S2 and G4G5-S3 biodiversity of globally common species and communities that have been identified as imperiled or vulnerable in a particular state will tend to be included as priorities for conservation in State Wildlife Action Plans (SWAPs) and/or in The Nature Conservancy (TNC) conservation areas. However, SWAPs are inconsistent in their consideration of these species, many do not address imperiled or vulnerable plants, and not all of the data is spatially explicit. In addition, not all TNC Eco-regional Conservation Areas

³ [Agricultural and ranching lands with naturally regenerated fallows should not use the natural vegetation classifications in this table.](#)

include S1-S3 species and communities in their analyses. Because of the rare and special nature of the S1-S3 biodiversity in a particular state, these lands should receive special consideration, including potential protection from intensification, reference to SWAP's and TNC, and/or inclusion of specific requirements for management, protection, or restoration in the IRMP. The practicality of implementation and the efficacy of these approaches in protecting S1-S3 biodiversity will be assessed in the field. Use of available information or funding support to conduct these activities may be needed, in some circumstances.

Table 3: Land Conversion

National Vegetation Classification & Current Management Regime*	Management history	Qualifying Future Management**	Non-Qualifying Future Management
Natural & Semi-natural² vegetation			
A) Un-Managed vegetation ("natural")	<ul style="list-style-type: none"> • No past harvest (e.g., primary forest; unplowed prairie) • Past harvest followed by little or no vegetation management and with sufficient time for recovery to natural composition and structure. 	<ul style="list-style-type: none"> • Maintain in natural vegetation <ul style="list-style-type: none"> – Maintain under non-extractive management; OR – If secondary forest and G4-G5 or S4-S5 community types³ shift to extensively managed vegetation 	<ul style="list-style-type: none"> • Convert either G1-G3 or S1-S3 types to managed or cultural vegetation • Convert either G4-G5 or S4-S5 types to intensively managed or cultural vegetation
B) Managed vegetation ("semi-natural"): Extensively managed forest or non-forest native rangelands	<ul style="list-style-type: none"> • Extensive management <ul style="list-style-type: none"> – Regeneration strategies rely on natural seeding or coppicing; no soil disturbance activities – Selective harvesting; including scattered single-tree removal and small patch harvest in support of natural regeneration; – Extensive grazing – Low use of mowing – Prescribed fire/limited fire suppression. – Very low use of vegetation disturbance for stand access. – Low chemical input – Low nutrient input 	<ul style="list-style-type: none"> • Restoration to natural vegetation • Maintain as extensively managed vegetation • Shift to intensively managed vegetation 	<ul style="list-style-type: none"> • Convert to cultural vegetation

<p>C) Managed vegetation ("semi-natural"):</p> <p>Intensively managed semi-natural forest and non-forest native rangelands</p>	<ul style="list-style-type: none"> • Intensive management <ul style="list-style-type: none"> – Regeneration strategies may include plantings and assisted natural regeneration, but result in no significant change in within-stand species composition or structure – Low use of soil disturbance for regeneration/ Very low tillage planting – Regeneration harvesting (including clear-cutting) and/or thinning and retention standards, as defined through published scientific literature or existing certification standards. – Extensive, rotational grazing – Rotational mowing – Prescribed fire/fire suppression. – Low to moderate vegetation disturbance for stand access – High-efficiency irrigation – Moderate chemical input – Moderate nutrient input 	<ul style="list-style-type: none"> • Restoration to extensively managed vegetation • Maintain as intensively managed vegetation • [OPTION 1] For intensively managed vegetation types, shift to cultural vegetation with special consideration of high priority stated conservation goals nationally through Federal agency identified areas, State Wildlife Action Plans, or TNC Eco-regional Portfolio sites. • Intensively managed vegetation that shifts to cultural vegetation must develop and implement wildlife habitat refuges* that are spatially consistent with the above stated priority conservation goals. Intensively managed vegetation that shifts to cultural vegetation must develop and implement wildlife habitat refuges* that are spatially consistent with the above stated priority conservation goals.OPTION 2) Delete prior bullet, meaning that lands could be restored or maintained as C), but that conversion to cultural vegetation would be non-qualifying. 	<ul style="list-style-type: none"> • Convert more than 4 percent of any forest management unit during a calendar year to cultural vegetation. • Convert rangelands dominated by native species to cultural vegetation.
<p>Cultural vegetation⁴</p>			
<p>D) Cultural vegetation planted with native or exotic species</p>	<ul style="list-style-type: none"> • Intensive Culture <ul style="list-style-type: none"> – Active regeneration (planting, seeding, deliberate seed tree retention) with one or two [native] species – Regeneration harvesting (including clear-cutting) and/or thinning and retention standards, as defined through published scientific literature or existing certification standards. – Intercropping – Short rotation crops – Moderate-high use of soil disturbance for 	<ul style="list-style-type: none"> • Restoration to natural/semi-natural vegetation • Maintain in cultural vegetation with native or exotic species 	

⁴Wildlife refuges should at a minimum retain essential structural elements of wildlife habitats or the biological legacies (logs, snags, etc.). For example, key species, densities, and the spatial arrangement of any remaining aggregated structures or biological legacies within the harvesting unit should be identified as goals for retention or enhancement set and monitored. See Society of American Forestry http://dictionaryofforestry.org/dict/term/variable_retention_harvest_system.

	regeneration – Moderate-high vegetation & soil disturbance for stand access – Moderate - high use of chemical inputs – Moderate-high use of nutrient inputs – Use of irrigation and high-efficiency irrigation		
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***National Vegetation Classification Definitions:**

Vegetation where ecological processes primarily determine species and site characteristics; that is, vegetation comprised of a largely spontaneously growing set of plant species that are shaped by both site and biotic processes. Natural vegetative forms recognizable physiognomic and floristic groupings that can be related to ecological site features. Human activities influence these interactions to varying degrees (e.g., logging, livestock grazing, fire, introduced pathogens), but do not eliminate or dominate the spontaneous processes.

² Semi-natural vegetation typically encompasses vegetation types where the species composition and/or vegetative growth forms have been altered through anthropogenic disturbances such that no clear natural analogue is known, but they are a largely spontaneous set of plants shaped by ecological processes.

³ Global ranks (G4-apparently secure, G5 secure globally or range-wide, respectively) for standard national classification concepts provided by NatureServe. State ranks for community types (e.g., S5 - 'secure' within state boundaries) provided by state Natural Heritage programs.

⁴ Cultural vegetation is defined as vegetation with a distinctive structure, composition, and development determined by regular human activity. Cultural vegetation has typically been planted or treated, and has relatively distinctive physiognomic, floristic, or site features when compared to natural vegetation. Distinctive physiognomic and structural attributes typically include one or more of the following:

- a) Dominant herbaceous vegetation that is regularly-spaced and/or growing in rows, often in areas with substantial cover of bare soil for significant periods of the year, usually determined by tillage or chemical treatment.
- b) Dominant vegetation with highly-manipulated growth forms or structure rarely found as a result of natural plant development, usually determined by mechanical pruning, mowing, clipping, etc.
- c) Dominant vegetation comprised of species not native to the area that have been intentionally introduced to the site by humans and that would not persist without active management by humans.

****Mitigation Options:** CSBP members did not fully investigate the array of mitigation options available or agree on whether they should be employed. Mitigation options may be considered for situations when participants seek to intensify management more than one level of classification, if mitigation efforts are expected to have direct and measurable native wildlife benefits within affected geographic areas (to be determined). Mitigation will not be allowed for natural systems that are rare or are not replicable (yet to be specified).

7 APPENDIX D: GREENHOUSE GAS EMISSIONS FACTORS

The following list represents those factors that, to the best of CSBP's knowledge, 1) growers have control over, and 2) there is significant variation among growers. CSBP will continue to consult with life cycle assessment experts and bioenergy facilities regarding which data are most important for growers to report in order for them to conduct accurate GHG emissions life cycle assessment for bioenergy they produce. This list may therefore change before the CSBP biomass production standard is finalized; some factors may be removed, others may be added.

5.1. S1. Yield

Yield	lbs/acre
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5.1.S2. Inputs: Emissions resulting from production inputs (fertilizer, pesticides, fuel).

Parameters for crops (annual and perennial)	Units
Nitrogen application rate	lb/ac
Phosphate application rate	lb/ac
Potassium application rate	lb/ac
Lime application rate	lb/ac
Lime application frequency	Years
Manure application rate	tons/ac
Manure type	
Manure hauling distance	Miles
Harvests per year	Number
Gasoline	Gal/ac*
Diesel	Gal/ac*
LPG	Gal/ac*
Natural gas	ft ³ /ac
Electricity	kWh/ac
Pesticide/Herbicide use	lbs/ac

** Fuel use may also be measured by recording the number of passes and equipment type (tractor make, model, horsepower, etc.) and extrapolating fuel use. (USDA has fuel efficiency ratings for agricultural equipment, though its level of accuracy is not known.)*

5.1.S3. Land Management Practices: Emissions resulting from land conversion, planting methods, and tillage practices.

Previous vegetation cover / crop rotation history of all energy crop lands owned and managed by the grower supplying the particular biorefinery or other biomass use facility under review.	Format to be consistent with LCA model TBD. For data that are not available due to land tenure / tenant changes, default values will be used.
Planting methodology	
Tillage Method	

5.1.S4. Soil Carbon: Emissions resulting from soil carbon depletion, including from crop / forest residue removal.

Residue Removal Rate -	%
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Soil Carbon released due to all causes, including crop residue removal	Format consistent with LCA
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5.1.S5. Harvest and Handling: Emissions resulting from harvesting, collection, handling, processing, and storage of biomass.

Gasoline	Gal/bdt (per bone dry ton) **
Diesel	Gal/bdt*
LPG	Gal/bdt*
Natural gas	ft ³ /bdt
Electricity	kWh/bdt

*** The feasibility of calculating fuel use by bone dry ton needs to be reviewed as growers generally calculate tonnage as delivered, regardless of moisture content.*

5.1.S6 Transportation: Emissions resulting from transportation of biomass.

Transportation mode (barge, Classes 1, 2 and 3 are “Light Duty, Classes 4, 5, and 6 are “Medium Duty, and 7-8 are “Heavy Duty”). truck, truck, rail)	
Transport distance	Mi

APPENDIX C: GUIDANCE FOR STANDARD IMPLEMENTATION

APPENDIX B: GUIDANCE FOR STANDARD IMPLEMENTATION

The following Antares/SCS Guidance has been developed during Field Testing. All of the text below was based upon field interviews and assessments. The Guidance provides a Participant-friendly pathway for meeting the expectations in the CSBP Indicators and Implementation. Guidance for this sustainability Standards will change in response to the growth in scientific knowledge and experiences from the utilization of the Standard. As such, the Guidance provided encompasses good agricultural production practices at this juncture of the biomass industry. These good agricultural practices for biomass production have been based upon grower-related experiences learned from traditional row cropping systems. Consequently, it is our expectation that both the Participants and auditors will add to the growth and refinements of Guidance Appendix B of the Standard quickly over time.

The following *guidance* is organized around the respective CSBP Standard Principles, Criteria and Indicators that users of this Standard seek to address. For select Indicators, key sources of information, resources, tips, and other evidence are provided to the Participant, NRCS field office, or Consumers. Specific resources provided are practical aids for compliance with the CSBP Standard. Table 1 is a summary of the respective Natural Resource Conservation Service Tools and Documentary Sources for CSBP Standard Implementation.

INTEGRATED RESOURCE MANAGEMENT PLANNING

PRINCIPLE: Biomass production shall be based on an integrated resource management plan that shall be completed, implemented, monitored and updated to address the environmental risks associated with current and future production, appropriate to the scale and intensity of the operation.

1.1.1 BASELINE INFORMATION

GUIDANCE: *The Program Participant completes the CSBP self-assessment checklist to the best of his or her knowledge. Instructions for filling out this form are located on the “Instructions” worksheet. The IRMP will automatically populate from the CSBP self-assessment checklist. Worksheets are also provided on the IRMP document through hyperlinks. After the Participant fills out the CSBP self-assessment checklist, the generated IRMP must be reviewed and edited by the Program Participant. This information establishes the information baseline prior to the audit. The Participant is responsible for updating this document year-by-year. See IRMP guidance below in 1.2.1-1.3.5 for objectives.*

Particular care is needed when changes in the scope or intensity of the operation may adversely affect environmental resources such as water, habitat, and soils or add additional CO₂ to the atmosphere. A workbook¹ is provided as part of the CSBP checklist for determining the environmental risk that changes in the scope of the Program Participants operation presents an increased risk to the environment. Some non-agricultural lands and land cleared after January 1, 2008 are ineligible for CSBP certification.

Program participants with biomass acres in areas of high ecological values will need to consult NatureServe and Natural Heritage programs. Wildlife habitat requires special considerations. The Participants must build upon experience with wildlife species to adequately assess the unique or commonness of the habitat on or adjacent to biomass acres for an initial assessment. For protection of any rare, threatened and endangered species and communities the Participant's need to consult the list of endangered or threatened species protected by the US Endangered Species Act (or species and communities considered critically imperiled, imperiled, or vulnerable by and important wildlife species and habitats identified in regional, state, or national conservation plans) will addressed in the IRMP Objectives (1.2.1 below) and Management Plan (Management Planning 1.3.1 and Implementation 1.3.2 below).

¹ The workbook for assessing environmental risks is currently under development.

1.2.1 ESTABLISHING OBJECTIVES

GUIDANCE: *Completing the IRMP template is the first step to assessing IRMP objectives. An independent assessment of the IRMP will be conducted by Certification Body. Program Participants that do not choose to be audited can use the self-assessment as a surrogate for audit processes and benchmark their sustainability achievements against the CSBP Criteria and Indicators. This feedback from the Non-conformities (NCs) or self-assessment is valuable information. The information re-establishes information baseline prior to subsequent audits.*

1.3.1. OPERATIONS PLANNING

GUIDANCE: *The Program Participants that receive non-conformities against CSBP environmental Indicators are required to develop Corrective Action Plans (CAPs) as part of the IRMP. Participants that change the intensity or scope of the operation or otherwise incur higher environmental risks in their production systems must document their environmental safeguards for soil, wildlife habitat, aquatic ecosystems, water quality, water quantity, and control invasive species in the IRMP. In addition to safeguards, increasingly more complete environmental assessments are required with increased environmental risks associated with the Participant's biomass acres. Examples of objectives that require more in-depth environmental assessments include introduction of invasive species, removal of key wildlife habitat, or the use of land-moving equipment for vegetation removal if conservation measures cannot be demonstrated. More complete assessments include but are not limited to areas of eroded or compacted soils, habitats or species that are rare, threatened or endangered or invasive, impaired water bodies or streams or blue line streams without buffers or conservation measures. Conversion of tracks of forested lands to biomass acres will require an assessment. Appendix C of the Standard provides eligibility guidelines for operations that are not classified as agriculture or operations that cannot demonstrate third-party certified biomass acres. A worksheet is provided in the self-assessment checklist to determine the need for assessments detail for IRMP planning. Conversions of permanent cover types to annual biofuel crops are one of many cases that trigger in-depth assessments such as those listed in Table 1. The independent auditor may agree or disagree with the Participant's IRMP findings for land conversion. The independent auditor represents and certification body. This certification body has the right to review major forest certification systems to determine if their respective planning provisions regarding land use change are robust. The certification body's findings may change the eligibility of biomass acres for CSBP certification. The Program Participant has the right to appeal the audit decision. See Indicators 2.1.1, 2.1.2, 3.1.1, 3.1.4, 3.2.1, 4.1.1, 4.2.1, and 4.3.1 and the respective guidance for more information on implementation.*

Non-conformities from the CB Audit Report must be addressed after each audit cycle to maintain the certification status within CSBP. Corrective Action Plans (see Glossary) are developed by the Program Participant as a written response to non-conformities. The CAPs developed by the Program Participant are among the fundamental objectives for updating the IRMP year-by-year. The Program Participants must submit CAPs to the CB as a result of all non-conformities from the CB Audit Report. Although "Opportunities for Improvement" are optional, OFIs written are designed to provide the Participant Operator with a mechanism of continuous improvement and may also become new planning objectives.

Corrective Action Plans must be implemented within the timelines agreed upon between the CB and the Program Participant. The Audit Report will provide timelines for addressing non-conformance issues raised during field or desk audits of the Program Participant's biomass operation.

1.3.3 MONITORING AND REVIEW

GUIDANCE: *The Program Participant's monitoring of the environmental status of the operation and implementation of Corrective Action Plans is a program requirement for continued certification. Corrective Action Plans will be also assessed by the auditor each year. The Program Participants must be vigilant that planned Corrective Actions are implemented in a planned area.*

SOIL

PRINCIPLE: Biomass production shall maintain or improve soil quality by minimizing erosion, enhancing carbon sequestration, and promoting healthy biological systems and chemical and physical properties.

2.1.1. SOIL ASSESSMENT AND MONITORING

GUIDANCE: *An in-depth assessment is required if residue removal by the Program Participant increases the risk of erosion, by either wind or water. Initially default values for soil carbon will be used. Soil organic matter is a surrogate for soil carbon and can be estimated in part from soil tests².*

2.1.2. RESIDUE REMOVAL

GUIDANCE: *Identification of compaction is experience-based and should be explained as part of the Program Participant learning process over time. Knowledge obtained from any forms, is valuable. Program Participant shall describe measures to maintain perennial crops and other cover methods e.g. do not make permanent paths, there by maintaining soil cover, reduce compaction by spreading the load.*

2.1.6. EROSION

GUIDANCE: *The Revised Universal Soil Loss (RUSLE-II) takes into consideration extreme weather events or upgrades to on-farm conservation systems and is an excellent overall farming system benchmark. The RUSLE II provides a solid reference points for arable lands, but is not meant as a substitute for robust soil and water conservation practices. Conservation systems or practices (state, local voluntary or mandatory BMPs on forest lands may suffice) should be identified. The Program Participant's conservation systems include, but are not limited to practices such as stream buffers, terraces, ponds, tiling, no till, ponds and tiling reduce erosive forces and for retaining sediments on site. Many other effective examples of conservation practices may be addressed in the IRMP and witnessed on farm or on forest. Other conservation practices include culverts (tubes), low water crossings, bridges, and gabions, rip-rap, geotechnical solutions, riparian buffers, grass waterways (seeded buffers), contour and strip farming, windbreaks, seed side slopes, haul roads, and the seeding of right of ways or road cuts.*

BIOLOGICAL DIVERSITY

PRINCIPLE: Biomass production shall contribute to the conservation or enhancement of biological diversity, in particular native plants and wildlife.

3.1.1. ASSESSMENT AND PROTECTION OF WILDLIFE HABITAT

GUIDANCE: *For assistance is assessing and protection wildlife habitat, the Program Participants should contact their State fish and wildlife agency's private lands division, State natural resources conservation services, state US Fish and Wildlife Service, office university extension wildlife, specialists/staff, wildlife conservation organizations, or private wildlife consultants).*

Program Participants engaged in small biomass operations (employing less than three family members or two family members and less than one full-time employee) may be exempted from a full assessment, if the IRMP is completed and adequately describes all relevant good agricultural practices that provide for the protection and maintenance of species and habitats at risk. The Highly Erodible Land Conservation and Wetland Conservation Certification is a

² For the conversion from soil organic matter to soil carbon the CSBP GHG working group is developing a list of reference values. Worksheet defaults and reference values will be built out in conjunction with the GHG working group. Although the Participant's soil test may be accurate for the sampling depth, CSBP see the need to account for additional soil carbon below the sample depth in the future. A worksheet will be developed to determine the relative decrease in either soil organic matter or soil carbon for the Participant's complete soil profile.

voluntary certification initiated with the submission of the AD-1026 form acknowledges the NRCS right to perform an erodibility assessment and whether there are any wetlands present. Note that this assessment is a prerequisite for USDA loan program (e.g. Direct Payment or Conservation Payment). If wetlands are present this will be indicated below the “Cropland” areas on the report format. Additional resources are provided in the IRMP (e.g. www.NatureServe.org, state wildlife action plans).

An independent assessment of the IRMP will be conducted by the third-party auditing firm. However, the Program Participant is responsible for carefully documenting any real or potential threats that the operation might have on the local biodiversity. A full assessment is required if high environmental risks are associated the Participant's operation. High risks includes real or potential presence of rare, threatened or endangered species and the clearing or alteration of woody vegetation that presents habitat for rare, threatened or endangered species. The independent auditor may agree or disagree with the Participant's IRMP findings for biodiversity. The auditor's findings may change the eligibility of biomass acres for CSBP certification or require additional conservation measures be implemented as a condition for certification. The Program Participant has the right to appeal the auditor's decision.

3.3.1. DOCUMENTATION OF VEGETATION CATEGORY

GUIDANCE: Imagery from the public or private domain should be sought to document the land use after January 1, 2008. The particular agriculture crops are not needed for assessing the vegetation category. However if fallow vegetation from agriculture or pasturelands is converted to biomass acres; the woody cover characteristics, such as average diameter at breast height, basal area are needed for estimations of the volume and carbon content as required in 5.1.5 if applicable. As with any changes to the scope or intensity of a Participant's operation an assessments of potential impacts are an essential part of the IRMP, Section 1.1.1., to be updated year by year.

3.3.2. LANDS ELGIBLE FOR CONVERSION

GUIDANCE: Appendix C presents a matrix for assessing the Participants field-level changes in management intensity. The classification system is derived from the National Vegetation Classification Standard (Version 2.0) http://www.fgdc.gov/standards/projects/FGDC-standards-projects/vegetation/NVCS_V2_FINAL_2008-02.pdf/. Greater scrutiny will be undertaken during the third-party audit wherever doubt exists as to the applicability of a vegetation classification matrix (e.g., old fields, various forest plantations.³ Although agricultural Participants do not generally assess their eligibility in Appendix C; changes in the scope or intensity of the operation require specific planning objectives and in the IRMP 1.2.1. Annual encroachment of woody vegetation ingrowth along irrigation ditches, field or forest edges, and woodlots are not conversions. Regrowth of spontaneous vegetation for complete fields, farms or other management units will be subjected to auditor review.

Approved CSBP forest certification programs (e.g. FSC) may be exempted from Appendix C, provided that added carbon is accounted for under Criteria 5.1.5 of the CSBP standard. The Clearing of mature vegetation releases greenhouse gasses that must be fully documented. All conversions will be subject to third-party audits by the CSBP-accredited certification body. The certification body has the discretion to review, accept, or reject the Appendix C classification system converted lands⁴.

3.3.3. PROTECTION OF KNOWN COMMUNITIES

³ “Natural (including semi-natural) vegetation is defined as vegetation where ecological processes primarily determine species and site characteristics; that is, vegetation comprised of a largely spontaneously growing set of plant species that are shaped by both site and biotic processes (Küchler 1969, Westhoff and van der Maarel 1973). Natural vegetation forms recognizable physiognomic and floristic groupings that can be related to ecological site features. Human activities influence these interactions to varying degrees (e.g., logging, livestock grazing, fire, introduced pathogens), but do not eliminate or dominate the spontaneous processes (Westhoff and van der Maarel 1973). Wherever doubt exists as to the naturalness of a vegetation type (e.g., old fields, various forest plantations), it is classified as part of the natural / semi-natural vegetation.”

GUIDANCE: *As a response to non-conformities, the Program Participants will develop both the knowledge and a suite of management practices to protect known communities. The identified communities will be addressed in annual IRMP updates and in continuous improvement 9.2.1. The certification body will review, approve, or reject the classification and protection measures for high risk species and communities of high ecological values present in the Participant's forest certifications program. Growers can access NatureServe Explorer <http://www.natureserve.org/explorer/>, to search by location to get a list of G1-G3 species by county or watershed and use the map viewer to quickly zoom in to an area of interest, and view whether the place you are looking at falls within a The Nature Conservancy ecoregional portfolio site: www.landscape.org.*

WATER

PRINCIPLE: *Biomass production shall maintain or improve surface water, groundwater, and aquatic ecosystems.*

4.1.1. WATER QUALITY MANAGEMENT PLAN

GUIDANCE: *The Participant shall describe operational risks to water quality, groundwater, and aquatic ecosystems. The GAP or forestry State or other BMPs to assure water resources are maintained or enhanced shall also be described in the IRMP. For agriculture and ranching systems, good agricultural practices, including the judicious timing of spray applications to avoid drift, weather or other product losses that might adversely impact water bodies shall be identified. Other GAPS for inclusion in the IRMP include the use of anhydrous nitrogen fertilizers or NRCS approved conservation practices⁵ or State forest BMPs.*

4.2.5. IRRIGATION/SALINITY

GUIDANCE: *One method to consider is NRCS Salinity and Sodic Soils Management (Practice code 610).*

4.3.1. AQUATIC ECOSYSTEMS MANAGEMENT PLAN

GUIDANCE: *Mapping shall include all wetlands, blue-line streams, riparian zones, streamside conservation zones, critical habitat areas and other no-go areas that operationally critical. If the aquatic ecosystems properties, such as stream flow, temperature, or hypoxia are affected within the watershed, Participants shall identify affected areas on the map. Growers can access the following to evaluate whether their acres might be located in impaired watersheds: <http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/index.cfm>.*

4.3.2. STREAM FLOW

GUIDANCE: *All blue line streams shall be identified on the Participant's map. If the aquatic ecosystems properties, such as stream flow temperature, or hypoxia are affected within the watershed, the Participant, these operational areas shall be identified on the map.*

AIR QUALITY AND EMISSIONS

PRINCIPLE: *Cellulosic bioenergy shall reduce GHG emissions as compared to fossil-based energy. Emissions shall be estimated via a consistent approach to life cycle assessment.*

5.1.3 PLANTING AND TILLAGE

GUIDANCE: *For Continuous Improvement the Participants shall obtain from the CSBP carbon reference table the emissions profile based on: equipment type (power unit or engine type), age and fuel utilization (gallons per hour), under 90%; 50% and 20% load. The references should also be based on the type of fuel (regular fuel or renewable fuel blends) utilized in the operation.*

5.1.4 SOIL CARBON AND ORGANIC MATTER

⁵ For partial compliance, Participants may use NRCS Riparian Area Management. T1737 -15 1998 and TR 1714- 16, 1999.

GUIDANCE: *For Continuous Improvement the Participant shall provide the Soil Conditioning Index information for their biomass acres.*

5.1.5 HARVESTING, COLLECTION, HANDLING, PROCESSING AND STORAGE

GUIDANCE: *For Continuous Improvement Participants shall obtain from the CSBP carbon reference table the emissions profile based on: equipment type (power unit or engine type), age and fuel utilization (gallons per hour), under 90%; 50% and 20% load. The references should also be based on the type of fuel (regular fuel or renewable fuel blends) utilized in the operation.*

5.1.6 TRANSPORTATION

GUIDANCE: *For Continuous Improvement Participants shall obtain from the CSBP carbon reference table the emissions profile based on: equipment type (power unit or engine type), age and fuel utilization (gallons per hour), under 90%; 50% and 20% load. The references should also be based on the type of fuel (regular fuel or renewable fuel blends) utilized in the operation.*

SOCIO-ECONOMIC WELL-BEING

PRINCIPLE: *Biomass production shall take place within a framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders (including land owners, farm workers, suppliers, bioenergy producers, and the local community), and ensures compliance with labor laws and human rights.*

6.1.1. FAIR LABOR STANDARD ACT

GUIDANCE: Participants must demonstrate that employees meet minimum wage and applicable overtime payment for farm or forest work performed. Local wages paid for piecework must also meet local minimum wage statutes. Although local wages are usually competitive and exceed minimum wages, the burden of proof resides upon the Participant to demonstrate that employee protection is equivalent to or in excess of Fair Labor Standards Act (FLSA) provisions concerning wages, working hours, health, retirement and leave benefits; equal opportunity hiring; safety and health in the workplace; and fair youth employment.

6.2.2. EMPLOYMENT CONTRACT

GUIDANCE: Written agreements are used by Participants that have more than five full-time employees. Family farmers or other Program participants that use short-term on-farm contractors for less than four working days in any growing or harvesting season may be exempted.

6.2.4. EMPLOYMENT CONTRACT

GUIDANCE: Workers and management have inalienable rights under Article I of the U.S. Constitution. Freedom of speech cannot be denied to workers or employers. Union-breaking or the harassment of workplace advocates will not be tolerated under CSBP. Workers' right to organize and associate freely, and/or negotiate working conditions must be understood and agreeable to the Program participant.

9.2.1. IMPROVE PERFORMANCE

GUIDANCE: *Non-conformities (NCs) are presented to all Participants as a result of the audit process. Some CSBP Indicators, although important for sustainability, are not common in the Participant's operations. Examples of non-conformities that will normally be issued by the auditor may include a more accurate estimation of soil carbon to the root-zone depth. Non-conformities for assessing or conserving riparian zones or biodiversity can be expected for operations that are changing scale or intensity and may pose a risk to blue-line streams or wildlife habitats. The implementation measures may include utilizing the NRCS tool in the following table (Table1). For example, the soil conditioning index tool and reporting the tool's output value in the IRMP.*

Although improvements in air quality and emissions may not be demonstrated year by year, continuous improvements are expected with more precise calculations of air quality and emissions above default values that are required for initial certification.

A workbook with tools, user-friendly guidelines and tabulated values will be developed, as part of the CSBP checklist or through a reporting web-based portal.

Table 1: NRCS and Other Resources for Program Participant CSBP Standard Implementation

Appendix B.2 - List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production		
USDA Tools	Description	Applicability
NRCS CPA 52 www.ia.nrcs.usda.gov/technical/envircomp/NRCS-CPA-52.xlsx	Provides for the documentation of the impacts of a planned action on people, their physical surrounding and nature and provides for documenting compliance with federal, state and local laws, regulations, (federal) Executive Orders and requirements.	1.1, 1.2, 1.3.5
NRCS CPPE Worksheets http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alpha/betical/ncps/?&cid=nrcs143_026849	Provide evaluation of the physical effects of implementing conservation practices on soil, water air plants and animals and human considerations.	1.3.4, 1.3.5, 4.1.2, 4.3.1, 4.3.5
Quality Criteria, Section 3, NRCS Field Office Technical Guide http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg	The minimally acceptable level of treatment required to achieve a resource management system for identified resource considerations for a particular land use as defined in the technical guide of NRCS.	1.3.1, 1.3.4
NRCS CPA 1155	A form for documenting producer's Conservation Practice Implementation Schedule.	1.3.1, 1.3.2, 1.3.3, 1.3.4
State Agronomy Handbooks Example - Illinois Agronomy Handbook http://www.aces.uiuc.edu/iah	Information on climatology, corn, soybeans, small grains, grain sorghum, cover crops, alternate crops, hay and pasture, seed, water quality, soil testing and fertility, nutrient management, tillage systems, water management, weed control, insects, diseases and other topics.	2.1.1, 2.1.2, 2.1.6
NRCS 590 http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alpha/betical/ncps/?&cid=nrcs143_026849	Nutrient Management Practice Standard Includes considerations to Minimize Agricultural Non Point Source Pollution of Surface and Groundwater and to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere	2.1.2, 4.1.1, 4.1.3, 4.1.5
Revised Universal Soil Loss Equation 2 (RUSLE2), SCI, STIR http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&type=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20 %20NRCS	Predicts sheet and rill erosion from rainfall or water, utilizing the soil condition index (SCI), the soil tillage intensity rating (STIR) and energy requirements for the planned crop system.	2.1.3, 2.1.6, 2.1.7, 4.1.2

Appendix B.2 - List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

USDA Tools	Description	Applicability
<p>WEPS or WEQ http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&type=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20 %20NRCS</p>	<p>WEPS predicts wind erosion on site and quantifies the offsite movement of soil and includes PM-10.</p> <p>WEQ erosion model is designed to predict long term, average annual soil losses from a field having specific characteristics.</p>	<p>2.1.3, 2.1.6, 2.1.7, 4.1.2</p>
<p>State NRCS Wildlife Habitat Assessment Procedures Example: http://www.or.nrcs.usda.gov/technical/ecs/biology/biology-technotes.html</p>	<p>Several Guides provide a relatively simple and objective means of determining the value of wildlife habitat. The guides can be used to determine if a CMU meets the minimum standard for wildlife conservation practices and measures can be identified to meet the minimum resource management system standard or to meet the wildlife habitat objectives of the land owner.</p>	<p>3.1.1, 3.1.2</p>
<p>NRCS 647 – Early Succession Wildlife Habitat Development/Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alpha/betical/ncps/?&cid=nrcs143_026849</p>	<p>Includes considerations for vegetative manipulation to maximize plant and animal diversity</p>	<p>3.1.2</p>
<p>NRCS 386 – Field Border http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alpha/betical/ncps/?&cid=nrcs143_026849</p>	<p>Includes Criteria for Reducing Erosion from Wind and Water, Protecting Soil and Water, Managing Pest Populations, Providing Wildlife Food and Cover and Pollinator Habitat, Increasing Carbon Storage and Improving Air Quality</p>	<p>3.1.2</p>
<p>NRCS 380 – Windbreak/Shelterbelt Establishment http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alpha/betical/ncps/?&cid=nrcs143_026849</p>	<p>Includes Criteria to Reduce Wind Erosion and Protect Growing Plants, Improve Air Quality Reducing and Intercepting Airborne Particulate Matter, Chemicals and Odors, Increasing Carbon Storage in Biomass and Soils, Enhancing Wildlife Habitat, Improving Irrigation Efficiency and Reduce Energy Use</p>	<p>3.1.2</p>
<p>Rare, Threatened and Endangered Species http://www.fws.gov/endangered/</p>	<p>Can search for County Distribution of Federally Threatened, Endangered and Candidate Species</p>	<p>3.1.3, 3.3.3</p>
<p>Invasive Species www.invasivespecies.gov</p>	<p>Can search for County lists of known invasive species</p>	<p>3.1.4, 3.2.1</p>
<p>NRCS 595 – Pest Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alpha/betical/ncps/?&cid=nrcs143_026849</p>	<p>Includes Criteria to Prevent or Mitigate Off-site Pesticide Risks to Water Quality from Leaching, Solution Runoff and Adsorbed Runoff Losses, to Prevent Off-site Pesticide Risks to Soil, Water, Air, Plants, Animals and Humans from Drift and Volatilization Losses, and to Prevent or Mitigate Onsite Pesticide Risks to Pollinators and Other Beneficial Species through Direct Contact.</p>	<p>3.1.4, 3.2.1, 3.2.2, 4.1.6</p>

Appendix B.2 - List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

USDA Tools	Description	Applicability
Weed Initiated Pest Risk Assessment Guidelines (APHIS) http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/wra.pdf	Provides a template for conducting Food and Agriculture Organization Stage 1 and 2 assessments.	3.2.2
USDA FSA-578 http://forms.sc.egov.usda.gov/efcommo/eFileServices/eFormsAdmin/FSA0578MANUAL_031015V01.pdf	A USDA FSA Form for reporting crops/land use by Tract and Field.	3.3.1, 5.1.1
NRCS 633 Waste Recycling http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alpha/betical/ncps/?&cid=nrcs143_026849	When manure or other wastes are used for plant nutrients the practice shall comply with conservation practice standard 590, Nutrient Management.	4.1.1, 4.1.3, 4.1.5
USEPA – Methods for Biosolids Testing www.epa.gov/region8/water/biosolids/analyticalmethods.html	Lists analytical methods to be used when testing Biosolids.	4.1.4
WINPST http://go.usa.gov/Kok	WIN-PST is an environmental risk screening tool for pesticides. Evaluates the potential of pesticides to move with water and eroded soil/organic matter and affect non-targeted organisms.	4.1.6, 4.1.7
NRCS 449 – Irrigation Water Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alpha/betical/ncps/?&cid=nrcs143_026849	Lists Knowledge, Skills and Capabilities required of Irrigator. Includes criteria to Manage Soil Moisture to Promote Desired Crop Response, to Optimize Use of Water Supplies, to Minimize Irrigation Induced Soil Erosion, to Decrease Non-Point Source Pollution of Surface and Groundwater, to Manage Salts in the Crop Root Zone, to Manage Air, Soil or Plant Micro-Climature, to Reduce Particulate Matter Movement and to Reduce Energy Use.	4.2.1, 4.2.6
FIRI 1.2, CPED http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&tttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20 %20NRCS	FIRI is A procedure for comparing improvements or changes * Year to year * Field, Farm and project level Relative rating A season long evaluation not a single event Composed of three elements * Management * System * Potential efficiency CPED models water distribution under a Center Pivot or Linear Move sprinkler system.	4.2.1, 4.2.6
NRCS Soil Test Kit Guide http://www.nrcs.usda.gov/Internet/FS_E_DOCUMENTS/stelprdb1044790.pdf	Describes procedures for 12 on-farm tests, includes an interpretive section for each test and data recording worksheets. Includes instructions for assembling a kit.	4.2.5
NRCS EFH2 http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/manage/?&cid=stelprdb1042921	A program for determining peak discharge as prescribed by Engineering Field Handbook Chapter 2. Includes procedure for computing Runoff Curve Number (RCN).	4.3.2

Appendix B.2 - List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

USDA Tools	Description	Applicability
NRCS 395 – Stream Habitat Improvement and Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alpha/betical/ncps/?&cid=nrcs143_026849	Lists 13 measures that may be taken singularly or in combination to improve stream habitat.	4.3.3
NRCS 657 – Wetland Restoration http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alpha/betical/ncps/?&cid=nrcs143_026849	Includes criteria for Hydric Soil Restoration, Hydrology Restoration, and Vegetative Restoration and considerations for Soil and Hydrology.	4.3.5
NRCS 659 – Wetland Enhancement http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alpha/betical/ncps/?&cid=nrcs143_026849	Includes criteria for Hydric Soil Enhancement, Hydrology Enhancement, and Vegetative Enhancement and considerations for Soil, Hydrology, Vegetation and Fish and Wildlife Habitat.	4.3.5
NRCS 396 – Riparian Herbaceous Cover http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alpha/betical/ncps/?&cid=nrcs143_026849	Includes criteria to Maintain or Improve Water Quality and Quantity, to Stabilize Streambanks and Shorelines, for Increasing Net Carbon Storage in Biomass and Soils, for Pollinator Habitat, for Terrestrial Wildlife and for Restoring Desired Plant Community	4.3.5
Greenhouse Gases, Regulated Emissions and Energy Use in Transportation (GREET) http://greet.es.anl.gov/	GREET1_2011 includes new pathways for bio-oil production from palm, rapeseed, jatropha and camelina and updated farming assumptions for corn stover, forest residue, switchgrass, sugarcane and soybean.	5.1.2 (?), 5.1.5(?), 5.1.6(?)
USDA Energy Estimator-Tillage http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/resources/?&cid=nrcsdev11_001039	Estimates diesel fuel use and costs in the production of key crops in crop management zones and compares energy savings between conventional and alternative tillage systems.	5.1.3
COMET 2 http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/resources/?&cid=nrcsdev11_001039	Provides estimates of carbon sequestration and net greenhouse gas emissions from soils and biomass for U.S. farms and ranches.	5.1.4

The framework of management components is likely to be different in agriculture and forestry for each resource concern. As such, the baseline assessment will need to show which management components are relevant on a given operation.

APPENDIX D:
**Scientific Certification Systems Forest Management Program Review of CSBP Draft
Approach and Forest Stewardship Council Approach to Land Conversion**

APPENDIX C: LAND CONVERSION – Draft Approach

The table that follows presents a draft approach developed by CSBP to address the limits to and opportunities for intensifying land management while qualifying for silver certification under CSBP. It is the result of a collaborative effort by CSBP members, but *should not* be read to mean that every member agrees with the full content of this appendix. For many on the Council, this is a pivotal issue, requiring additional exploration and discussion. As a result, all or portions of this Appendix are subject to revision based on additional study.

Introduction

CSBP presents a four category approach to land classification, for the purposes of defining qualifying land conversion. These categories utilize the national vegetation classification* system developed by NatureServe, the Ecological Society of America, and federal agency partners, and adopted as the U.S. federal standard for vegetation description by the Federal Geographic Data Committee (FGDC 1997, 2008) (see glossary). The basic land classification system defines natural, semi-natural and cultural vegetation classifications for all lands in the U.S. (see definitions below). The CSBP draft approach further divides lands into the following four categories:

Un-Managed vegetation (“natural”)

Managed vegetation (“semi-natural”): Extensively managed forest or non-forest lands

Managed vegetation (“semi-natural”): Intensively managed semi-natural forest and non-forest lands

Cultural vegetation planted with native species, exotic species, and short-rotation woody crops

Overview of Approach

Landowners initiate consideration for enrollment in CSBP by defining and documenting an initial vegetation classification for their lands, A) – D) (first column in the table below), and by identifying the management history and practices of lands, as of January 1, 2008 (second column in the table below). Once documented, lands may intensify land management practices and move one level of management intensity down the table, and qualify for CSBP silver certification. CSBP members disagree, however, as to whether lands should be able to move from C) to D) and still qualify for silver certification. Some members suggest that lands in a natural or semi-natural state of any type can be more intensively managed, but it would be unsustainable, according to CSBP’s definition (see glossary), if acreages were allowed to move to native or exotic species cultural vegetation. Other members believe that moving from C) to D) represents a reasonable intensification of management practices that should be allowed within the definition of sustainability under the standard. Therefore, two options are presented in yellow as bracketed and unresolved.

For the provisional standard, landowners should protect G1-3 imperiled and vulnerable species (see definitions below). This means: a) they are important components of biodiversity, and b) while lands associated with the species can be managed, consistent with the protection of these species, communities and their habitat, there should not be intensification of production on lands associated with G1-3 biodiversity to the next land classification in all of the A-D categories. During field testing, CSBP will assess whether additional land area is required to be added to the “assumed area occupied” associated with Natural Heritage Points in order to assess the costs of addressing G3 sites and conserve biodiversity within the context of intensified biomass production. Some are concerned that the assumed area of impacts in the NatureServe Analysis are significantly understated. On the ground experience indicates that the acreage impacted by G-3 and S1-3 species may be an order of magnitude higher than what is assumed in the report.

For the provisional standard, the G4G5-S1S2 and G4G5-S3 biodiversity of globally common species and communities that have been identified as imperiled or vulnerable in a particular state will tend to be included as

priorities for conservation in State Wildlife Action Plans (SWAPs) and/or in The Nature Conservancy (TNC) conservation areas. However, SWAPs are inconsistent in their consideration of these species, many do not address imperiled or vulnerable plants, and not all of the data is spatially explicit. In addition, not all TNC Eco-regional Conservation Areas include S1-S3 species and communities in their analyses. Because of the rare and special nature of the S1-S3 biodiversity in a particular state, these lands should receive special consideration, including potential protection from intensification, reference to SWAP's and TNC, and/or inclusion of specific requirements for management, protection, or restoration in the IRMP. The practicality of implementation and the efficacy of these approaches in protecting S1-S3 biodiversity will be assessed in the field. Use of available information or funding support to conduct these activities may be needed, in some circumstances.

Table 3: Land Conversion

National Vegetation Classification & Current Management Regime*	Management history	Qualifying Future Management**	Non-Qualifying Future Management
National Vegetation Classification & Current Management Regime*	Management history	Qualifying Future Management**	Non-Qualifying Future Management
Natural & Semi-natural ² vegetation			
Un-Managed vegetation (“natural”)	No past harvest (e.g., primary forest; unplowed prairie) Past harvest followed by little or no vegetation management and with sufficient time for recovery to natural composition and structure.	Maintain in natural vegetation Maintain under non-extractive management; OR If secondary forest and G4-G5 or S4-S5 community types ³ shift to extensively managed vegetation	Convert either G1-G3 or S1-S3 types to managed or cultural vegetation Convert either G4-G5 or S4-S5 types to intensively managed or cultural vegetation
Managed vegetation (“semi-natural”): Extensively managed forest or non-forest lands	Extensive management Regeneration strategies rely on natural seeding or coppicing; no soil disturbance activities Selective harvesting; including scattered single-tree removal and small patch harvest in support of natural regeneration; Extensive grazing Low use of mowing Prescribed fire/limited fire suppression. Very low use of vegetation	Restoration to natural vegetation Maintain as extensively managed vegetation Shift to intensively managed vegetation	Convert to cultural vegetation

National Vegetation Classification & Current Management Regime*	Management history	Qualifying Future Management**	Non-Qualifying Future Management
	<p>disturbance for stand access. Low chemical input Low nutrient input</p>		
<p>Managed vegetation (“semi-natural”):</p> <p>Intensively managed semi-natural forest and non-forest lands</p>	<p>Intensive management Regeneration strategies may include plantings and assisted natural regeneration, but result in no significant change in within-stand species composition or structure Low use of soil disturbance for regeneration/ Very low tillage planting Regeneration harvesting (including clear-cutting) and/or thinning and retention standards, as defined through published scientific literature or existing certification standards. Extensive, rotational grazing Rotational mowing Prescribed fire/fire suppression. Low to moderate vegetation disturbance for stand access High-efficiency irrigation Moderate chemical input Moderate nutrient input</p>	<p>Restoration to extensively managed vegetation Maintain as intensively managed vegetation [OPTION 1) For intensively managed vegetation types, shift to cultural vegetation with special consideration of high priority stated conservation goals nationally through Federal agency identified areas, State Wildlife Action Plans, or TNC Eco-regional Portfolio sites. OPTION 2) Delete prior bullet, meaning that lands could be restored or maintained as C), but that conversion to cultural vegetation would be non-qualifying.]</p>	
Cultural vegetation ⁴			
Cultural vegetation planted with native or exotic species	<p>Intensive Culture Active regeneration (planting, seeding, deliberate seed tree retention) with one or two [native] species Regeneration harvesting (including</p>	<p>Restoration to natural/semi-natural vegetation Maintain in cultural vegetation with native or exotic</p>	

National Vegetation Classification & Current Management Regime*	Management history	Qualifying Future Management**	Non-Qualifying Future Management
	clear-cutting) and/or thinning and retention standards, as defined through published scientific literature or existing certification standards. Intercropping Short rotation crops Moderate-high use of soil disturbance for regeneration Moderate-high vegetation & soil disturbance for stand access Moderate - high use of chemical inputs Moderate-high use of nutrient inputs Use of irrigation and high-efficiency irrigation	species	

*National Vegetation Classification Definitions:

Vegetation where ecological processes primarily determine species and site characteristics; that is, vegetation comprised of a largely spontaneously growing set of plant species that are shaped by both site and biotic processes. Natural vegetative forms recognizable physiognomic and floristic groupings that can be related to ecological site features. Human activities influence these interactions to varying degrees (e.g., logging, livestock grazing, fire, introduced pathogens), but do not eliminate or dominate the spontaneous processes.

² Semi-natural vegetation typically encompasses vegetation types where the species composition and/or vegetative growth forms have been altered through anthropogenic disturbances such that no clear natural analogue is known, but they are a largely spontaneous set of plants shaped by ecological processes.

³ Global ranks (G4-apparently secure, G5 secure globally or range-wide, respectively) for standard national classification concepts provided by NatureServe. State ranks for community types (e.g., S5 – ‘secure’ within state boundaries) provided by state Natural Heritage programs.

⁴ Cultural vegetation is defined as vegetation with a distinctive structure, composition, and development determined by regular human activity. Cultural vegetation has typically been planted or treated, and has relatively distinctive physiognomic, floristic, or site features when compared to natural vegetation. Distinctive physiognomic and structural attributes typically include one or more of the following:

a) Dominant herbaceous vegetation that is regularly-spaced and/or growing in rows, often in areas with substantial cover of bare soil for significant periods of the year, usually determined by tillage or chemical treatment.

- b) Dominant vegetation with highly-manipulated growth forms or structure rarely found as a result of natural plant development, usually determined by mechanical pruning, mowing, clipping, etc.
- c) Dominant vegetation comprised of species not native to the area that have been intentionally introduced to the site by humans and that would not persist without active management by humans.

****Mitigation Options:** CSBP members did not fully investigate the array of mitigation options available or agree on whether they should be employed. Mitigation options may be considered for situations when participants seek to intensify management more than one level of classification, if mitigation efforts are expected to have direct and measurable native wildlife benefits within affected geographic areas (to be determined). Mitigation will not be allowed for natural systems that are rare or are not replicable (yet to be specified).

From: Brendan Grady
Sent: Thursday, March 29, 2012 1:02 PM
To: Michael Keyes
Cc: Neil Mendenhall; Kyle Meister; Robert Hrubes
Subject: RE: comments and Track Changes requested asap - CSBP approach to Land Conversion

Michael,

Kyle and I took a quick look at this. I don't have proposed language for you, but we compared the draft standard against the general FSC standard. There are more notes in the attached document. There are lots of more details we could go into, but I'm not sure how relevant it is. Also, here's a link to the FSC-US standard for more definitions: <http://fscus.org/images/documents/standards/FSC-US%20Forest%20Management%20Standard%20v1.0.pdf>

In general the approach taken by the CSBP is consistent with FSC rules on conversion. It defines a spectrum of categories, where it is permissible to move categories to more intensively managed land in only limited circumstances. Although the definitions do not overlap entirely, category A would be termed natural forest, categories B&C would be semi-natural forest management, and D would be plantation management. The FSC rule is that conversion from natural or semi-natural forest to plantations is not permitted by the FSC Standard, except for the following limited case:

"C6.10 Forest conversion to plantations or non-forest land uses shall not occur, except in circumstances where conversion:

- a) entails a very limited portion of the forest management unit; and
- b) does not occur on high conservation value forest areas; and
- c) will enable clear, substantial, additional, secure, long term conservation benefits across the forest management unit."

Definitions and examples to illustrate this point can be found in Criterion 6.10 of the FSC-US Forest Management standard.

There is one potential gap here, in that the CSBP proposed option 1 allowing conversion of category c to d does not have restrictions similar to 6.10 (a-c), and thus the CSBP would be more permissive. The rules about moving from natural forest to semi-natural are more complicated. The FSC would prohibit it if the natural forest is a type 1 old growth forest, and restrict it in other cases. I believe what CSBP has proposed is consistent, in that it allows extractive management only if it is a secondary forest.

There is also confusion over the term plantation. Just because there is a planted forest, it does not mean it is an FSC plantation:

"Plantation: Forest areas lacking most of the principal characteristics and key elements of native ecosystems as defined by FSC-approved national and regional standards of forest stewardship, which result from the human activities of either planting, sowing or intensive silvicultural treatments (source: FSC-STD-01-001).

The use of establishment or subsequent management practices in planted forest stands that perpetuate the stand-level absence of most *principle characteristics and key elements of native forest ecosystems* will result in a stand being classified as a plantation. The details addressing ecological conditions used in stand-level classification

are outlined in related guidance. Except for highly extenuating circumstances the following are classified as plantations:

cultivation of *exotic species* or recognized exotic sub-species;

block plantings of cloned trees resulting in a major reduction of within-stand genetic diversity compared to what would be found in a natural stand of the same species;

cultivation of any tree species in areas that were naturally non-forested ecosystems.”

After the three clear cases described above, it becomes much more challenging to determine when the principle characteristics and key elements of native forest ecosystems are not met. There is specific guidance in appendix G of the standard, but trying to compare this classification system to the one proposed by CSBP would be a much longer exercise.

Hope this helps,

Brendan Grady

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Scientific Certification Systems

Setting the Standard for Sustainability

From: Michael Keyes

Sent: Friday, March 23, 2012 11:27 AM

To: Robert Hrubes

Cc: Brendan Grady; Neil Mendenhall

Subject: comments and Track Changes requested asap - CSBP approach to Land Conversion

Robert,

The Draft CSBP standard (for forestry and agriculture) will be discussed and key forestry and agricultural requirements decided upon during the April 18-19 meeting.

The Appendix C: Land Conversion matrix-Draft Approach (page 45) is a key point for discussion and resolution.

Prior to this meeting, Council members have asked SCS for their comments and suggestions regarding the Land Conversion text and approach.

Note that the guidance provided by SCS if accepted may be directly written into the standard's as "IMPLEMENTATION" section outlined in yellow below.

The matrix is referenced on page 21 of the attached standard as follows:

“LANDS ELIGIBLE FOR CONVERSION

Program participant only shifts the intensity of land management in accordance with the matrix in Appendix C.

IMPLEMENTATION: **To be field tested in Phase 2 and 3 Tasks with guidance from Council “**

Today I am committed to forwarding some, but not all comments to Council members and would really appreciate your timely input. I look forward to your comments and suggestions.

Thanks.

Michael Keyes, Ph.D.

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Scientific Certification Systems

Setting the Standard for Sustainability

VeriFlora, Sustainable Agriculture and Biofuel's Certification, Fair Labor Practices

APPENDIX E: Producer IRMP and Supporting Documentation

- Completed IRMP Document
- BCAP Documents
- NRCS Farm Soil Report
- Soil Test and Seeding Inputs
- Receipts for Water Impoundment Reservoirs
- Receipts for Terrace Systems with Tile



Integrated Resource Management Plan

Farm Name (Redacted for Confidentiality)

Producer Name (Redacted for Confidentiality)

Independence, MO

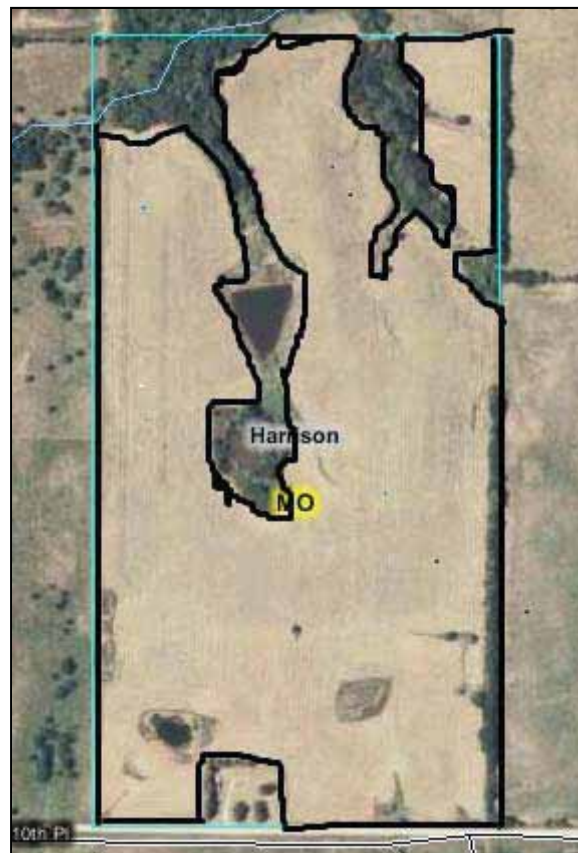


Figure 1 – Map of Farm Boundaries and Biomass fields

Soil Principle

Biomass production shall maintain or improve soil quality by minimizing erosion, enhancing carbon sequestration, and promoting healthy biological systems and chemical and physical properties.

Farm Name does the following to maintain or improve soil health:

- assesses and monitors nutrient levels of the soils or plants and soil capabilities to guide his management decisions
 - A copy of soil test, fertilizer and lime applications included in this checklist.
- conserves soil and maintains its productivity through an integrated resource management plan



- The lime and soil nutrients applied in the fall along with the seeding to specifications of soil test.
- uses planning protocols supported by the Natural Resource Conservation Service (NRCS) Conservation Planning process which meets NRCS goals of getting to a RUSLE II score of T or better
 - A copy of the NRCS Conservation Plan that complies with the BCAP designation for Show Me Energy
- manages nutrients to reduce loss to air and water
 - Nutrients applied according to NRCS Soil Plan
- retains biomass materials required for erosion control and soil fertility
 - Grower will harvest after crop sciences in the fall and will leave at least 6 inches stubble height
- identifies techniques that might lead to compaction
 - Not use same travel paths while liming the field. Lime unloading and loading zones were shifted from the field
- Has seeded a biomass crop mix which is a variety of species with different root profiles and should enhance soil carbon over time
 -
- uses appropriate methods to reduce compaction if necessary and maintain site productivity
 - 0
- limits field travel zones or paths as needed to meet management objectives
 - Limit trips in same path, no roads in field and changes path in field travel to limit compaction.
- maintains a RUSLE-II score less than or equal to T
 - RUSEL II achieved in order to receive BCAP funding
- applies USDA conservation practices and conservation systems
 - Have a history of utilizing USDA Conservation structures on farm [technical guide for practices included]

Additional Practices – Soil Principle

Tile inlet terraces have been built in an area where the slope was vulnerable to soil erosion. The tile inlet system drains into the pond in the middle section of the farm. The two farm ponds pictured in the lower half of the photo had exceeded their useful life and have been filled and the biomass crop has been planted over the area once covered with water.

Biological Diversity Principle

Biomass production shall contribute to the conservation or enhancement of biological diversity, in particular native plants and wildlife.

Farm Name does the following to maintain or improve biological diversity:

- assessed vegetation cover types and wildlife habitats on enrolled acres and associated incidental areas and, where credible data are available, across the landscape
 - Farm planning has strong recreational hunting component for upland birds.
- has identified important wildlife species and habitats identified in state wildlife action plans
 - Part of farm in prairie chicken habitat and quail is target on balance of farm



- has documented and incorporated the findings of the assessment into planning and management activities
 - creates habitat for upland birds using brush piles, cover near pond and brush draws for cover
- has developed and implemented practices that contribute to the conservation of native vegetation that minimize the effects of your operations on wildlife habitat
 - BCAP seeding mix has native species included
- has adopted conservation practices related to control of non-crop invasive species (e.g., those not intentionally planted) on biomass production acres
 - Controls noxious weeds with spray and mechanical means
- management plans incorporate the role of prescribed or natural fire or other ecological processes where appropriate and practical
 - Has used prescribed fire in past to improve seeding rigor
- implements practices designed to control the spread of and reduce the occurrence of non-crop invasive species on enrolled lands
- does not plant crops that are known to be potentially invasive in the eco-region
- the crop has been grown at a reasonable scale for similar purposes in the target region and not been found to be invasive
 - There is switchgrass and big blue on other acres on the farm
- avoids using an energy crop that is potentially invasive and might disrupt biodiversity in the eco-region
 - Used only the BCAP approved mix
- includes harvest, transportation, equipment cleaning, and storage protocols in an IRMP
- Other vegetation types were documented as of January 1, 2008
 - Basically crop production

Additional Practices – Biological Diversity Principle

Much of the area has a rich population of White Tail Deer and native turkeys. The grower can identify hawk, owls, song sparrows, meadow lark and some wood pecker species as he canvases the farm. There is habitat maintained to provide cover for the hunting activities on the farm as evidenced by the brushy creeks in the farm maps.

Water Principle

Biomass production shall maintain or improve surface water, groundwater, and aquatic ecosystems.

Farm Name does the following to maintain or improve water quality:

- Has a farm pond located in a critical area which takes water from a USDA designed tile inlet drainage system and the over flow from an older pond structure.
- employs conservation practices and tillage systems to erosion control on the operation
 - No till has been used in history
- provided the following comments in regard to avoiding ground or surface water contamination:



- Filter strips and pond on land
- has adopted a comprehensive set of conservation practices as outlined in Soil Nutrient, Conservation and Water Quality Management Plans
 - Built ponds and terraces to slow water down and hold soil in place
- pest and disease management methods effectively control outbreaks of pests, diseases, and fire while not harming human health or the environment
- uses Integrated Pest Management (IPM)
 - rotated crops in past
- pesticide management includes: 1) where possible, use of least-toxic and narrow-spectrum pesticides to achieve management objectives, 2) application of pesticides in compliance with label requirements, 3) application of pesticides in accordance with conservation practices, 4) provision of equipment and training to employees and contractors for the safe application, 5) storage of pesticides and response to hazardous spills, and 6) biological control agents are used following strict protocols and by trained personnel
 - Suggest to give added weight to this multi-attribute indicator
- disposes of agricultural chemicals, containers, and liquid or solid nonorganic wastes, including fuel and oil, off-site and in compliance with federal and state laws
- has had the local water authority determine that ground or surface water is not being depleted faster than it is being naturally replenished

Air Quality/Emissions Principle

Cellulosic bioenergy shall reduce GHG emissions as compared to fossil-based energy. Emissions shall be estimated via a consistent approach to life cycle assessment.

Please provide answer here....

Farm Name does the following to reduce air emissions and enhance air quality:

- has provided yield data
- has provided data to facilitate calculation of emissions resulting from production inputs (fertilizer, pesticides, fuel)
- has provided information regarding land conversion, planting methods, and tillage practices
- has provided data to facilitate calculation of emissions resulting from harvesting, collection, handling, processing, and storage of biomass
- has provided data to facilitate calculation of emissions resulting from transportation of biomass

Socio-Economic Principle

Biomass production shall take place within a framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders (including land owners, farm workers, suppliers, bioenergy producers, and the local community), and ensures compliance with labor laws and human rights.



Farm Name does the following to sustainably distribute socioeconomic opportunity for and among all stakeholders and to ensure compliance with labor laws and human rights:

- only employs family members on the operation
- takes measures to provide a safe and healthy workplace
- employs family members on the operation
- ensures that employees are prepared to handle injuries and chemical spills

Legality Principle

Biomass production shall comply with applicable federal, provincial, state, and local laws, ordinances, and regulations.

Farm Name does the following to ensure that its operations comply with applicable laws, ordinances, and regulations:

- All employees, and relevant contractors can demonstrate working level awareness and knowledge of the laws, ordinances, and regulations that apply to the ownership/leasehold and operation
 - Knows law to best of his ability
- has a program or processes in place to ensure compliance with applicable laws, ordinances, and regulations

Transparency Principle

Production of certified biomass shall be transparent.

Farm Name does the following to ensure that its operations are transparent:

- promotes transparency by allowing the Council to release summary certification audit reports that do not contain any proprietary data to the public upon request

Continuous Improvement Principle

Biomass production practices and outcomes shall continuously improve based on the best available science.

Farm Name does the following to continuously improve its operations:

- can demonstrate efforts to improve environmental performance based upon monitoring programs and actions to address any non-conformances identified during certification audits, where applicable
- exercises care in the storage of agricultural chemicals
- exercises care in the storage of fertilizers and manure
- has explored collaborative research and testing opportunities through universities, government agencies, and industry processing facilities in your community

BCAP-24 (01-05-11) U.S. DEPARTMENT OF AGRICULTURE Commodity Credit Corporation BIOMASS CROP ASSISTANCE PROGRAM (BCAP) APPLICATION (Establishment and Annual Payments)	1. Farm Number 941	2. Tract Number(s) 2644
	3. Enrollment Number	4. Enrolled Acres 66.2
5A. County Office Name HARRISON COUNTY FSA OFFICE	5A. Enrollment Period: FROM (MM-DD-YYYY) 12/1/2011	5B. Enrollment Period: TO (MM-DD-YYYY) 11/30/2016
5B. County Office Street Address 1400 N 41ST STREET	7A. Admin. ST & CO Code 29-081	7B. Phys. Loc. ST & CO Code 29-081
5C. City, State, ZIP RETHANY, MO 64424	6. Project Area ID Number: 1	
5D. Telephone Number (Include Area Code): (660) 425-7635		

This Application is for purposes of seeking payments from the Commodity Credit Corporation (referred to as "CCC") on behalf of the undersigned owners, operators, or tenants (who may be referred to as "the Participant"). It accepted the Participant agrees to place the designated acreage into the Biomass Crop Assistance Program ("BCAP") from the date the Application is approved by the CCC. The Participant also agrees to implement on such designated acreage the conservation, forest, stewardship, or equivalent plan for biomass crop production developed for such acreage and approved by the CCC and the Participant. Additionally, the Participant agrees to comply with the terms and conditions contained in this Application including the Appendix to this document entitled Appendix to BCAP-24 Biomass Crop Assistance Program Application (referred to as "Appendix"). By signing below, the Participant acknowledges that a copy of the Appendix has been provided to such person. Such person also agrees to pay such liquidated damages in an amount specified in the Appendix if the Participant removes or modifies acres after application approval. The terms and conditions of any approval are contained in this form BCAP-24 and in BCAP-24 Appendix and all related addendum and forms related to participation in the BCAP program. BY SIGNING THIS APPLICATION FOR PAYMENTS PRODUCERS ACKNOWLEDGE RECEIPT OF THE FOLLOWING FORMS: BCAP-23; BCAP-24; BCAP-24 APPENDIX AND ANY ADDENDUM THERETO; IF APPLICABLE.

9A. Annual Rental Rate Per Acre (BCAP-23) \$ 154.49 9B. Total Acres Accepted (BCAP-23) 66.2 9C. Annual Payment (BCAP-23) \$ 10,227 9D. First Year Annual Payment \$ 9E. Advanced Partial First Year Payment \$	10. Identification of BCAP Land (See Page 2 for additional space)			
	A. Common Land Unit	B. BCAP Practice	C. Acres Accepted	D. Total Estimated Establishment Payment by Field
	1	BC2A	62.8	\$ 15,455
	2	BC2A	1.7	\$ 418
	3	BC2A	1.7	\$ 418
E. Total Estimated Establishment Payment			\$ 16,291	

11. PARTICIPANTS (If more than three individuals are signing, continue on attachment.)

A(1) Name and Address (Zip Code): [Redacted]	(2) Share 100%	(3) Signature (By): [Redacted]	(4) Title/Relationship of the Individual if Signing in a Representative Capacity	(5) Date (MM-DD-YYYY) 7/12/11
B(1) Name and Address (Zip Code): [Redacted]	(2) Share 0%	(3) Signature (By): [Redacted]	(4) Title/Relationship of the Individual if Signing in a Representative Capacity owner	(5) Date (MM-DD-YYYY) 7/12/11
C(1) Name and Address (Zip Code): [Redacted]	(2) Share %	(3) Signature (By): [Redacted]	(4) Title/Relationship of the Individual if Signing in a Representative Capacity	(5) Date (MM-DD-YYYY)

12. CCC USE ONLY - Payments according to the shares are approved.

A. Signature of CCC Representative
[Signature]

B. Date (MM-DD-YYYY)
7-27-11

NOTE: The following statement is made in accordance with the Privacy Act of 1974 (5 USC 552a - as amended). The authority for requesting the information identified on this form is 7 CFR Part 1400, the Commodity Credit Corporation Charter Act (15 U.S.C. 714 et seq.), and the Food, Conservation, and Energy Act of 2008 (Pub. L. 110-246). The information will be used by CCC to review a participant's farm to locate within a designated project area contract under the Biomass Crop Assistance Program. The information collected on this form may be classified as either Federal, State, Local government agencies, Tribal agencies, and non-governmental entities that have been authorized access to the information by statute or regulation and/or is reported in publicly available files identified in the System of Records Notice for USDA/FSA-2, Farm Records File (Automated). Providing the requested information is voluntary. However, failure to provide the requested information will result in an inability on the part of CCC to review a participant's farm to locate within a designated project area contract under the Biomass Crop Assistance Program.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0560-0002. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. The providers of information are not required to provide information if it is not necessary for the collection of information. RETURN THIS COMPLETED FORM TO YOUR COUNTY FSA OFFICE.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all of its programs and activities on the basis of race, color, sex, handicap, age, marital status, family status, genetic information, religion, sexual orientation, political beliefs, genetic information, race, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibitions apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's Technical Assistant at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Assistant Secretary for Civil Rights, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Room 5410, Washington, DC 20250-9410, or call toll-free at (866) 622-9992 (English) or (800) 877-8339 (TDD) or (866) 377-8642 (Spanish language relay) or (800) 845-6139 (Spanish language relay). USDA is an equal opportunity provider and employer.

Original - County Office Copy Owner's Copy Operator's Copy

RECEIVED
HARRISON COUNTY FSA OFFICE

Landowner:

Date:

Farm No.:

Tract No.:

Contract No.:

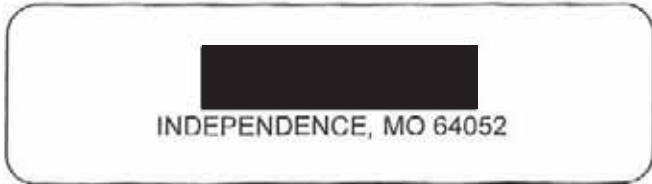
Contract Acres	
new seedings	66.2
existing grass	



BETHANY SERVICE CENTER
 1400 N 41ST ST
 BETHANY, MO 64424-7156
 (660) 425-7635

MELVIN LEE
 DISTRICT CONSERVATIONIST

Conservation Plan



Pasture

Tract: 2644

Forage Harvest Management

Forage will be harvested for production of biomass or hay. Fertilizer will be applied for production based on 250 cow-days of grazing. Minimum cutting height is 6 inches. No harvesting from May 1 through July 15. These fields are enrolled in the Biomass Crop Assistance Program. Follow the requirements on the attached BCAP worksheets.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	62.8 ac	7	2012		
2	1.7 ac	7	2012		
3	1.7 ac	7	2012		
Total:	66.2 ac				

Pasture and Hay Planting

Adapted forages will be planted into an appropriate seedbed. Prior to planting, fertilizer and lime will be applied for stand establishment according to soil test recommendations. These fields are enrolled in the Biomass Crop Assistance Program. Follow the requirements on the attached BCAP worksheets.

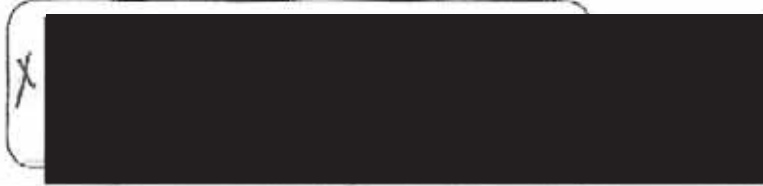
Field	Planned Amount	Month	Year	Applied Amount	Date
1	62.8 ac	5	2012		
2	1.7 ac	5	2012		
3	1.7 ac	5	2012		
Total:	66.2 ac				

Prescribed Grazing

Grazing will not occur until after July 15th. Livestock will be removed by Aug 31st under continuous grazing. A minimum grazing height of 8" will be required for continuous grazing and 6" will be allowed for rotational grazing. These fields are enrolled in the Biomass Crop Assistance Program. Follow the requirements on the attached BCAP worksheets.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	62.8 ac	7	2012		
2	1.7 ac	7	2012		
3	1.7 ac	7	2012		
Total:	66.2 ac				

CERTIFICATION OF PARTICIPANTS



CERTIFICATION OF:

DISTRICT CONSERVATIONIST
Melvin Lee 7/26/11
MELVIN LEE DATE

CONSERVATION DISTRICT
Morgan Harding 7/26/11
HARRISON COUNTY SOIL & WA DATE

PUBLIC BURDEN STATEMENT

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collections is 0578-0013. The time required to complete this information collection is estimated to average 45/0.75 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection information.

PRIVACY ACT

The above statements are made in accordance with the Privacy Act of 1974 (5 U.S.C 522a). Furnishing this information is voluntary, however failure to furnish correct, complete information will result in the withholding or withdrawal of such technical or financial assistance. The information may be furnished to other USDA agencies, the Internal Revenue Service, the Department of Justice, or other state or federal law enforcement agencies, or in response to orders of a court, magistrate, or administrative tribunal.

USDA NON-DISCRIMINATION STATEMENT

"The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, family status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, DC 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer."

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JUL 12 2011
HARRISON COUNTY FSA

Morgan Harding
COC
7-27-11

Native Grass Forbs; BC2A: Job Sheet for Establishment and Maintenance

Landowner:

Date: 7-Jun-11

Farm No.:

Tract No.:

Contract No:

BCAP Ac.:

941

2644

66.2

Field	Planned		Applied		Planned Conservation Treatment
	Amount	mm/yy	Amount	Date	
1,2,3	66				<p style="text-align: center;">BC2A - Native Grass & Forbs Establishment</p> <p style="text-align: center;">Soil Fertility (Nutrient Mgt.)</p> <p>Apply minerals in accordance with minimum needs as determined by a current soil test (analysis made during the last 3 years). Analysis will be from samples taken from each field. See attached MU guide for soil sampling procedures</p> <p>In the establishment year; fertilizer will be applied based on soil test results recommendations for warm season grass ESTABLISHMENT</p> <p>Application of lime over 2000 lbs. ENM are optional. You may choose to limit lime application to 2000 lbs. of ENM.</p> <p>Seeding mixes for your contract are marked on the following page</p> <p>Seeding Dates:</p> <p style="text-align: center;">Nov. 16 to June 30</p> <p>Drilled Seedings -</p> <p>Seed will be planted 1/4 to 1/2 inch deep in a firm, tilled or no tilled seed bed.</p> <p>Broadcast Seedings -</p> <p>Prepare a firm seedbed. All tillage operations will be done on the contour. Roll or Cultipack before and after placing seed</p>
	66.2				
	4				

Native Grass Forbs; BC2A: Job Sheet for Establishment and Maintenance

Field	Planned		Applied		Planned Conservation Treatment
	Amount	Year	Amount	Date	
1,2,3	66 <i>66.2</i>				<p>Mowing during establishment: may be completed as often as necessary to control weeds.</p> <p>Chemical Treatment Existing cool season grasses will require a fall and spring application of herbicide prior to seeding</p> <p>For "How to" information to convert existing stands to another approved cover see the attached, "Preparing Non-Native Cool-Season Grasses for Conversion to Wildlife-Friendly Vegetation Conservation Practice Information Sheet (IS-MO645C)"</p> <p>The use of herbicides must be in strict adherence to and consistent with registered use, label directions, and precautions</p> <p>The approved vegetative cover will be maintained to control erosion for the duration of the contract.</p> <p>Pest Management: Manage and control undesirable species of weeds, insects and diseases to maintain or improve the plant community. All noxious weeds, as determined by state law or county commissions, will be controlled.</p>
1,2,3	66 <i>66.2</i>				
1,2,3	66 <i>66.2</i>				

Native Grass Forbs; BC2A: Job Sheet for Establishment and Maintenance

Biomass Crop Seeding Mixes

Seeding rates for drilled plantings		
Fields	Mix	lbs. PLS per acre
1,2,3	Big Bluestem \2	3.0
	Indiangrass \2	3.0
	Switchgrass \2	1.8
	Illinois Bundleflower \1	0.9
	Purple Prairie Clover \1	1.0

Seeding rates for broadcast plantings		
Fields	Mix	lbs. PLS per acre
	Big Bluestem \2	4.5
	Indiangrass \2	4.5
	Switchgrass \2	2.7
	Illinois Bundleflower \1	1.4
	Purple Prairie Clover \1	1.5

	Canada or Virginia Wild Rye	8.2
	Switchgrass \2	2.7
	Illinois Bundleflower \1	0.9
	Purple Prairie Clover \1	1.0

	Canada or Virginia Wild Rye	12.3
	Switchgrass \2	4.1
	Illinois Bundleflower \1	1.4
	Purple Prairie Clover \1	1.0

PLS = Pure Live Seed. Per cent of live seed in a bag of seed is calculated from the % of "pure" seed multiplied by the % germination plus the % "hard" in a seed bag. Example: seed tag reads: 88% purity, 60% germination, 10 % dormant or hard seed. The math would be .88 X .70 (.60 + .10) = .616 or 62% Pure Live Seed. If this is a tag from a 50 lb. bag of material, 31 lbs. (.616 X 50) is seed that is viable and should germinate.

\1 The seed must have been grown for sale in Missouri or adjacent states (see "origin" on the seed bag tag).

\2 See the list of recommended cultivars for native grass plantings. Non cultivar seed may also be used.

Native Grass Species Cultivars for Biomass Production in Missouri

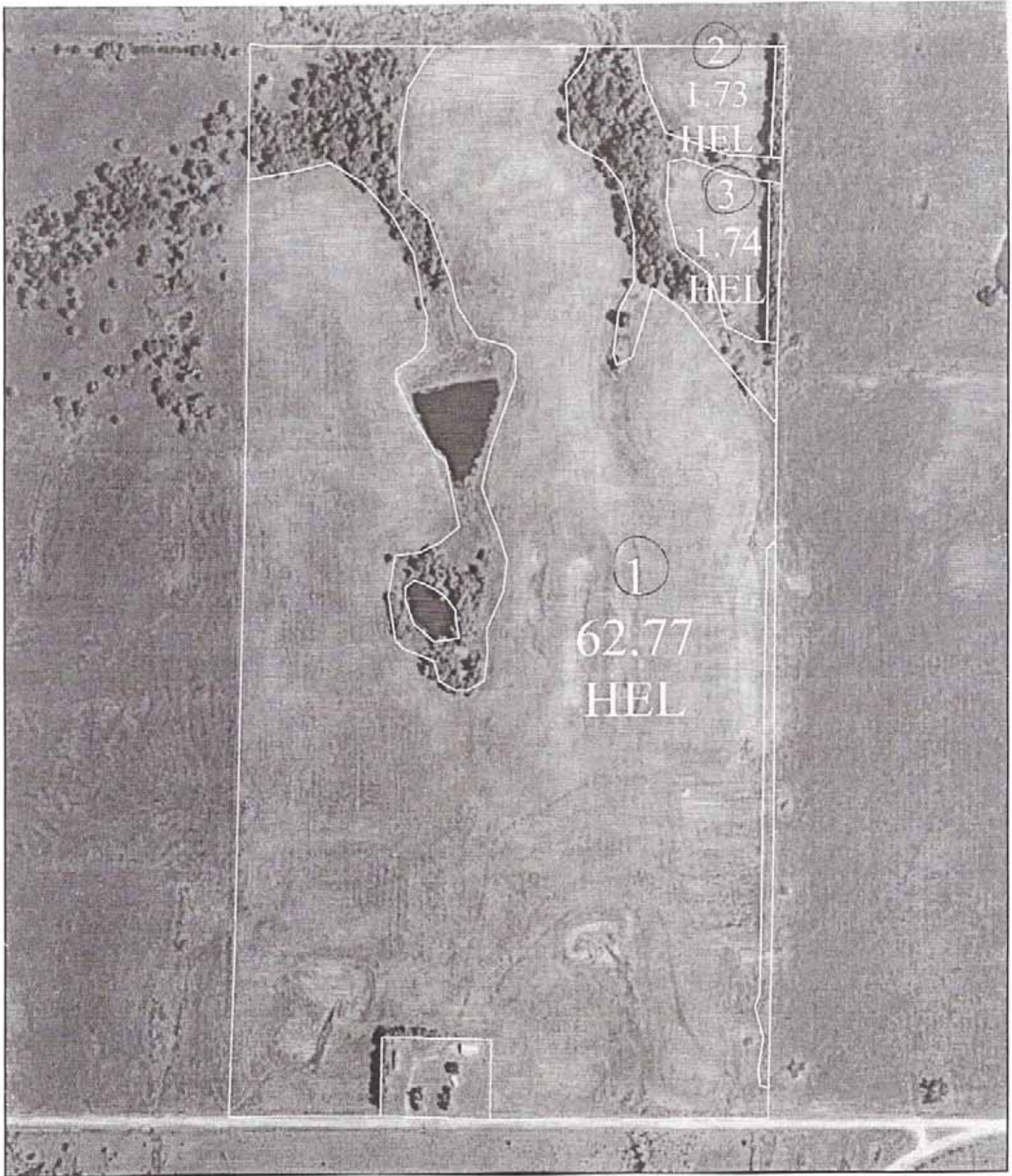
Grass Species	Cultivar
Big Bluestem	Rountree
	Kaw
Indiangrass	Rumsey
	Osage
Switchgrass	Kanlow
	Alamo
Virginia Wild Rye	Cuivre River
	O'Ma'Ha'

Native Grass Forbs; BC2A: Job Sheet for Establishment and Maintenance

Absolutely no disturbance will be performed during the primary nesting season. The primary nesting season occurs from May 1 to July 15.

Field	Planned		Applied		Planned Conservation Treatment
	Amount	Year	Amount	Date	
1,2,3	66				Haying
	662				Hay may be harvested after July 15.
					Contract holders must report, to FSA, annually, the number of acres harvested, bales produced and amount tonnage harvested.
					Bales will be stored on sites with good surface drainage Bales may be transported to a processing facility, uncovered on open trailers
					Mowing height for haying will not be less than 6 in.
1,2,3	66				Grazing
	662				Grazing may occur after July 15.
					Set stocking (no rotation) of BCAP acres is allowed from July 16th until Aug 31st of each year. Livestock will have to be removed by the Aug 31st deadline to allow plants to replenish root reserves prior to dormancy. After full dormancy the BCAP acres may be grazed again.
					Maximum stocking is:
					2333 lbs. Live weight per acre
					A rotational grazing plan may be developed to allow grazing beyond the August 31 date. Contact your local NRCS staff to document a rotational grazing plan. You will need to provide a map of all acres to be included in the rotation (including non BCAP acres), numbers of pastures, location and sources of water, species, numbers, weight, class of livestock to be grazed.
					For set stocking grass may not be grazed below 8". If 8" stubble height occurs before August 31 livestock will be removed.
					Contract holders must report, to FSA, the number of acres grazed, the number days utilized and the number of cattle units that are grazed.
1,2,3	66				Harvest of Seed
	662				Seed may be harvested after July 15.
					Contract holders will be required to submit, to FSA, verifiable documentation of all sales.

Farm No.	941	Tract N	2644	ClI No.	
Name:				Practice:	BCAP
ACRES ON CONTRACT:	66.2				
Acres to be seeded:	66.2				
Lime ENM CWT	810	66.2	53622		
Nitrogen	0	66.2	0		
Phosphate	85	66.2	5627		
Potash	40	66.2	2648		
Components					
Components	Code	Qty.	Pmt Rate	C/S Amt	
Air Seeding	MOSMBCAP22		9.55	0	
Site Prep Crop-Mech-Light	MOSMBCAP2	66.2	28.10	1860	
Site Prep Crop-Chem-Light	MOSMBCAP3	66.2	16.31	1080	
Site Prep MPast-Mech-Light	MOSMBCAP4		41.13		
Site Prep MPast-Chem-Light	MOSMBCAP5		17.82		
Seeding-Conv. Or No-Till Drill	MOSMBCAP21	66.2	25.40	1681	
Limestone ENM CWT	MOSMBCAP10	536.2	2.49	1335	
Nitrogen	MOSMBCAP11		0.41	0	
Phosphate	MOSMBCAP12	5627.0	0.33	1857	
Potash	MOSMBCAP13	2648.0	0.33	874	
Spreading/Broadcasting	MOSMBCAP20	66.2	10.45	692	
Soil Test	MOSMBCAP1	1.0	9.98	10	
Seed Mix #1-Drilled	MOSMBCAPMIX1	66.2	86.08	5698	
Cultipack, Roll or Harrow	MOSMBCAP23	66.2	18.18	1204	
Total Cost Share				16291	
Approved By:		Second Party Review			
Seed type	Big Bluestem	Indiangrass	Switchgrass	Bundleflower	
Lbs/ac	3.0	3.0	1.8	0.9	
Amt. Required	198.6	198.6	119.2	59.6	
Amt. Applied					
Seeding adequate					
Seed type	Purple Prairie Clover				
Lbs/ac	1.0				
Amt. Required	66.2				
Amt. Applied					
Seeding adequate					
YOU MUST SUBMIT ALL INVOICES FOR REIMBURSEMENT					
WE MUST HAVE ALL SEED TAGS FOR REIMBURSEMENT					



United States Department of Agriculture Harrison County Farm Service Agency

Farm 941 Tract 2644

Prepared by FSA-NOT FOR LEGAL USE
312

May 09, 2011



1:3,807



GIS_MQ_306 slu_a_m081

US 80 001 Rev. P. 11-081

Wetland Determination Identifiers

Ⓜ Restricted Use

Ⓜ Limited Restrictions

Ⓜ Exempt from Conservation Compliance Provisions

Disclaimer: Wetland identifiers do not represent the size, shape or specific determination of the area. Refer to your original determination (CPA-026 and attached maps) for exact wetland boundaries and determinations, or contact NRCS.



United States
Department of
Agriculture



NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Harrison County, Missouri



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://soils.usda.gov/sqi/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrsc>) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

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individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

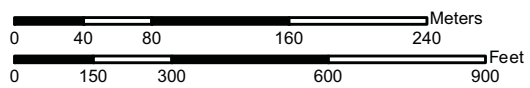
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map (CS Farm)



Map Scale: 1:4,370 if printed on A size (8.5" x 11") sheet.



MAP INFORMATION

Map Scale: 1:4,370 if printed on A size (8.5" x 11") sheet.
 The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: UTM Zone 15N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Harrison County, Missouri
 Survey Area Data: Version 12, Dec 22, 2011

Date(s) aerial images were photographed: 7/13/2007

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

MAP LEGEND

- Area of Interest (AOI)
- Soils
- Soil Map Units
- Special Point Features**
 - Blowout
 - Borrow Pit
 - Clay Spot
 - Closed Depression
 - Gravel Pit
 - Gravelly Spot
 - Landfill
 - Lava Flow
 - Marsh or swamp
 - Mine or Quarry
 - Miscellaneous Water
 - Perennial Water
 - Rock Outcrop
 - Saline Spot
 - Sandy Spot
 - Severely Eroded Spot
 - Sinkhole
 - Slide or Slip
 - Sodic Spot
 - Spoil Area
 - Stony Spot
- Special Line Features**
 - Gully
 - Short Steep Slope
 - Other
- Political Features**
 - Cities
- Water Features**
 - Streams and Canals
- Transportation**
 - Rails
 - Interstate Highways
 - US Routes
 - Major Roads
 - Local Roads
- Very Stony Spot
- Wet Spot
- Other

Map Unit Legend (CS Farm)

Harrison County, Missouri (MO081)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
30004	Adair clay loam, 5 to 9 percent slopes, eroded	15.1	18.3%
30085	Grundy silt loam, 2 to 5 percent slopes	0.0	0.0%
30091	Grundy silty clay loam, 2 to 5 percent slopes, eroded	10.8	13.1%
30120	Lagonda silty clay loam, 5 to 9 percent slopes, eroded	1.8	2.1%
30133	Lamoni clay loam, 5 to 9 percent slopes, eroded	7.9	9.6%
30195	Shelby clay loam, 14 to 20 percent slopes, severely eroded	6.1	7.4%
30196	Shelby clay loam, 9 to 14 percent slopes, severely eroded	3.8	4.6%
30197	Shelby loam, 14 to 20 percent slopes	0.0	0.0%
30200	Shelby loam, 9 to 14 percent slopes	33.0	39.9%
36055	Zook-Colo silty clay loams, channeled, 0 to 2 percent slopes, frequently flooded	4.0	4.9%
Totals for Area of Interest		82.6	100.0%

Map Unit Descriptions (CS Farm)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified

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by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Harrison County, Missouri

30004—Adair clay loam, 5 to 9 percent slopes, eroded

Map Unit Setting

Elevation: 800 to 1,300 feet

Mean annual precipitation: 35 to 41 inches

Mean annual air temperature: 50 to 54 degrees F

Frost-free period: 177 to 209 days

Map Unit Composition

Adair and similar soils: 88 percent

Description of Adair

Setting

Landform: Hillslopes

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loess over till

Properties and qualities

Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 12 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 10 percent

Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)

Available water capacity: Moderate (about 7.6 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Ecological site: Till Upland Prairies And Savannas (R109XY006MO)

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Typical profile

0 to 7 inches: Clay loam

7 to 33 inches: Clay

33 to 77 inches: Clay loam

30085—Grundy silt loam, 2 to 5 percent slopes

Map Unit Setting

Elevation: 650 to 1,350 feet

Mean annual precipitation: 35 to 41 inches

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Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 177 to 209 days

Map Unit Composition

Grundy and similar soils: 90 percent
Minor components: 5 percent

Description of Grundy

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Loess

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Land capability (nonirrigated): 2e
Ecological site: Loess Upland Prairies And Savannas (R109XY002MO)
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Typical profile

0 to 13 inches: Silt loam
13 to 18 inches: Silt loam
18 to 36 inches: Silty clay
36 to 70 inches: Silty clay

Minor Components

Edina

Percent of map unit: 3 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Haig

Percent of map unit: 2 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear, convex

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

30091—Grundy silty clay loam, 2 to 5 percent slopes, eroded

Map Unit Setting

Elevation: 700 to 1,200 feet

Mean annual precipitation: 35 to 41 inches

Mean annual air temperature: 50 to 54 degrees F

Frost-free period: 177 to 209 days

Map Unit Composition

Grundy and similar soils: 95 percent

Description of Grundy

Setting

Landform: Interfluves

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loess

Properties and qualities

Slope: 2 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 12 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)

Available water capacity: High (about 9.8 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Ecological site: Loess Upland Prairies And Savannas (R109XY002MO)

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Typical profile

0 to 8 inches: Silty clay loam

8 to 15 inches: Silty clay

15 to 35 inches: Silty clay

35 to 60 inches: Silty clay loam

30120—Lagonda silty clay loam, 5 to 9 percent slopes, eroded

Map Unit Setting

Elevation: 500 to 1,400 feet

Mean annual precipitation: 33 to 41 inches

Mean annual air temperature: 50 to 55 degrees F

Frost-free period: 177 to 220 days

Map Unit Composition

Lagonda and similar soils: 85 percent

Minor components: 14 percent

Description of Lagonda

Setting

Landform: Hillslopes

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Convex

Parent material: Loess over pedisediment

Properties and qualities

Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 10 to 20 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent

Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)

Available water capacity: High (about 10.8 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Ecological site: Loess Upland Prairies And Savannas (R109XY002MO)

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Typical profile

0 to 7 inches: Silty clay loam

7 to 39 inches: Silty clay

39 to 80 inches: Clay loam

Minor Components

Fine-silty

Percent of map unit: 12 percent

Landform: Hillslopes

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Side slope

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Down-slope shape: Convex, linear

Across-slope shape: Convex

Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)

Haig

Percent of map unit: 1 percent

Landform: Hillslopes

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Colo

Percent of map unit: 1 percent

Landform: Stream terraces

Down-slope shape: Concave

Across-slope shape: Linear

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

30133—Lamoni clay loam, 5 to 9 percent slopes, eroded

Map Unit Setting

Elevation: 650 to 1,500 feet

Mean annual precipitation: 35 to 41 inches

Mean annual air temperature: 50 to 54 degrees F

Frost-free period: 177 to 209 days

Map Unit Composition

Lamoni and similar soils: 90 percent

Minor components: 5 percent

Description of Lamoni

Setting

Landform: Hillslopes

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Till

Properties and qualities

Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 12 to 24 inches

Frequency of flooding: None

Frequency of ponding: None

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Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.0 inches)

Interpretive groups

Land capability (nonirrigated): 3e
Ecological site: Till Upland Prairies And Savannas (R109XY006MO)
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Typical profile

0 to 7 inches: Clay loam
7 to 31 inches: Clay
31 to 60 inches: Clay loam

Minor Components

Clarinda

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

30195—Shelby clay loam, 14 to 20 percent slopes, severely eroded

Map Unit Setting

Elevation: 650 to 1,500 feet
Mean annual precipitation: 35 to 41 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 177 to 209 days

Map Unit Composition

Shelby and similar soils: 100 percent

Description of Shelby

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Till

Properties and qualities

Slope: 14 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

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Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: Till Protected Backslope Prairies And Savannas (R109XY008MO),
Till Exposed Backslope Prairies And Savannas (R109XY021MO)
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Typical profile

0 to 6 inches: Clay loam
6 to 25 inches: Clay loam
25 to 60 inches: Clay loam

30196—Shelby clay loam, 9 to 14 percent slopes, severely eroded

Map Unit Setting

Elevation: 650 to 1,500 feet
Mean annual precipitation: 35 to 41 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 177 to 209 days

Map Unit Composition

Shelby and similar soils: 95 percent

Description of Shelby

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Till

Properties and qualities

Slope: 9 to 14 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups

Land capability (nonirrigated): 4e

Ecological site: Till Upland Prairies And Savannas (R109XY006MO)

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Typical profile

0 to 7 inches: Clay loam

7 to 25 inches: Clay loam

25 to 58 inches: Clay loam

30197—Shelby loam, 14 to 20 percent slopes

Map Unit Setting

Elevation: 650 to 1,500 feet

Mean annual precipitation: 35 to 41 inches

Mean annual air temperature: 50 to 54 degrees F

Frost-free period: 177 to 209 days

Map Unit Composition

Shelby and similar soils: 95 percent

Description of Shelby

Setting

Landform: Hillslopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Till

Properties and qualities

Slope: 14 to 20 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 30 percent

Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)

Available water capacity: High (about 10.0 inches)

Interpretive groups

Land capability (nonirrigated): 4e

Ecological site: Till Protected Backslope Prairies And Savannas (R109XY008MO),

Till Exposed Backslope Prairies And Savannas (R109XY021MO)

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Typical profile

0 to 11 inches: Loam

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11 to 36 inches: Clay loam
36 to 60 inches: Loam

30200—Shelby loam, 9 to 14 percent slopes

Map Unit Setting

Elevation: 650 to 1,500 feet
Mean annual precipitation: 35 to 41 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 177 to 209 days

Map Unit Composition

Shelby and similar soils: 95 percent

Description of Shelby

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Till

Properties and qualities

Slope: 9 to 14 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 10.0 inches)

Interpretive groups

Land capability (nonirrigated): 4e
Ecological site: Till Upland Prairies And Savannas (R109XY006MO)
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Typical profile

0 to 12 inches: Loam
12 to 37 inches: Clay loam
37 to 60 inches: Loam

36055—Zook-Colo silty clay loams, channeled, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

Elevation: 500 to 1,400 feet

Mean annual precipitation: 35 to 41 inches

Mean annual air temperature: 50 to 54 degrees F

Frost-free period: 177 to 209 days

Map Unit Composition

Zook, channeled, and similar soils: 55 percent

Colo, channeled, and similar soils: 33 percent

Description of Zook, Channeled

Setting

Landform: Flood plains

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)

Depth to water table: About 12 to 36 inches

Frequency of flooding: Frequent

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)

Available water capacity: High (about 11.4 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Ecological site: Wet-Mesic Upland Drainageway Prairies And Savannas (R109XY029MO)

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Typical profile

0 to 48 inches: Silty clay loam

48 to 72 inches: Silty clay loam

Description of Colo, Channeled

Setting

Landform: Flood plains

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium

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Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: About 12 to 36 inches

Frequency of flooding: Frequent

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)

Available water capacity: High (about 11.4 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Ecological site: Wet-Mesic Upland Drainageway Prairies And Savannas
(R109XY029MO)

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Typical profile

0 to 46 inches: Silty clay loam

46 to 61 inches: Silty clay loam

References

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United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. <http://soils.usda.gov/>

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Custom Soil Resource Report

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

FIELD INFORMATION			
Field ID	FIELD	Sample no.	1
Acres	65	Last limed	unknown
		Irrigated	no
Last crop	115 SOYBEANS		

Bill Jackson
 FSR Copy: N

Serial no.	823832-1	Lab no.	C1109437
County	Jackson	Region	1
Submitted	5/2/2011	Processed	5/10/2011
Soil sample submitted by: Firm		Outlet	

This report is for
 [REDACTED]
 INDEPENDENCE MO 64052

SOIL TEST INFORMATION		RATING						
		Very low	Low	Medium	High	Very high	Excess	
pH _s	(salt pH)	5.5	*****					
Phosphorus	(P)	6 lbs/a	*****					
Potassium	(K)	135 lbs/a	*****					
Calcium	(Ca)	4612 lbs/a	*****					
Magnesium	(Mg)	567 lbs/a	*****					
Sulfur	(SO ₄ -S)	ppm						
Zinc	(Zn)	ppm						
Manganese	(Mn)	ppm						
Iron	(Fe)	ppm						
Copper	(Cu)	ppm						
Organic matter	3.5 %	Neutralizable acidity	5.0 meq/100g	Cation exchange capacity	19.1 meq/100g			
pH in water		Electrical conductivity	mmho/cm	Sodium (Na)	lb/a			
Nitrate (NO ₃ -N)	Topsoil ppm	Subsoil ppm	Sampling depth	Top inches	Subsoil inches			
Cropping options	Yield goal	NUTRIENT REQUIREMENTS					LIMESTONE SUGGESTIONS	
		Pounds per acre						
		N	P ₂ O ₅	K ₂ O	Zn	S		
7 WARM SEASON GRASS EST	0	0	85	40			Effective neutralizing material (ENM)	
27 WARM SEASON GR PAST	250 CD/A	60	45	60			B10	
							Effective magnesium (EMg)	
							0	

Comments:

Nitrogen requirements may be reduced by 30 pounds per acre for the first crop following soybeans. Not applicable for wheat.
 Some herbicide labels list restrictions based on soil pH in water. This sample has an estimated pH in water of 6.0. Use this estimated pH in water as a guide. If you wish to have soil pH in water analyzed, contact your dealer or Extension specialist listed below.
 For warm season grass production, apply 60 lbs nitrogen per acre in early June. To determine limestone needed in tons/acre, divide your ENM requirement by the guarantee of your limestone dealer.

Regional Agronomy Specialist Travis Harper
 White - Farmer, Yellow - FSA, Blue - Firm, Pink - Extension

Phone (660) 885-5556
 MP 189 Revised 9/05, Reprinted 5/07

Signature Columbia

AV	TICKET	TYPE	DESCRIPTION	UNITS	U/M	PRICE	EXTENSION	
			CAINSVILLE 800-338-2369 / LACONA ELEVATOR 641-534-3121 or 800-688-3078 LACONA STATION 641-534-3611 / LAMONI 800-346-1612 or 641-784-3326 CHARITON 641-774-2135 / MELCHER 641-947-2151 / HILO 641-942-6223 HUNTERDON 641-877-2711 / KNOXVILLE 641-842-5511					
			*** DECEMBER NEWS *** HOLIDAY SCHEDULE CLOSED DECEMBER 24TH AND JANUARY 2ND WISHING YOU ALL A VERY HAPPY HOLIDAY SEASON !!!					
			REMINDER: DEFER PAY GRAIN CHECKS WILL NOT BE WRITTEN UNTIL 1/3/12. THANKS					
			"CREDIT CARDS MAY BE USED AT TIME OF PURCHASE AT THE C-STORE BUT NOT FOR PAYMENT ON ACCOUNT" VISIT US ON OUR WEB SITE www.sccoop.com *WE APPRECIATE YOUR BUSINESS AND SUPPORT*					
IV	1835427	ROA	* Paid on Account *	*			5,872.5	
	1838611	Chg	AG LINE * Tot Sale - Lamoni *		125.0000	TGN 17.250000	2,156.2 2,156.2	
			Purch Amt	* Monthly Totals *	Purch Dol			
			125.00	FERTILIZER	\$2,156.25			

CASH SALES	BEGINNING BALANCE	PAYMENTS	CHARGE SALES	ADJUSTMENTS	TOTAL AMOUNT DUE BY:
	5,872.54	5,872.54-	2,156.25		12/15/11 \$2,156.2
PREPAY BALANCE	OVER 90	61-90	91-90	CURRENT	NET DUE IF PAID BY:
				2,156.25	12/15/11 \$2,156.2

TH CENTRAL COOP. FOR INQUIRIES CHARITON 2120 OSCEOLA AVE. KNOXVILLE 601 N. SHERMAN LACONA 118 N. MEYERS AVE. LAMONI 4TH & LINDEN
 29963 [REDACTED] 641-774-2135 CHARITON, IA 50002 [REDACTED] 641-842-5511 KNOXVILLE, IA 50138 641-534-4071 LACONA, IA 50139 641-784-3326 LAMONI, IA 50
 Regular 800-346-1612



South Central Coop
118 N. Meyers Ave.
Lacona, Iowa 50139

LOCAL: 641-534-4071
TOLL FREE: 800-688-3078

GRAIN DEALER
LICENSE NO. GD-904
Ticket - 1858722

Date 1/27/18 Page 1

Sales Ticket

Account
29963

Customer

[REDACTED]

* Regular Account *
3305 SHELEY ROAD

INDEPENDENCE MO 64052

Type By Branch
Charge Sale SD Lamoni

Origin Branch - Lamoni

Item	Description	Units	U/M	Price	Tax	Dis	Extension
40040	AG LIME	26.1700	TON	\$17.500000	N	N	\$457.98
Sub-Total							\$457.98
Total Due							\$457.98
							2/15/12

*Billed to
Account
4/20*

AUTHORIZED COMPANY/BUYER SIGNATURE

DATE

AUTHORIZED CUSTOMER / SELLER SIGNATURE

DATE

ALL ACCOUNTS DUE BY 15TH OF MONTH FOLLOWING PURCHASE. Finance Charge is a periodic rate of 1.65% per month, which is an annual rate of 19.8%, applied to the new balance

Cairsville 660-893-5218 800-339-2389	Chariton 841-774-2135	Humeston 641-877-2711	Knoxville 841-842-5511	Lamoni 641-784-3328 800-346-1612	Melcher 641-947-2151	Mio 841-942-8623
--	--------------------------	--------------------------	---------------------------	--	-------------------------	---------------------

AY	TICKET	TYPE	DESCRIPTION	UNITS	U/M	PRICE	EXTENSION	
			CHARITONVILLE 800-336-2367 / LACONA ELEVATOR 841-534-3221 or 800-336-3076 LACONA STATION 641-534-3611 / LAMONI 800-346-1612 or 641-784-3326 CHARITON 641-774-2135 / MELCHER 641-947-2151 / MILO 641-942-6223 HUMESTON 641-877-2711 / KNOXVILLE 641-842-5511					
			**** NOVEMBER NEWS **** WITH BEAN HARVEST BUSTING THE BINS & CORN HARVEST WELL UNDER WAY, WE WANT TO THANK YOU FOR YOUR BUSINESS & PATIENCE DURING THESE LONG HARVEST DAYS ! STORAGE CHARGES: MINIMUM .17 CTS/BU FOR THE 1ST 90 DAYS THEN .0015 CTS/BU/DAY AGRONOMY NEWS: NOW IS THE PRIME TIME TO PLAN NEXT YEAR'S INPUTS... STOP IN AND VISIT WITH OUR AGRONOMISTS AND LOCK THOSE PRICES IN ! *CREDIT CARDS MAY BE USED AT TIME OF PURCHASE AT THE C-STORE BUT NOT FOR PAYMENT ON ACCOUNT* VISIT US ON OUR WEB SITE www.sccoop.com *WE APPRECIATE YOUR BUSINESS AND SUPPORT*					
t	1829654	Chg	11-52-0 BULK	10,810.8612	LB	.385000	4,162.1	
			0-0-60 BULK	4,409.1388	LB	.340000	1,499.1	
			CUSTOM SPREADING-SPINNER	65.0000	ACR	3.250000	211.2	
			* Tot Sale - Lamoni *				5,872.5	
		Purch	Unit	* Monthly Totals *	Purch	Del		
		15,219.99		FERTILIZER	\$5,661.29			
		65.00		SERVICES	\$211.25			

CASH SALES	REQUIRING BALANCE	PAYMENTS	CHARGE SALES	ADJUSTMENTS	TOTAL AMOUNT DUE BY:
			5,872.54		11/15/11 \$5,872.5
PREPAY BALANCE	OVER 90	61.90	31.60	CURRENT	NET DUE IF PAID BY:
				5,872.54	11/15/11 \$5,872.5

TH CENTRAL COOP FOR INDUSTRY CHARITON 2120 OSCEOLA AVE KNOXVILLE 601 N. SHERMAN LACONA 118 N. MEYERS AVE LAMONI 4TH & LINDEN
 29763 [REDACTED] 1-774-2135 CHARITON, IA 50049 641-842-5511 KNOXVILLE, IA 50138 641-534-4071 LACONA, IA 50139 641-784-3326 LAMONI, IA 50
 800-346-1612

Mail
 12/19

SCHILDBERG CONSTRUCTION CO., INC.

P.O. BOX 358
GREENFIELD, IOWA 50849

C 174043

2911-2012 0411

North

08174043

Proj. No. Quarry
DECATUR QUARRY

Sold To SOUTH CENTRAL LOAN
114 N. Myer's Increase 882648 628

Addr. Decatur, IA 52001

IA MO. SECY OF AGRICULTURE CERTIFIED LBS. ECCE/ENM PER TON
AG LIME ROCK SAND STOCKPILE 42011

DATE 11/1/79 11/1/79
IA 85 0818 Quarry Lime - Aglime

Gross	ENM	MAT'L	15.17	13,603
Tare	31,000	MAT'L DRY	31.55	27,887
Net	20,000	MAT'L W/ W	1,526.32	1,306,530
		@ \$		Per Ton

THIS IS TO CERTIFY THAT THE MATERIAL HEREIN DESCRIBED MEETS THE APPLICABLE CONTRACT REQUIREMENTS AND SPECIFICATIONS

Amount Sale
Sales Tax
Total

Driver *Adam Bretingham*
Weigher *DEAN M. TAYLOR*
Rec'd by *Stull*

AUTOMATED BUSINESS FORMS (402) 731-2300

Call if you need anything

Thank you

SCHILDBERG CONSTRUCTION CO., INC.

P.O. BOX 358
GREENFIELD, IOWA 50849

Missouri

D 108391



Proj. No. [Redacted] Quarry

Sold To [Redacted] 118 N. Reynolds Avenue
Lamar, Mo. 64803

IA. MO. SECY. OF AGRICULTURE CERTIFIED LBS. ECC/ENM PER TON

DESCRIPTION	ROCK	SAND	STOCKPILE
AG LIME	<input type="checkbox"/>	<input type="checkbox"/>	52811
DATE 1-16-70			
Gross 41,328			
Tare 24,568			
Net 16,760			

THIS IS TO CERTIFY THAT THE MATERIAL HEREIN DESCRIBED MEETS THE APPLICABLE CONTRACT REQUIREMENTS AND SPECIFICATIONS

Amount Sale
Sales Tax

Total

CHARGE CASH ON ACCT. CHECK

On Off

Driver [Redacted]
Weigher [Redacted]
Rec'd by [Redacted]

SCHILDBERG CONSTRUCTION CO., INC.

P.O. BOX 358
GREENFIELD, IOWA 50849

Missouri

D 108690



Proj. No. [Redacted] Quarry

Sold To [Redacted] 118 N. Reynolds Avenue
Lamar, Mo. 64803

IA. MO. SECY. OF AGRICULTURE CERTIFIED LBS. ECC/ENM PER TON

DESCRIPTION	ROCK	SAND	STOCKPILE
AG LIME	<input type="checkbox"/>	<input type="checkbox"/>	52811
DATE 1-16-70			
Gross 41,328			
Tare 24,568			
Net 16,760			

THIS IS TO CERTIFY THAT THE MATERIAL HEREIN DESCRIBED MEETS THE APPLICABLE CONTRACT REQUIREMENTS AND SPECIFICATIONS

Amount Sale
Sales Tax

Total

CHARGE CASH ON ACCT. CHECK

On Off

Driver [Redacted]
Weigher [Redacted]
Rec'd by [Redacted]

~~_____~~
~~_____~~
~~_____~~
~~_____~~

HARRISON COUNTY SOIL AND WATER CONSERVATION DISTRICT
1400 N 41st Street, Bethany, MO 64424 - Phone (660) 425-7655 #3

Attached is your copy of the approved cost-share application which shows your approval date, termination date, and the amount of funds obligated for this practice. Cost-share funds will be paid only to the landowner. **You have six (6) months or until June 15th (which ever comes first) to complete the practice – NO EXTENSIONS – no exceptions.**

LANDOWNER/OPERATOR CHECKLIST TO RECEIVE COST-SHARE PAYMENT

- _____ Before paying the contractor, call the office to see if the contractor has turned in checkout notes for the practice!
- _____ Is the practice completed according to specifications?
- _____ Do all the bills have the vendor's address at the top and the date the components were purchased or work was started? All bills should have a purchase date after the approval date, however, bills for fencing supplies only can have a date before the approval date.
- _____ Are the bills marked paid and show the check number and date paid? **Effective July 1, 2006, all bills for the earthwork contractor, tile contractor, and the steel pipe/collars provider must have a copy of the canceled check, cashier check, money order, or picture image of the check. All other bills must indicate the check number and date the bill was paid.**
- _____ Are the bills itemized showing each component unit cost (units include hours, square feet, pounds, feet, cubic yards, acres, site preparation, etc.) and the number of units?
- _____ Are the tickets for Fertilizer and Lime itemized showing the analysis of each, number of units of each, and the cost per unit of each?
- _____ Does the ticket for seed show the total pounds purchased, cost per pound, and the purity and germination rates or do you have a copy of the seed ticket from the bag?
- _____ Is the fence built more than 25 feet horizontally from the normal pool water line? **Before bringing in your bills, call the office so a technician can come and measure the fence before you come in.** This will save you another trip to the office to complete your claim.

A Landowner Worksheet will be used to itemize labor, mulch and farm cut hedge posts by the number of each unit and cost per unit. Other fence supply items you might have on hand, such as wire, steel posts, etc, must have a bill showing the cost of the item and the date on the bill does not matter; if these items are put on the landowner worksheet as being on hand, they cannot be paid on for cost-share.

To submit a claim for work not done, work not meeting specifications or to turn in bills for more than the actual cost is a fraudulent claim and cost-share may be denied for the practice.

A maintenance agreement must be signed and notarized when bills are turned in. This agreement insures the maintenance of the practice for its life span and will be recorded after you have received your payment.

These cost-share funds are provided to you from the State Soils and Parks Sales Tax Funds.

Pat (Cox) Lambert, District Manager

Carma Hansel, District Clerk

Harrison County SWCD Board of Supervisors

All NRCS/SWCD programs and services are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.



MISSOURI DEPARTMENT OF NATURAL RESOURCES
SOIL AND WATER DISTRICTS COMMISSION
COST-SHARE ASSISTANCE CONTRACT

1 - HARRISON SWCD
1400 NORTH 41ST STREET
BETHANY, MO 64424
(660)425-7655 EXT. 123

SALING, CHARLES M
3305 SHELEY ROAD
INDEPENDENCE, MO 64052

Contract Number
SN046 001-09-0011

Landowner TIN: XXX-
XX-1450

Legal Owner: [REDACTED]

PRACTICE: DSL-44 TERRACE SYSTEMS WITH TILE

ALLOCATION GROUP: ALLOCATIONS

I (we), the undersigned, do hereby request cost-share assistance to help defray the cost of installing the TERRACE SYSTEMS WITH TILE as listed above. It is understood and agreed that:

1. The TERRACE SYSTEMS WITH TILE installed with cost-share assistance shall be properly maintained.
2. The cooperator acknowledges that to receive payment a Vendor Input Form is required and that a 1099-G form will be issued at the end of the calendar year.
3. Condition of Payment of State Cost-Share Funds: If a practice is removed, altered, or modified so as to lessen its effectiveness without consent of the Soil and Water Conservation District Board of Supervisors for a period of 10 years after the date of receiving payment, SALING, CHARLES M shall refund to the Missouri Soil and Water Districts Commission the state cost-share funds used for the practice. The cooperator(s) that received the cost-share payment remains responsible for the maintenance of the practice upon change of ownership unless the responsibility is transferred with the deed for the property.
4. Right of ingress and egress for the purpose of inspecting construction and maintenance of a practice cost-shared with state funds is hereby granted by the cooperator(s).
5. The cooperator(s) will be notified of any maintenance violation and the board will give a reasonable and fair estimate of time to correct the problem(s). If the violation is not corrected within the specified time, the matter will be referred to the Soil and Water Districts Commission for further action.
6. Should this contract be approved by HARRISON SWCD, the Cooperator(s) will be notified by the district. If the cooperator(s) accepts cost-share assistance, the cooperator(s) will not start the practice prior to board approval of this contract.
7. Providing false information on documents in an effort to receive state cost-share funds is a criminal offense, punishable by fines and/or jail sentences. Discovery of such an offense is prosecutable by the Missouri Attorney General's Office or the local county prosecutor.

COOPERATOR'S SIGNATURE - If someone is authorized to sign for the cooperator(s), the signature entered must include the name of the person signing the form and state that he/she is signing FOR the cooperator(s) (i.e. Frank Operator for Farms, Inc.)

[REDACTED SIGNATURE]

8/27/08
DATE



MISSOURI DEPARTMENT OF NATURAL RESOURCES
SOIL AND WATER DISTRICTS COMMISSION
COST-SHARE ASSISTANCE CONTRACT

1 - HARRISON SWCD
1400 NORTH 41ST STREET
BETHANY, MO 64424
(660)425-7655 EXT: 123

SALING, CHARLES M
3305 SHELEY ROAD
INDEPENDENCE, MO 64052

Contract Number
SN046 001-09-0011

Landowner TIN:
XXX-XX-1450

Legal Owner: [REDACTED]

PRACTICE: DSL-44 - TERRACE SYSTEMS WITH TILE	
ALLOCATION GROUP: ALLOCATIONS	MAXIMUMS: Practice:20000.00

REASON: *2/27/09 is termination date PL wrote board approval by mistake*

LIFE SPAN 10	TERM DATE <i>6/27/08</i>	FARM # 941	TRACT # 2644	CONS PLAN LOC S-36 T-67 R-29	FIELD NUMBERS 1	CLASS/SUBCLASS 3/E	"T" ON FIELD 3
PRE-INSTALL (SR) 12	POST-INSTALL (SR) 2	PRE-INSTALL (G) 0	POST-INSTALL (G) 0	ACRES SERVED 12.00	HUC CODE 10280101-150002	PWSS-P	

COMPONENT	COST / UNIT	EXT APRVD	EST \$	CS %	APRVD AMOUNT
HORIZONTAL OUTLET8IN	\$65.7000 /EA	1.00	\$65.70	75%	\$49.27
PERFCORRPE PIPE 5IN	\$0.8300 /FT	366.00	\$303.78	75%	\$227.83
PERFCORRPE PIPE 6IN	\$1.0700 /FT	860.00	\$920.20	75%	\$690.15
PERFCORRPE PIPE 8IN	\$1.9000 /FT	745.00	\$1,415.50	75%	\$1,061.62
RELIEF WELL 10IN	\$115.2000 /EA	1.00	\$115.20	75%	\$86.40
RELIEF WELL 8IN	\$96.5400 /EA	1.00	\$96.54	75%	\$72.40
RISER 6IN	\$82.7700 /EA	8.00	\$662.16	75%	\$496.62
TERRBRBASEPRUGO	\$1.8700 /LIN FT	1,450.00	\$2,711.50	75%	\$2,033.62
TOPSOILTERR	\$0.5900 /LIN FT	1,450.00	\$855.50	75%	\$641.62
TRENCH/BKFILL < 12IN	\$1.2700 /FT	1,981.00	\$2,515.87	75%	\$1,886.90

SUBTOTAL \$9,661.95 \$7,246.43

Other Funds	MAX COST-SHARE	\$7,246.43
-------------	----------------	------------

TOTAL DISTRICT COST-SHARE OBLIGATION MINUS ANY OTHER FUNDS \$7,246.43

PRACTICE AND QUANTITIES REQUESTED ARE NEEDED, PRACTICAL, AND MINIMUM NECESSARY.	
<i>B. B. [Signature]</i> TECHNICIAN'S SIGNATURE	<i>8-27-08</i> DATE
<i>Andrew Callan</i> CONTRACT APPROVED BY (Board Member)	<i>8/27/08</i> DATE

HARRISON COUNTY SOIL AND WATER CONSERVATION DISTRICT
1400 N 41st Street, Bethany, MO 64424 - Phone (660) 425-7655 #3

Attached is your copy of the approved cost-share application which shows your approval date, termination date, and the amount of funds obligated for this practice. Cost-share funds will be paid only to the landowner. **You have six (6) months or until June 15th (which ever comes first) to complete the practice – no automatic time extensions.** A 30 day extension can be given only if your contractor and/or you are on site and actively working.

LANDOWNER/OPERATOR CHECKLIST TO RECEIVE COST-SHARE PAYMENT

- _____ Before paying the contractor, call the office to see if the contractor has turned in checkout notes for the practice!
- _____ Is the practice completed according to specifications?
- _____ Do all the bills have the vendor's address at the top and the date the components were purchased or work was started?
- _____ Are the bills marked paid and show the check number and date paid? **Effective January 1, 2005, all bills \$500 or more must have a copy of the canceled check, cashier check, money order, picture image, a substitute check, a credit card or debit card receipt (Visa, MasterCard, Etc), or a copy of the statement from the financial institution if the statement includes the date, amount, check number, and who the check or debit was made to. INVOICES IN EXCESS OF \$500 CAN NOT BE PAID IN CASH.**
- _____ Are the bills itemized showing each component unit cost (units include hours, square feet, pounds, feet, cubic yards, acres, site preparation, etc.) and the number of units?
- _____ Are the tickets for Fertilizer and Lime itemized showing the analysis of each, number of units of each, and the cost per unit of each?
- _____ Does the ticket for seed show the total pounds purchased, cost per pound, and the purity and germination rates or do you have a copy of the seed ticket from the bag?
- _____ Is the fence (if applicable) built more than 25 feet horizontally from the normal pool water line? **Before bringing in your bills, call the office so a technician can come and measure the fence before you come in.** This will save you another trip to the office to complete your claim.

A Landowner Worksheet will be used to itemize labor, mulch and farm cut hedge posts by the number of each unit and cost per unit. Other items you might have on hand, such as wire, steel posts, etc, must have a bill showing the cost of the item and the date on the bill does not matter; if these items are put on the landowner worksheet as being on hand, they cannot be paid on for cost-share.

To submit a claim for work not done, work not meeting specifications or to turn in bills for more than the actual cost is a fraudulent claim and cost-share may be denied for the practice.

A maintenance agreement must be signed and notarized when bills are turned in. This agreement insures the maintenance of the practice for its life span and will be recorded after you have received your payment.

These cost-share funds are provided to you from the State Soils and Parks Sales Tax Funds.

Pat (Cox) Lambert, District Manager

Carma Hansel, District Clerk

Harrison County SWCD Board of Supervisors

All NRCS/SWCD programs and services are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.



MISSOURI DEPARTMENT OF NATURAL RESOURCES
 SOIL AND WATER DISTRICTS COMMISSION
COST-SHARE ASSISTANCE APPLICATION

Harrison SWCD
 1400 North 41st Street
 Bethany, MO 64424 (660) 425-7655 Ext 115

Application Number R 1-06-0063



INDEPENDENCE, MO 64052-2667

PRACTICE	DWC-1 WATER IMPOUNDMENT RESERVOIRS
PROJECT	RCS-West Fork

I (we), the undersigned, do hereby request cost-share assistance to help defray the cost of installing the soil erosion control practice as listed above. It is understood and agreed that:

1. SOIL EROSION CONTROL PRACTICE INSTALLED WITH COST-SHARE ASSISTANCE SHALL BE PROPERLY MAINTAINED.

Condition of Payment of State Cost-Share Funds: If a project is removed, altered, or modified so as to lessen its effectiveness without consent of the Soil and Water Conservation District Board of Supervisors for a period of ten (10) years or the expected life of the project, whichever is the lesser, after the date of receiving payment, the landowner(s) shall refund to the Missouri Soil and Water Districts Commission the state cost-share funds used for the project. As this condition will be binding upon heirs, assignees, or other transferees, the landowner(s) understand(s) that before receiving any funds it will be necessary to sign this agreement, which may be recorded in the county where the land is located. This maintenance agreement does not constitute a lien upon property of the landowner, or the landowner's heirs or assignees.

Condition of Payment of State Cost-Share Funds: In the event the Soil and Water Conservation District determines that the maintenance of the cost-shared practices will effect a hardship upon the landowner(s), the District may assume maintenance responsibility. Right of ingress and egress for the purpose of maintenance of a practice cost-shared through state funds is hereby granted by the landowner(s).

2. Terms of cost for which reimbursement is later claimed are to be supported by receipts for payments made to contractors or other workers.
3. The District and/or NRCS shall develop a conservation plan to implement this practice. Should this application be approved, the landowner will be notified by the District. If the landowner accepts State Cost-Share assistance, the landowner will not start the practice prior to board approval of this application.
4. Providing false information on invoices or any other documents in the effort to receive reimbursement of state cost-share funds is a criminal offense, prosecutable by the Missouri Attorney General's Office or the local county prosecutor. Submitting false information on any document in an effort to obtain public funds is punishable by fines and/or jail sentences. Upon discovery of such an offense, the Department of Natural Resources will promptly refer the matter to the Missouri Attorney General's Office for prosecution.

LANDOWNER'S SIGNATURE - If someone is authorized to sign for the landowner, the signature entered **MUST** include the name of the person signing the form and state that he/she is signing FOR the landowner (i.e. Frank Operator for Farmer Farms, Inc.)



DATE 3/17/06



MISSOURI DEPARTMENT OF NATURAL RESOURCES
 SOIL AND WATER DISTRICTS COMMISSION
COST-SHARE ASSISTANCE APPLICATION

Harrison SWCD
 1400 North 41st Street
 Bethany, MO 64424 (660) 425-7655 Ext 115

Application Number **R 1-06-0063**



LANDOWNER TIN

INDEPENDENCE, MO 64052-2667

PRACTICE **DWC-1 WATER IMPOUNDMENT RESERVOIRS**

PROJECT **RCS-West Fork**

REASON

FARM # 0941	TRACT # 2644	ACRES SERVED 1	LIFE SPAN 10	TERMINATION DATE 6/15/06	"T" ON FIELD 5	LAND CAP CLASS / SUBCLASS 3E	
CONSERVATION PLAN LOCATION NE1/4 SE1/4 S36 T67 R29		FIELD NUMBERS 3	PRE-INSTALL (SR) 0	POST-INSTALL (SR) 0	PRE-INSTALL (G) 23	POST-INSTALL (G) 1	

Component	Cost/Unit	Extent Apprvd	Estimated \$	Percent	Not to Exceed
CLEARING -MEDIUM	\$1,000.0000 / ac	1	\$1,000.00	65	\$650.00
EARTHWORK- CY	\$1.2000 / yds^3	2939	\$3,526.80	65	\$2,292.42
FENCE-75% BRDB 9/05	\$0.9700 / ft	1155	\$1,120.35	75	\$840.26
FERT - BLANKET FERT	\$89.3100 / ac	1	\$89.31	65	\$58.05
MULCHING	\$213.4600 / ac	1	\$213.46	65	\$138.75
SEED - CSG CAT PLANT	\$32.7000 / ac	1	\$32.70	65	\$21.26
SEEDBED PREP-SM AREA	\$45.4500 / ac	1	\$45.45	65	\$29.54
SEED-SPREAD SM AREAS	\$26.4800 / ac	1	\$26.48	65	\$17.21
SHUT-OFF VALVE	\$83.0600 / ea	1	\$83.06	65	\$53.99
SPE WATER 1-1/4 INCH	\$0.8000 / ft	150	\$120.00	65	\$78.00
SS PIPE - 6 INCH	\$5.3000 / ft	75	\$397.50	65	\$258.38
STEEL PLATE 3/16 IN	\$6.0300 / ft	24.5	\$147.74	65	\$96.03
SUBTOTAL			\$6,802.85		\$4,533.89

Other Funds	MAX COST-SHARE \$	\$4,533.89
TOTAL DISTRICT COST-SHARE OBLIGATION MINUS ANY OTHER FUNDS		\$4,533.89

PRACTICE AND QUANTITIES REQUESTED ARE NEEDED AND PRACTICAL, AND ARE OF MINIMUM EXTENT TO CONTROL EROSION.

TECHNICIAN'S SIGNATURE: *B. Boring* DATE _____

APPLICATION APPROVED BY: *Hobart Wells* DATE 3-17-06

Producer Farm Production History

Date	What Done	Yield	Notes
01-May-05	50/20/20		
01-May-05	roundup burn, spartan	44,4.2/acre	
01-Jun-05	plant sunflowers	8 bags	270/8377ns
01-Oct-05	harvest sunflowers	1164/acre	
06-Jan-06	lime (enm 436)	3.2 ton/acre	
07-Feb-06	Melvin ok'd disc & oats		
15-Mar-06	plant oats	2.5/acre	
05-Jun-06	2-4d spray	2.5 gal	
15-Jun-06	new pond		
10-May-06	50-0-0		
15-Jul-06	harvest oats	53.8/acre	
07-Aug-06	60-30-60		
21-Aug-06	burndown w/ buccaneer	40 gal	
22-Sep-06	plant Fescue	5 lbs/ acre	
01-Jan-07	rowed fescue no yield		
01-Jun-08	fescue contaminated by cattle no seed only hay		
01-Nov-08	terraces installed		
01-Jan-09	soybeans 67 acres		
01-May-10	2-4d spray		
01-Jan-10	soybeans 128 acres / netties	25/acre	
01-Jan-11	soybeans 67acres		
01-May-11	2-4d spray		
17-Jun-11	planted warm season grass for prarie chicken		
29-Aug-11	purchase neddies		
15-Nov-11	151.17 tons of lime (enm 368)	2.28/acre	66.2 acres
18-Nov-11	planted warm season grass for BCAP		
20-Jan-12	26.17 tons of lime (enm 368)	.395/ acre	66.2 acres

Appendix G

Growing Excellence Field Testing Findings

**A Progress Report
from
Growing Excellence Inc.**

**Survey Feedback from U.S. Forest Landowners
CSBP Draft Standard**

April 2012



Introduction

While Growing Excellence continues to complete landowner/grower surveys regarding the applicability of the CSBP Standard to forestry based biomass production for biofuels, there are already some clear trends developing from the initial woody crop landowner surveys. The purpose of this progress report is to describe the landowner survey process and discuss the preliminary results.

Executive Summary

Growing Excellence and its team of supporting consultants has interviewed and gathered feedback regarding the CSBP draft certification standard from a broad group of FSC and/or SFI certified landowners in the US South and Pacific Northwest regions. These landowners are generally supportive of the general concept and architecture of the CSBP objectives and the principles. However, based on the extensive operational experience with forest certification, these landowners have also offered a number of significant improvements to the CSBP standard. These suggestions align into four general areas.

Utilize the Desired Results Approach. Forest landowners are more familiar with a certification process that identifies the desired results with the expectation that the landowner will find the appropriate means for achieving those results. This approach supports a national certification standard as it recognizes the diverse range of ecosystems, landowner objectives and operational situations. Much of the prescriptive language in the current CSBP standard should be removed and replaced with CSBP's desired results.

Provide Supporting Materials. As forest landowners evaluate the costs and benefits of complying with the CSBP standard and seeking certification, they want a better understanding of the technical aspects of the standard. Supporting materials such as more detailed references, case studies, examples, guidance documents and similar materials should be provided. This is especially needed for small acreage landowners who generally do not have any technical staff supporting their operations.

Focus on Legal Compliance. All forest landowners and especially those involved in forest certification are focused on compliance with the applicable state and federal laws and regulations. Landowners found legal compliance verbiage in many of the principles and suggested those references be consolidated into a single principle. They also strongly recommended that prescriptive requirements that exceed current laws and regulations should be removed, as they will discourage participation in the CSBP program.

Support Biomass Use of Residuals. Nearly 100% of the current biomass input from forest landowners is residuals from either manufacturing or harvesting processes. This is even true with high intensity short rotation tree plantations. While some forest landowners are considering or perhaps experimenting with woody crops for biomass production, the current direction of excluding such residuals from the CSBP program will likely discourage nearly all forest landowners from seeking CSBP certification. The oft-

asked question is “Why would I spend the time and money to get CSBP certification when it will not apply to 99% of my biomass production?”

Project Objectives

On behalf of the CSBP, Growing Excellence, Inc. is recruiting and interviewing a sample of large and small landowners who are experienced in forest certification processes. Landowners are being selected from within each of the major working forest regions of the United States including the South, Pacific Northwest, and upper Midwest. Collectively, these regions represent over 80% of the existing woody biomass production in the United States¹. As of 2011, woody biomass from forest based residuals represents over 57% of biomass consumed in the U.S.²

While there is over 492 million acres of forestlands in the United States certified to one of three programs, the majority of forest landowners do not participate in a recognized forest certification program. However, for the purposes of this project, the decision was to recruit and engage landowners highly familiar with one or more of the forest certification programs including Forest Stewardship Council (FSC), Sustainable Forestry Initiative (SFI) or the American Tree Farm (ATF) standards. This familiarity greatly increases the respondent’s initial understanding of the CSBP standard objectives, structure and terminology. The project’s initial project sample design recruits landowners as detailed below.

Southern United States

Large landowners – 3

Landowners engaged or potentially engaged in forest interplantings - 1

Small landowners – 3

Pacific Northwest

Large landowners including one existing short rotation woody crop grower - 2

Landowner engaged or potentially engaged in forest interplantings - 1

Small landowners – 2

Northeast and Lake States

Large landowner - 1

Small landowners - 2

Most, but not all, landowners have been identified with interviews either completed or scheduled. We are still seeking several landowners in the Northeast and Lake States.

Fortuitously, the majority of recruited landowners currently market woody biomass as residues from their existing forest crop harvesting operations. Thus, these landowners

¹ U.S. Billion-Ton Update: Biomass Supply for a Bioenergy and Bioproducts Industry
A Study Sponsored by U.S. Department of Energy, Energy Efficiency and Renewable Energy Office of the Biomass Program August 2011

² U.S. Billion-Ton Update: Biomass Supply for a Bioenergy and Bioproducts Industry
A Study Sponsored by U.S. Department of Energy, Energy Efficiency and Renewable Energy Office of the Biomass Program August 2011

are very familiar with current regional biomass markets and emerging biomass market opportunities. The majority of interviewed landowners are experimenting with different biomass crops and management regimes. As the economics of biomass cropping become profitable, they will consider allocating small acreages to biomass production.

The primary objective of this phase of the project is to solicit landowner feedback on the draft CSBP standard regarding:

- ❖ Structure
- ❖ Clarity
- ❖ Terminology
- ❖ Appropriateness and acceptability of principles and implementation criteria
- ❖ Recommended changes, i.e. improved references and implementation tools
- ❖ Challenges to implementation

Project Methodology

Prior to a formal face-to-face interview, each landowner is sent an introductory letter providing background on the CSBP objectives and programs³. In addition, the draft standard as found on the CSBP website is also provided accompanied by the January 2012 forestry draft short version of the standard. Landowners are also asked to “assume” for the purposes of this interview that they are able to sustainably and profitably grow biomass crops currently. In advance of the interview, each landowner is also provided with a structured questionnaire⁴ to frame the interview. The questionnaire design is based on standard “indifference testing” often used in market research in evaluating the diversity of responses from well-informed respondents. This is often more “enlightening” than simply averaging responses to questions.

For each component of the draft CSBP forestry standard, landowners are asked to address the four following interrelated questions.

1. *How would you define the clarity of purpose and language used for this requirement? Are you able to read this requirement and understand what is required? (U1-U10) U1 = Very unclear or not understandable U10 = Clear and understandable.*
2. *Do you already meet this requirement as part of your current land management program? (M1-M10) M1 = No part of requirement currently met M10 = All of requirement currently met.*
3. *Relevant to your land ownership and operations, what is your assessment of the current availability of information needed to meet this requirement? Do you currently have access to information or believe you could easily find it or do you think the information will be difficult to obtain? (I1-I10) I1 = Largely unavailable I10 = Completely available.*
4. *How would you evaluate the time, difficulty and costs to assemble the required plans and information needed to meet this requirement? (C1-C10) C1 = potentially prohibitive C10 = minimal and affordable*

³ Appendix One

⁴ Appendix One

Each landowner is asked to review the questionnaire in advance, but to not complete the questionnaire until the time of the interview so that the Growing Excellence interviewer can address any questions prior to the landowner providing their final rankings and recommendations. Landowners are also encouraged to provide recommended revisions to the standard and to provide explanations for serious objections to principles, criteria and/or implementation tools.

Evaluation of Landowner Questionnaire Rankings

In order to evaluate the true diversity of responses to each section, the following ranking tables were developed for the consolidated sample of landowners and for each of the four key questions.

The following tables highlight the “key opportunities for improvement of the CSBP standard” for seven Southern and PNW large and small landowners. NOTE: These are preliminary results that will be updated at the completion of the forest landowner interviews.

Table One. Clarity and Understanding (numbers of respondents)

Clarity and Understanding	Rankings										
	0	1	2	3	4	5	6	7	8	9	10
Principle/Criteria											
1.3.0 - IRMP	1			2				2	1		1
2.0.0 - Soils				1	2				2		2
2.1.0				1	3				1		2
2.6.0	2	3		1					1		
2.7.0	1	4						1	1		
3.0.0 - Biodiversity	1	3	1				1	1			
6.0.0 - Socio Econ.	2	1						1			3
6.2.0	2				1				1		3
6.2.1	3							1	1	1	1
8.0.0 -Transparency		2			1		1			1	2

Table Two. Current Management Practices Meet Requirements (numbers of respondents)

Current Management Practices Meet Requirement	Rankings										
	0	1	2	3	4	5	6	7	8	9	10
Principle/Criteria											
1.3.1 IRMP		2			1				3		1
2.6.0 Soils	2	2		1					2		
2.7.0	2	2	1			1	1				
3.2.3 Biodiversity		4							1	1	1
3.3.3	1					3			1	1	1
4.1.0 Water	1	3	1						1	1	
4.2.0	2	3				1			1		
4.3.0		3	1			1		1	1		
5.1.0 Climate	1	4		1					1		
5.1.1	1	4		1					1		
5.2.0	1	4		1					1		
5.3.0	1	4		1					1		
5.4.0	1	4		1					1		
5.5.0	1	4		1					1		
6.0.0 Socio-Econ	3	1							1		2
6.1.0	3								1	1	2
6.1.1	2	1							1	1	2
6.2.0	3							1		1	2
6.2.1	4								2		1
6.2.2	4	2	1								
6.2.3	3								1		3
6.3.0	2								1		4
6.3.1	3								1	2	1
6.3.2	3						1		1		2
6.3.3	3								1	1	2
6.3.4	3					1			1		2
6.3.5	3								1	1	2
6.3.6	3								1		3
6.4.0	4	1									2
6.4.1	3	1									3
8.1.1 Transparency		2				1			1		3

Table Three. Access to Information

Access to Information	Rankings										
	0	1	2	3	4	5	6	7	8	9	10
Principle/Criteria											
2.0.0 Soils	1		1	2	1	1			1		
2.1.0	1	1		2	1				2		
2.1.1		1		1		1			1	2	1
2.6.0	4	1				1		1			
2.7.0	2	3		1			1				
3.0.0 Biodiversity		2				2			2		1
3.1.0		2			1	2			1	1	
3.3.2	3				1			1			2
4.1.0 Water	2	2				1				2	
4.2.0	1	4			1		1				
4.3.0		4			1		1			1	
4.6.4	1	1		1		2			2		
5.1.0 Climate		2		1		1			1	2	
5.1.1		2		1		2	1			1	
5.2.0		2		1		2	1	1			
5.3.0		2		1		2	1	1			
5.4.0		2		1		2	1	1			
5.5.0		2		1		2	1		1		
6.0.0 Socio-Econ	3	1				1		1			1
6.0.0	3	1				1		1			1
6.1.0	2						1	1			3
6.1.1	3							1		1	2
6.2.0	3								2		2
6.2.1	4								2	1	
6.2.2	3								2		2
6.2.3	3								1	1	2
6.3.0	3								1		3
6.3.1	3								1	2	1
6.3.2	3								2		2
6.3.3	3								1	1	2
6.3.4	3								2		2
6.3.5	3								1	1	2
6.3.6	3								1		3
6.4.0	3		1					1			2
6.4.1	3		1					1			2
9.1.1 Improvement	3						1		1		2

Table Four. Implementation Time and Cost

Time and Cost to Implement	Rankings										
	0	1	2	3	4	5	6	7	8	9	10
Principle/Criteria											
1.1.1 IRMP			2			2	1		1		1
1.3.0	1			1		2		1	1		1
1.3.1	1		1		1	1	1	1			1
1.3.2	1		1		1	1		1	1	1	
2.0.0 Soils	3	1			1		1				1
2.1.0	3	1			1		1				1
2.1.1	2	2				1		1	1		
2.5.0	1	1	1	2							2
2.6.0	5			1		1					
2.7.0	4	2				1					
3.0.0 Biodiversity	2	1	1	1						1	1
3.1.0	2	1	2		1					1	
3.1.1		1		2		2	1				1
3.1.2		1			1	1		1	2		1
3.1.3		1	1		1				1	1	2
3.3.1	2			1					1	2	1
3.3.2	3	1								1	2
3.3.3	1	1	1			1		1	2		
4.1.0 Water	2					2			2	1	
4.2.0	3	1				3					
4.3.0	2	1			1	2					1
4.4.0	1					2	1			1	2
4.5.0				1		3			1	1	1
4.6.2	1	1	1	1			1				2
4.6.3	1	2	1	1			1				1
4.6.4	1	2	1			1	1				1
4.6.5	1	2						1			3
5.1.0 Climate	1	3			1			1		1	
5.1.1	1	3			1			1		1	
5.2.0	1	3			1			1	1		
5.3.0	1	3			1			1	1		
5.4.0	1	3			1			1	1		
5.5.0	1	3			1			2			
6.0.0 Socio-Econ	3							1			3
6.1.0	3					1		1			2

6.1.1	2	1				1			1	2
6.2.0	3			1			1			2
6.2.1	3	1						1		2
6.2.2	3	1	1							2
6.2.3	3	1						1		2
6.3.0	3	1						1		2
6.3.1	3		1					1	1	1
6.3.2	3			1			1			2
6.3.3	2		1				1			3
6.3.4	3			1				1		2
6.3.5	3		1			1			1	1
6.3.6	3							1	1	2
6.4.0	4					1				2
6.4.1	4					1				2
9.1.0 Improvement	2				1	1				3
9.1.1	2				1		1	1		2

Key Results.

While the landowner interviews are still underway, it is evident that landowners had significant issues with specific components of the draft standard when low (zero to three) rankings were recorded. Conversely, high rankings of eight through ten indicate a trend of clear understanding and applicability to current operations. To date, size of ownership and familiarity with forest certification have not been a factor in forest landowner responses. The following is a preliminary review of emerging trends identified in the landowner interviews.

PRINCIPLE 1. Integrated Resource Management Planning

This principal is generally understood by interviewed landowners and can be fully implemented as most factors are addressed in current management planning process.

PRINCIPLE 2. Soil

The technical references in this principle are not generally applicable to forest operations and the costs of monitoring are seen as significant. Forest landowner concerns regarding this principle are reflected in across the board low rankings.

PRINCIPLE 3. Biodiversity

Interviewed forest landowners are very concerned with the inclusion of G3 and S1 to S3 species in this principle as the CSBP criteria exceed any similar provisions in forest certification programs. There are no limitations or guidance for identifying species listed in state wildlife action plans and the lack of effective protocols for identifying and surveyed these species will have a significant impact on implementation costs. The provisions regarding invasive species could be problematic for some growers who may grow biomass crops that may be considered “invasive”. The lack of a completed Appendix C resulted in some questions and confusion.

PRINCIPLE 4. Water

Interviewed forest landowners found these measures to be clear and, in most circumstances, already being implemented through the application of state water quality standards and compliance with forest certification standards. Some of the terms reflect an agricultural perspective and are likely not applicable to forest operations. In addition, the treatment of irrigation and drainage systems as compared to natural waterways is not clear. Some provisions appear to be redundant, i.e. e. pesticide use is covered in several principles and legal compliance is raised in several principles in addition to being Principle 7.

PRINCIPLE 5. Climate Change

The life cycle analysis element would likely be cost prohibitive for many forest landowners. Expectations are unclear, sampling protocols are unknown and most forest landowners have no background in life cycle analysis.

PRINCIPLE 6. Socio-Economic Well-Being

The principle is focused on employees, but many forest landowners use contractors so the clarity and applicability of this principle is not understood. Compliance with applicable US and state laws should be sufficient for compliance. Does CSBP have some expectations beyond current law?

PRINCIPLE 7. Knowledge of Law

Interviewed forest landowners are knowledgeable of applicable laws and regulations and have management systems the detail responsibility for compliance to operations managers.

PRINCIPLE 8. Transparency

If transparency within the CSBP program is equivalent to similar requirements for the forest certification programs, then forest landowners have few issues with this principle. If the CSBP have a differing view on transparency dealing with landowner financial information, chemical use reporting, company specific data and/or proprietary information, then additional information should be provided.

PRINCIPLE 9. Continuous Improvement

Interviewed forest landowners are fully supportive of improving their operations. However, landowners should have the final decision on what changes, if any, are to be implemented. Landowners were also interested in how growers would be afforded the opportunity to help the CSBP improve their standard over time.

Preliminary Landowner Recommendations

While the landowner interviews are still underway, a preliminary list of recommended actions has surfaced.

PRINCIPLE 1. Integrated Resource Management Planning

It would be helpful to have an introductory section that identifies the structure of the CSBP standard and the numbering system. It would benefit those seeking certification to have a CSBP standard structured similar to major forest certification systems.

PRINCIPLE 2. Soil

Forest landowners would be more able to understand CSBP expectations if the terminology and measures were applicable to forestry operations. CSBP should consider re-evaluating monitoring measures as they appear to be prohibitively expensive.

PRINCIPLE 3. Biodiversity

Have the CSBP standard provisions covering biodiversity more closely align with similar provisions for the forest certification programs. Defining terms such as “eco-regional” would be helpful.

PRINCIPLE 4. Water

Clarifying the treatment of irrigation and drainage systems and providing terminology applicable to forestlands operations within the principle would be helpful. CSBP should consider re-evaluating monitoring measures as they appear to be very costly.

PRINCIPLE 5. Climate Change

It would be very helpful to have a set of guidelines, lookup tables, case studies and similar tools to assist forest landowners in complying with this principle.

PRINCIPLE 6. Socio-Economic Well-Being

If the expectation is compliance with federal and state laws, then clearly state that position and include this as part of Principle 7 rather than listing specific measures. If something beyond compliance with applicable laws is expected, then make that statement and provide justification. Contractors should be included.

PRINCIPLE 7. Knowledge of Law

Modify the language to have the growers and operations managers rather than employees as the focal of point for compliance.

PRINCIPLE 8. Transparency

It would be helpful if the CSBP view of transparency were fully aligned with similar provisions in the forest certification programs. An outline of a summary report for public release would be a good tool. Forest landowner approval should be a requirement for the release of any information.

PRINCIPLE 9. Continuous Improvement

A process for establishing a baseline for some key indicators may be helpful in assessing improvements. The principle should clearly state that landowners have the final decision on what improvements are to be implemented and when and how they will be implemented.

Preliminary Growing Excellence Findings

Both large and small forest landowners who have experience with forest certification generally understand the CSBP initiative and proposed certification program objectives and principles. In many cases these landowners are currently marketing woody biomass from forest residues. However, as noted by landowners and outlined above, if the program is to successfully recruit and certify both large and small forest landowners, there are numerous and meaningful improvements necessary to the standard itself and the supporting implementation, education and training processes.

Our preliminary observations and comments focus on the strategic opportunities and challenges for the Council.

1. It is important to all private forest landowners that the CSBP standard encompasses woody biomass produced as residuals from sustainably grown and often certified sawlog and pulpwood crops. Purposely excluding such residuals presents the forest landowner with the dilemma of investing in CSBP certification for what is foreseeably likely to be 10% or less of their woody biomass production. From our review of the current situation, few, if any, forest landowners will likely opt into the CSBP program if forest residuals are not included.
2. Certification programs are more than the written standard. When the CSBP launches its certification program later this year, success will largely depend upon the program training and educational support programs provided to landowners.
3. Given the marginal profitability of growing woody biomass, growers will focus on the costs as compared to the benefits of CSBP certification. Many of the uncertainties of forest landowners relating to implementing the standard can be readily overcome by providing descriptions of the implementation criteria and simple to understand case studies and similar tools to describe procedures and expected time and financial investments necessary to provide compliance.
4. Smaller (less than 1000 acres) non-industrial private forest landowners and uncertified forest landowners will require greater recruiting and educational efforts. Targeting state and regional level family forest associations, state agencies and consulting foresters may be the most efficient and effective way to market the CSBP program to this very large landowner category.
5. The CSBP have proposed a national standard. Therefore, the standard should recognize a broad range of land ownership categories, eco-regions and biomass cropping operating environments. Wherever possible, implementation criteria should focus on results rather than prescriptive monitoring requirements with the suitability of monitoring processes determined by program auditors on an ownership-by-ownership basis.

Appendix One

CSBP Biomass Draft Certification Standard Potential Woody Crop Grower Feedback Questionnaire

Introduction:

The Council on Sustainable Biomass Production has recently completed a draft biomass voluntary certification standard for review by potential agricultural and woody crop biomass growers. The following questionnaire has been developed as part of a nationwide approach to potential Woody biomass crop growers to solicit their specific feedback and recommendations in regards to the draft standards stated principles and implementation criteria. As a potential grower, your inputs are greatly appreciated and will be *essential* in developing final revisions to the standard. In addition to your input, large and small acreage potential growers have been solicited in the US South, upper Midwest and the Pacific Northwest. Any and all information that you provide will be kept strictly confidential as to its source.

The CSBP intends to officially launch the certification program later this summer. The success of this program is highly dependent upon potential participant's clear understanding of the programs:

- ⑩ Potential strategic merits and value of the certification program
- ⑩ Clarity and understanding of the standard's requirements
- ⑩ Perceptions of participation costs and risks

Currently, growing of woody crops primarily for biomass at today's energy prices remains a somewhat questionable business in many parts of the country.

However, for the purposes of this questionnaire we would ask the growers to make the assumption that growing woody crops partially or primarily for biomass is a profitable enterprise for a portion of their lands.

Prior to our proposed interview with you or your staff we highly recommend you invest about 30 min. of your time to look through the council's website (www.csbp.org) which fully describes the Council membership mission and objectives.

Growers Questionnaire:

Below, in abbreviated format, growers will find the CSBP draft standard language for the principles and implementation criteria. Growers are asked, after reading through the draft standard, to use the following ranking questions to score how your organization feels about each of the principles and implementation criteria.

Grower Rating Questions -

How would you define the clarity of purpose and language used for this requirement? Are you able to read this requirement and understand what you are required to do? (U1-U10) U1 = Very unclear or understandable U10 = Clear and Understandable

Do you already meet this requirement as part of your current land management program? (M1-M10) M1 = No part of requirement currently met M10 = All of requirement currently met

What is your assessment of the current availability of information needed to meet this requirement, relevant to your land ownership and operations? Do you currently have access to information or believe you could easily find it, or do you think the information will be difficult to obtain? (I1-I10) I1 = Largely unavailable I10 = Completely available

How would you evaluate the time, difficulty, and costs to assemble the required plans and information needed to meet this requirement? (C1-C10) C1 = potentially prohibitive C10 = minimal and affordable

Not Applicable to Your Operations = N/A

Example grower ranking:

1.1.1 IMPLEMENTATION

Program participant develops a timetable to implement management actions, and establishes a corresponding system for documenting implementation.

Potential Growers Multiple Rankings
Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)
U9, M4, I7, C3

Your scores will be combined with other similar regional and acreage potential growers. Growers are asked to please avoid using the “not applicable” ranking wherever possible.

Also please remember we strongly advise to not fill out the questionnaire until the Growing Excellence team are with you to address any questions you have about the standard, the initiatives objectives and the overall program recruitment process.

Growers will also have the opportunity to provide specific detailed recommendations, concerns and opportunities before during or after the interview.

1 DRAFT PRINCIPLES, CRITERIA, AND INDICATORS FOR FORESTRY

1 PRINCIPLE 1 – INTEGRATED RESOURCE MANAGEMENT PLANNING

Biomass production shall be based on an integrated resource management plan that shall be completed, implemented, monitored and updated to address objectives of the CSBP standard, appropriate to the scale and intensity of the operation.

1.1 ASSESSMENT

Conduct an assessment.

1.1.1 BASELINE INFORMATION

Program participant compiles and evaluates baseline information on existing conditions within, at a minimum, the area proposed for certification to inform decisions about resource goals and land management options.

IMPLEMENTATION: Assessments typically include a compilation of information on crop production and management including rotation management activities, soils, natural vegetation cover, rare species and communities, existing wildlife habitats and aquatic ecosystems, legal or contractual use requirements and past and current land and water conservation activities. This information may pertain solely to the area proposed for certification or to a larger planning landscape that provides context for the area of interest. Given an understanding of expectations for certification, An assessment shall identify local factors that may influence options for biomass

production as well as opportunities for integrating biodiversity conservation and wildlife habitat considerations into production goals.

For further indicators and implementation guidance regarding assessment, see the following:

2.1.S1 Soil assessment and monitoring

3.1.S1 Assess habitat

3.1. S4 Control of Non-Crop Invasive Species

3.2.S1 Assessment of biomass crops

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.2 OBJECTIVES

Identify management objectives.

1.1.1 ESTABLISH OBJECTIVES

Program participant, using information developed during the assessment process, determines their priorities and describes management objectives and options for the area proposed for certification and for production, taking into account landscape factors as appropriate.

IMPLEMENTATION: Certification criteria and indicators of the CSBP standard shall be addressed as appropriate for the area proposed for certification and the scale and intensity of the operation, at either the silver or gold level. As program participant priorities are established, consider significant issues and opportunities related to sustainability of biomass production and conservation of biodiversity and wildlife habitat. Certification indicators provide a structure for evaluating management practices, to identify potential conflicts, and to optimize achievement of management objectives. Explore opportunities to avoid, minimize, or mitigate environmental impacts during this phase.

For further indicators and implementation guidance regarding establishment of management objectives, see the following:

2.1.S1 Soil assessment and monitoring

2.1.S2 Soil nutrient and conservation planning

3.1.S4 and S3 Rare, threatened and endangered wildlife and biodiversity

3.1.S4 Control of Non-Crop Invasive Species

3.2.S3 Crop spread

4.1.S1 Integrated Resource Management Planning (Water Quality)

4.2.S1 Water management plan (Water Quantity)

4.3.S1 Integrated resource management plan (Aquatic Ecosystems)

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.3 MANAGEMENT PLAN

Develop and implement a plan.

For further indicators and implementation guidance regarding establishment of management objectives, see the following:

- 2.1.S1 Soil assessment and monitoring
- 2.1.S2 Soil nutrient and conservation planning
- 3.1.S4S3 Rare, threatened and endangered wildlife and biodiversity
- 3.1.S4 Control of Non-Crop Invasive Species
- 3.2.S3 Crop spread

- 4.1.S1 Integrated Resource Management Planning (Water Quality)
- 4.2.S1 Water management plan (Water Quantity)
- 4.3.S1 Integrated resource management plan (Aquatic Ecosystems)

Potential Growers Multiple Rankings
Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.1 MANAGEMENT PLANNING

Program participant develops specific land management actions for each mapped production area, soil type, and vegetation cover type within the area proposed for certification.

IMPLEMENTATION: Depending upon the scope of the plan, management actions may be described for a larger planning landscape.

Potential Growers Multiple Rankings
Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.2 IMPLEMENTATION

Program participant develops a timetable to implement management actions, and establishes a corresponding system for documenting implementation.

Potential Growers Multiple Rankings
Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.3 MONITORING

Program participant continually monitors and documents specific management practices in order to ensure that management objectives are being met.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.4 ADAPTIVE MANAGEMENT

Program participant adapts plans as needed to changing conditions.

IMPLEMENTATION: To monitor and document the results of implementation over time, the plan shall identify relevant crop and natural resource measures and other indicators, including those used in the standard to assess achievement of certification criteria. The program participant also shall use those measures to identify improvement opportunities and adjust the management plan accordingly.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.5 REVIEW

Management plans are comprehensively reviewed by program participant at least every five years and updated as needed.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

2 PRINCIPLE 2 – SOIL

Biomass production shall maintain or improve soil quality by minimizing erosion, enhancing soil carbon sequestration, and promoting healthy biological systems and chemical and physical properties.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1 MAINTAIN OR IMPROVE SOIL HEALTH

Minimize erosion and maintain soil carbon and nutrients at appropriate levels, as well as the overall physical, chemical and biological properties of the soil.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.1 SOIL ASSESSMENT AND MONITORING

Program participant assesses and monitors nutrient levels of the soil or plants and soil capabilities guide management decisions. and activities.

(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 Management Plan.)

IMPLEMENTATION:

Soil assessment shall be conducted at the level of the area proposed for certification and include use of data from soils maps where available. Soils shall be tested periodically for organic matter and for nitrogen, phosphorus and other nutrients relevant to local resource concerns. Management decisions shall be based on soil capabilities in selection of species or crops, appropriate cultural practices, expected yields, and erosion control.

Potential Growers Multiple Rankings
Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.2 SOIL NUTRIENT AND CONSERVATION PLANNING

Program participant conserves soil and maintains its productivity through an integrated resource management plan and for operations on forestland complies with state forest practice regulations and utilizes state best management practices.

(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 Management Plan.)

IMPLEMENTATION: Agricultural program participants shall use planning protocols supported by the Natural Resource Conservation Service (NRCS) Conservation Planning process [and for operations on forestland complies with State best management practices.](#)

Nutrients shall be managed to reduce loss off site to air and water.

Potential Growers Multiple Rankings
Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.3 RESIDUE REMOVAL

Program participant retains biomass materials required for erosion control and soil fertility.

IMPLEMENTATION: The use of agricultural and forest residues shall not be at the expense of long-term soil productivity, stability, health and organic matter content.

Potential Growers Multiple Rankings
Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.4 COMPACTION

Program participant identifies soils vulnerable to compaction and uses appropriate methods to reduce compaction if necessary and maintain site productivity.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10);
Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.5 ROAD CONSTRUCTION

Program participant limits field travel zones or paths as needed to meet management objectives.

IMPLEMENTATION: Temporary field travel zones or paths should be used when practical and consistent with management objectives, and should be closed and rehabilitated when operations are complete.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10);
Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.6 EROSION

For agricultural operations, score less than or equal to T on RUSLE-II, with recognition of variances for extreme weather events or upgrades to on-farm conservation systems.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10);
Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.7 SOIL CARBON

Program participant maintains or improves soil carbon levels.

IMPLEMENTATION:

A zero or positive score on the Soil Conditioning Index shall be considered an adequate proxy for maintaining or improving soil carbon content.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10);
Availability of Information (I1-I10); Time/Costs (C1-C10)

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3 PRINCIPLE 3 – BIOLOGICAL DIVERSITY

Biomass production shall contribute to the maintenance or enhancement of biological diversity, in particular native plants and wildlife.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1 BIODIVERSITY

Ensure that biomass production systems support native biodiversity both on-site and at an eco-regional level.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.1 ASSESSMENT OF WILDLIFE HABITAT

To support effective management planning, program participant assesses vegetation cover types and wildlife habitats on enrolled acres and associated incidental areas and, where credible data are available, across the landscape. (Component of Principle 1: Integrated Resources Management Planning, 1.1 Assessment.)

IMPLEMENTATION: Specifications for assessment: The assessment shall be appropriate to the scale of the area proposed for certification and intensity of the operation and conducted prior to the commencement of site-disturbing operations. The assessment must be conducted during the “enrollment period.” The prior condition of vegetation and habitat immediately prior to program enrollment shall be considered in both the assessment and management planning. The assessment shall include, but not necessarily be limited to, information on known occurrences of rare, threatened, and endangered species and communities* and, important wildlife species and habitats identified in state wildlife action plans. (For assistance program participants should contact their State fish and wildlife agency’s private lands division, State Natural Resources Conservation Service, state US Fish and Wildlife Service, office University Extension Wildlife specialists/staff, Wildlife Conservation Organizations, or private wildlife consultants). For operations on forestland the assessment should include a review of the potential impacts of biomass crop production on wildlife species at the stand level. Findings of the assessment shall be documented and incorporated into planning and management activities.

*Footnote: Rare, threatened and endangered species and communities shall include species listed as endangered or threatened by the US Endangered Species Act; species and communities considered critically imperiled, imperiled, or vulnerable by NatureServe and Natural Heritage programs; and important wildlife species and habitats identified in regional, state, or national conservation plans (e.g., state wildlife action plans, conservation organization eco-regional conservation plans).

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.2 HABITATS AND THEIR WILDLIFE VALUES

Program participant develops and implements practices that contribute to the conservation of vegetation and wildlife and minimize the effects of their operations on wildlife habitat.

IMPLEMENTATION: Practices to be adopted appropriate to scale of the operation and effect on the resource: Agricultural cropping systems shall conserve habitat of native wildlife and plants significant to maintenance of biological diversity. Program participants shall utilize diversity of feedstock within a stand as appropriate to provide structural habitat that supports native wildlife. Agricultural operations shall avoid harvesting during wildlife nesting, calving, fawning, and brood-rearing seasons by adhering to local primary nesting and fawning/calving season dates. Program participants shall retain sufficient vegetative cover for wildlife inhabiting their biomass fields (e.g. leaving stubble on the field, leaving strips of unharvested biomass, and/or other effective practices).Disruptive mechanical

operations (such as, but not limited to, mowing, discing, and harvesting) shall be timed to minimize impacts on wildlife, especially during critical reproduction and migratory periods.

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.3 RARE, THREATENED, AND ENDANGERED WILDLIFE AND BIODIVERSITY

Program participant develops and implements practices to protect rare, threatened and endangered wildlife and biodiversity appropriate to the scale and intensity of the operation.

(Component of Principle 1: Integrated Resource Management Planning, 1.2 Objectives, and 1.3 Management Plan.)

IMPLEMENTATION: Management plans shall include measures needed to protect rare, threatened and endangered species (see footnote * above) as well as biodiversity.. Plans and activities shall be developed in consultation with resource agencies, conservation organizations, or expert professionals (who may be employees of the program participant), and shall include mapping, cataloging, and monitoring of biodiversity elements, as well as the design and adoption of set-asides, buffers, corridors, conservation management treatments, or other appropriate strategies to achieve conservation objectives identified in the IRMP and biodiversity protection.

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.4 CONTROL OF NON-CROP INVASIVE SPECIES

Program participant adopts conservation practices related to control of non-crop invasive species (e.g., those not intentionally planted) on biomass production acres. If invasive species are observed, program participant includes in the IRMP a strategy to manage them.

(Component of Principle 1: Integrated Resource Management Planning, 1.2 Objectives, and 1.3 Management Plan.)

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.2 AVOIDING INTRODUCTION OF INVASIVE FEESTOCK SPECIES

Avoid introduction or production of an energy crop that is potentially invasive in the target region and that may disrupt biodiversity on an eco-regional scale.

IMPLEMENTATION: An important role in avoiding the introduction of invasive species is that of the seed or cultivar developer and feedstock consumer specifying which crops should be grown. A crop will not be deemed to be "introduced" if it is already in production at a reasonable scale in the target region for similar purposes (e.g., biomass production for pulp), and not been found to be invasive.

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.1 ASSESSMENT OF INVASIVENESS

Program participant does not utilize species that are known to be invasive or are potentially invasive in the relevant eco-region. Prior to planting, an assessment is completed by a suitable 3rd party (e.g., crop developer, academic scientist, government agency).

(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment.)

IMPLEMENTATION: The following decision methodology will be used to determine whether a species is known to be invasive or potentially invasive in the target region.

- A feedstock crop would be “known to be invasive” in the target region if it appears on a list for that target region compiled by a scientifically credible national, state, or county authority, and would therefore not be eligible for certification.
- A feedstock crop will not require assessment for invasiveness if the crop has been grown at a reasonable scale for similar purposes in the target region and not been found to be invasive.
- If the crop is not “known to be invasive” in the target eco-region, but has not previously been grown in the target region or is a variety that includes characteristics beyond the known range of the species, then it will be evaluated to determine if it is “potentially invasive” in the target region. Such evaluation may include a published, peer-reviewed, and validated tool (at this time, the Australian Weed Risk Assessment is the only such tool available) or other methods provided that the input data and results are scientifically credible and are made generally available for review. If the results of the assessment determine that the crop is not potentially invasive, it is eligible for certification.
- If the results of the assessment determine that the crop is potentially invasive, additional protocols, still to be determined, will be required to determine whether the feedstock is eligible for certification in target region. This will include evaluating the crop for invasiveness using carefully controlled field trials in the target region.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.2 DEPLOYMENT OF SPECIES AND CULTIVARS

Deployment of species and cultivars: Program participant adheres to appropriate conservation practices, crop developer recommendations, and federally-mandated label requirements, where applicable, for species or cultivars being deployed.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.3 CROP SPREAD

Program participant includes, in the Integrated Resource Management Plan, protocols for the biomass crop prior to cultivation that includes, where applicable:

- Adoption of conservation practices that limit potential for the spread of the crop, including:
 - Harvest, transportation, equipment cleaning, and storage protocols (e.g., steps to limit seed dispersal during transport).
 - Chemical or cultural control methods to ensure crop removal at the conclusion of production.
- Conservation practices, or chemical, cultural or physical control methods, for removal of plants or pests that represent a significant risk of establishment outside the production system, including assistance to owners or managers of neighboring properties to respond if spread occurs.

(Component of Principle 1: Integrated Resource Management Planning, 1.2 Objectives, and 1.3 Management Plan.)

IMPLEMENTATION: Where adoption of conservation practices do not prevent the establishment of a crop or its genetic material outside the production area; control methods taken by the responsible party fail to remediate the

invasion of plants or genetic material within two growing seasons; and the invasion is considered problematic to the neighboring landowner/leaseholder or to the integrity of natural ecosystems, CSBP certification will be revoked.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.3 LAND CONVERSION

Promote the conservation of native ecosystems by limiting land conversion activities to lands that do not support important conservation objectives.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.1 DOCUMENTATION OF VEGETATION CATEGORY

Program participant has documented the vegetation category as of January 1, 2008, of all lands in each contiguous ownership / leasehold where they are seeking certification.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.2 LANDS ELIGIBLE FOR CONVERSION

Program participant only shifts the intensity of land management in accordance with the matrix in Appendix C.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.3 PROTECTION OF KNOWN COMMUNITIES

Program participant protects known globally- and state-ranked G1-G3 / S1-S3 species and communities and supports inventory of lands where there could be a lack of information and a need for surveys and other information gathering.

Note: Global (G) ranks for standard national classification concepts provided by NatureServe. State (S) ranks for community types provided by state Natural Heritage programs.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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4 PRINCIPLE 4 – WATER

1.1.1 TRACE ELEMENTS IN BIOSOLIDS

Program participant tests sludge and manure for heavy metals on a quarterly basis.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.2 NITROGEN

Program participant uses a farm gate nitrogen budget to balance nitrogen entering and leaving with minimum amount of residual nitrogen or adopts a comprehensive set of nutrient conservation practices.

IMPLEMENTATION: Conservation practices must address N management at each point where it needs to be managed in operation, and shall include: nutrient balancing, nutrient use efficiency, field management, in-field treatment, and edge of field management.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.3 PHOSPHORUS

Program participant adopts a comprehensive set of conservation practices that address phosphorus management if fertilizer (organic or synthetic), sludges or manure is applied. Program participant takes steps necessary (either through reduced application or additional mitigation measures) to achieve a score of low or medium risk on the NRCS Phosphorus Index.

IMPLEMENTATION: Conservation practices must address each point where phosphorus (P) needs to be managed in the operation. These points include: nutrient balancing, nutrient use efficiency, field management, in-field treatment, and edge of field management. The Phosphorus Index can be found at

<http://www.nrcs.usda.gov/technical/ecs/nutrient/pindex.html>

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.4 PESTICIDE MANAGEMENT

Program participant adopts pest management methods that effectively control outbreaks of pests, diseases, fire, and introduction of invasive plants while not harming human health or the environment.

IMPLEMENTATION: Integrated Pest Management (IPM) shall be used when practical. Regardless of use of IPM, pest management methods shall include: a. Where possible, use of least-toxic and narrow-spectrum pesticides to achieve management objectives. b. Application of pesticides in compliance with label requirements. c. Application of pesticides in accordance with conservation practices. d. Provision of equipment and training to employees and contractors for the safe application, storage of pesticides response to hazardous spills. e. If biological control agents are used, they are applied by trained workers using proper equipment. Their use will be documented, monitored and strictly controlled in accordance with state and national laws and internationally-accepted scientific protocols.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.5 PESTICIDE USE

Program participant mitigates for impacts on identified resource (e.g., through erosion control, timing of application, etc.) when risk ratings on the Natural Resources Conservation Service Windows Pesticide Screening Tool (NRCS' WIN-PST) input reference are intermediate or greater.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.6 WASTE DISPOSAL

Program participant disposes of agricultural chemicals, containers, and liquid or solid non-organic wastes, including fuel and oil, off-site and in compliance with federal and state laws.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1 AQUATIC ECOSYSTEMS

Preserve or enhance the functions and services of aquatic ecosystems.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.1 INTEGRATED RESOURCE MANAGEMENT PLAN

Program participant complies with an integrated resource management plan and for operations on forestland complies with state forest practice regulations and implements best management practices that addresses the negative impacts of operation on aquatic ecosystem health within the watershed.

(Component of Principle 1: Integrated Resource Management Planning, 1.1 Assessment, 1.2 Objectives, and 1.3 Management Plan.)

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.2 STREAM FLOW

Program participant adopts conservation practices considered sufficient to avoid negative impact on local stream flows and stream channel morphology, flood storage and conveyance capacity, and in-stream habitat conservation practices.

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.3 STREAM TEMPERATURE

Program participant adopts conservation practices and for operations on forestland implements State forest practice regulations and best management practices considered sufficient to avoid negative impact on local stream temperature regimes, conservation practices.

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.4 HYPOXIA

Program participant does not increase the risk of hypoxia in downstream environments. (This indicator will be assumed to be met if silver level water quality indicators are met.)

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.5 WETLANDS

Program participant prevents negative impact on local wetlands through adoption of relevant conservation practices and other measures as appropriate.

IMPLEMENTATION: Program participants shall not directly impact or make changes to hydrology that result in the drainage, filling, or degradation of any wetland that is not considered "prior converted" or drained prior to passage of the 1985 Food Security Act's "Swampbuster" provision.

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

5 PRINCIPLE 5 – CLIMATE CHANGE

1.1 LIFE CYCLE ASSESSMENT

Program participant provides data needed for the biofuel or biopower producer to conduct a life cycle assessment (LCA) that accurately reflects emissions from the production and pre-conversion processing of biomass on the acres under consideration for certification.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.1 FERTILIZER AND FUEL

Emissions resulting from production inputs (fertilizer and fuel)

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.2 LAND CONVERSION AND MANAGEMENT

Emissions resulting from land conversion, planting methods, and tillage practices.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.3 RESIDUE REMOVAL

Emissions resulting from soil carbon depletion, including from crop/forest residue removal.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.4 HARVEST AND STORAGE

Emissions resulting from harvesting, collection, handling, processing, and storage of biomass.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.5 TRANSPORTATION

Emissions resulting from transportation of biomass.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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6 PRINCIPLE 6 – SOCIO-ECONOMICS WELL-BEING

Biomass feedstock production shall take place within a business framework that sustainably distributes overall socio-economic opportunity for and among all stakeholders, (including land owners, farm workers, suppliers, biorefiners, and local community. ensures compliance or improves upon all applicable labor and human rights laws, and provides for decent working conditions and terms of employment.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1 COMPLIANCE WITH LABOR LAW

Ensure that human rights and labor laws are respected in biomass production.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.1 FAIR LABOR STANDARDS ACT

Program participant demonstrates compliance with the Fair Labor Standards Act (FLSA) and all other federal and state labor laws.

IMPLEMENTATION: Employers shall maintain and provide documentation of compliance with the Fair Labor Standards Act (FLSA) provisions concerning minimum wage and overtime pay; health, retirement and leave benefits; equal opportunity hiring; safety and health in the workplace; fair youth employment; and, union rights, among others, unless state law requires greater employee protection.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.2 FAIR TREATMENT OF WORKERS

All workers shall receive fair treatment.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.1 GRIEVANCE PROCEDURES

Program participants with 10 or more full time employees (including seasonal workers) have a management policy that provides a mechanism for employees to raise concerns, safety issues, or grievances without fear of termination or any other reprisal, and inform workers of the policy at the time of hire or adoption of the policy.

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.2 EMPLOYMENT CONTRACT

Employer provides workers with a written agreement (e.g., employment contracting) describing the terms of hire.

IMPLEMENTATION: The contract must include the following provisions:

- the employer shall not require workers to work more than 12 consecutive hours in a 24- hour period
- workers are provided a minimum of 24 consecutive hours rest (one day off) for every six consecutive days of work
- specify that if an employee is underperforming, employer will provide employee an opportunity to improve their performance before terminating employment.

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.3 WORKPLACE IMPROVEMENTS

Program participant provides opportunities for employees to make suggestions for workplace improvements.

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.3 ENVIRONMENT, HEALTH, AND SAFETY (EHS)

Program participant shall ensure that biomass production activities are conducted in a manner that protects the health and safety of employees.

Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

1.1.1 COMPLIANCE WITH LAWS AND REGULATIONS

Employer maintains and provides documentation of compliance with federal, state, and local occupational health and safety laws and regulations.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.2 TRAINING

Employer maintains and provides documentation that employees are trained for health and safety in the workplace.

IMPLEMENTATION:

- All employees, including seasonal employees, receive health and safety information, in a language they understand.
- All full time employees receive health and safety training and get updated training at least every 5 years.
- All employees using potentially dangerous chemicals and machinery have received appropriate training.
- Supervisors are trained in emergency procedures and all provided information about who to contact in case of emergency and location of emergency kits.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.3 HAZARDOUS MATERIALS PROTECTION

Employer provides and employees use adequate protective clothing, appropriate safety equipment, and filtered air respirator systems and/or positive pressure cabs for workers handling highly toxic chemicals.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.4 ACCIDENTS AND INJURIES

Employees are prepared to handle injuries and chemical spills.

IMPLEMENTATION:

- Employees have access to well-stocked first aid kit at each work site.
- Employees are trained in emergency response procedures.
- Appropriate to the size of operation, procedures, materials, and training to address spills of hazardous materials are maintained.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.5 SANITATION

Employer provides clean drinking water and clean latrines with hand washing stations to workers.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.6 INSURANCE AGAINST WORKPLACE INJURY

Employer provides workers compensation and disability insurance for all full time employees.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.4 FREEDOM OF ASSOCIATION

Workers may organize and associate freely, including for negotiating working conditions.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.1 FREEDOM OF ASSOCIATION

Employer respects the right of workers to associate freely in the workplace and, if desired, organize among themselves to negotiate working conditions.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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IMPLEMENTATION: Verified through private interviews with employees.

7 PRINCIPLE 7 – LEGALITY

Biomass production shall comply with applicable federal, state, and local laws, statutes and regulations.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1 KNOWLEDGE OF LAW

Program participant and employees are knowledgeable about and comply with laws, statutes, and regulations applicable to their operation.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.1 FAMILIARITY WITH THE LAW

Program participant, employees, and relevant contractors are able to demonstrate working level awareness and knowledge of the laws, statutes, and regulations that apply to their ownership / leasehold and operations.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.2 ENSURING COMPLIANCE

Program or processes to ensure compliance with applicable laws, ordinances, and regulations are in place.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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8 PRINCIPLE 8 – TRANSPARENCY

Production of certified biomass shall be transparent.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1 TRANSPARENT PROCEDURES

Make results of certification audits and general information related to producing sustainable biomass available to the public.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)

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1.1.1 TRANSPARENCY POLICY

Program participant promotes transparency by allowing the Council to release summary certification audit reports that do not contain any proprietary data to the public upon request. (CSBP will not require public disclosure of proprietary information or information protected by intellectual property laws.)

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10);
Availability of Information (I1-I10); Time/Costs (C1-C10)

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9 PRINCIPLE 9 – CONTINUOUS IMPROVEMENT

Biomass producers, developers will continuously improve practices and outcomes based on the best available science.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10);
Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1 IMPROVEMENT

Comply with all changes made to the standard over time.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10);
Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.1 ADOPTION OF IMPROVEMENTS

Program participant complies with changes to the standard within the specified compliance period.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10);
Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.2 PROGRESS

Demonstrate efforts to improve the environmental outcomes of operations.

Potential Growers Multiple Rankings

Clarity (U1-U10); Current Practices (M1-M10);
Availability of Information (I1-I10); Time/Costs (C1-C10)

--

1.1.1 IMPROVE PERFORMANCE

Program participant demonstrates efforts to improve environmental performance based upon monitoring programs and actions to address any non-conformances identified during certification audits.

<p>Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)</p>

1.1.2 AUDITOR RECOMMENDATION

Program participant considers adoption of practices recommended by auditors to improve performance to the standard.

<p>Potential Growers Multiple Rankings Clarity (U1-U10); Current Practices (M1-M10); Availability of Information (I1-I10); Time/Costs (C1-C10)</p>

Finally the Growing Excellence team and the CSBP wish to sincerely thank you for investing the time to help the Council successfully launch this certification standard.

Question: Clarity													
Count of Prin/Crit	Response												
Prin/Crit	0	1	2	3	4	5	6	7	8	9	10	Total Landowners	
1.1.1						2	1	1	2		1		7
1.2.1				1		1		2	1		2		7
1.3.0	1			2				2	1		1		7
1.3.1		1		1				1	2	1	1		7
1.3.2		1	1						2	2	1		7
1.3.3						1			2	2	2		7
1.4.0						1	1	1	1	1	2		7
1.5.0					1				1	2	3		7
2.0.0				1	2				2		2		7
2.1.0				1	3				1		2		7
2.1.1				1					3	1	2		7
2.2.0								1	1	2	3		7
2.3.0							1		1		5		7
2.4.0									1	1	5		7
2.5.0		1				1		2	1		2		7
2.6.0	2	3		1					1				7
2.7.0	1	4						1	1				7
3.0.0	1	3	1				1	1					7
3.1.0			1					4	1		1		7
3.1.1		1				1			4		1		7
3.1.2		1						2	1	1	2		7
3.1.3						1			3	1	2		7
3.1.4							1		1	2	3		7
3.2.0								2		2	3		7
3.2.1							1		2	1	3		7
3.2.2						2		1	1	1	2		7
3.2.3		1				1		1	1	1	2		7
3.3.0				1							1	5	7
3.3.1		2	1					1	2		1		7
3.3.2	2								2	1	2		7
3.3.3		1				1				2	3		7
4.1.0		1							1	1	4		7
4.2.0		1	1			2			1		2		7
4.3.0		1				2			3		1		7
4.4.0								1	1	1	4		7
4.5.0		2		1		1		1		1	1		7
4.6.0										2	5		7
4.6.1	1					1			1	1	3		7
4.6.1.1	1								2		4		7
4.6.2	1								1	1	4		7
4.6.3	1								1	1	4		7
4.6.4	1	1			1				1	1	2		7
4.6.5	1							1		1	4		7
5.1.0		1			1		1			1	3		7
5.1.1	1					1	1			1	3		7

5.2.0	1				2			1	3	7
5.3.0	1			1	1			1	3	7
5.4.0	1			1	1			1	3	7
5.5.0	1				1	1		1	3	7
6.0.0	2	1				1			3	7
6.1.0	2					1	1		3	7
6.1.1	2						2	1	2	7
6.2.0	2			1			1		3	7
6.2.1	3					1	1	1	1	7
6.2.2	2						1	1	3	7
6.2.3	2							2	3	7
6.3.0	2				1	1			3	7
6.3.1	2						2		3	7
6.3.2	2						2		3	7
6.3.3	2						2		3	7
6.3.4	2						2		3	7
6.3.5	2						1	1	3	7
6.3.6	2					1	1		3	7
6.4.0	2						1	1	3	7
6.4.1	2						1	1	3	7
7.0.0								1	6	7
7.1.0								1	6	7
7.1.1								2	5	7
7.2.0							1		6	7
8.0.0		2		1	1			1	2	7
8.1.0			1				2	1	3	7
8.1.1			1				1	1	4	7
9.0.0						1			6	7
9.1.0			1				1		5	7
9.1.1							1	1	5	7
9.2.0		1		1	1		1		3	7
9.2.1					1		2		4	7
9.2.2					1			1	5	7

Question: Current Management												
Count of Prin/Crit	Response											
Prin/Crit	0	1	2	3	4	5	6	7	8	9	10	Total Landowners
1.1.1					2				3	1	1	7
1.2.1		1						2	3		1	7
1.3.0	1	1						2	2		1	7
1.3.1		2			1				3		1	7
1.3.2		1		1				1	2	2		7
1.3.3								1	2	3	1	7
1.4.0						1		1	2	1	2	7
1.5.0									4	1	2	7
2.0.0	1				1	1	1		1		2	7
2.1.0	1				1	1	1		1		2	7
2.1.1		2				1		1	2		1	7
2.2.0						1	1		2		3	7
2.3.0	1								2		4	7
2.4.0	1								2	1	3	7
2.5.0	2							1	2		2	7
2.6.0	2	2		1					2			7
2.7.0	2	2	1			1	1					7
3.0.0						2	1		1		3	7
3.1.0	1	1				3			1		1	7
3.1.1						3	2	2				7
3.1.2	1			1				1	1		3	7
3.1.3				1		2			1	1	2	7
3.1.4							1		3		3	7
3.2.0		1	1				1			1	3	7
3.2.1		1	1			1		1	1		2	7
3.2.2		2							1	2	2	7
3.2.3		4							1	1	1	7
3.3.0					1		1		1		4	7
3.3.1		1				1		1		2	2	7
3.3.2	2			1						1	3	7
3.3.3	1					3			1	1	1	7
4.1.0	1	3	1						1	1		7
4.2.0	2	3				1			1			7
4.3.0		3	1			1		1	1			7
4.4.0									1	1	5	7
4.5.0	1	1				1			1	1	2	7
4.6.0										1	6	7
4.6.1								1	1		5	7
4.6.1.1									1	1	5	7
4.6.2									2		5	7
4.6.3									3	1	3	7
4.6.4		1	1						2		3	7
4.6.5									1		6	7
5.1.0	1	4		1					1			7
5.1.1	1	4		1					1			7

5.2.0	1	4	1				1			7	
5.3.0	1	4	1				1			7	
5.4.0	1	4	1				1			7	
5.5.0	1	4	1				1			7	
6.0.0	3	1					1	2		7	
6.1.0	3						1	1	2	7	
6.1.1	2	1					1	1	2	7	
6.2.0	3					1		1	2	7	
6.2.1	4						2		1	7	
6.2.2	4	2	1							7	
6.2.3	3						1		3	7	
6.3.0	2						1		4	7	
6.3.1	3						1	2	1	7	
6.3.2	3					1		1	2	7	
6.3.3	3						1	1	2	7	
6.3.4	3					1		1	2	7	
6.3.5	3						1	1	2	7	
6.3.6	3						1		3	7	
6.4.0	4	1							2	7	
6.4.1	3	1							3	7	
7.0.0								1	6	7	
7.1.0							1		6	7	
7.1.1						1		1	5	7	
7.2.0						1			6	7	
8.0.0		2					1	1	3	7	
8.1.0		2					1	1	1	2	7
8.1.1		2				1		1	3	7	
9.0.0						1			6	7	
9.1.0	1							1	5	7	
9.1.1	1							1	5	7	
9.2.0		1					2	1	3	7	
9.2.1		1					1	1	4	7	
9.2.2		1						1	5	7	

Question: Information													
Count of Prin/Crit	Response												
Prin/Crit	0	1	2	3	4	5	6	7	8	9	10	Total Landowners	
1.1.1							1	3	1	1	1		7
1.2.1						1			4		2		7
1.3.0	1					1		1	3		1		7
1.3.1	1						1	1	2	1	1		7
1.3.2	1			1					2	2	1		7
1.3.3									3	2	2		7
1.4.0						1			3	1	2		7
1.5.0									3	2	2		7
2.0.0	1		1	2	1	1			1				7
2.1.0	1	1		2	1				2				7
2.1.1		1		1		1			1	2	1		7
2.2.0		1				1		1		2	2		7
2.3.0		1		1					3		2		7
2.4.0						1		1	1	1	3		7
2.5.0		1							3		3		7
2.6.0	4	1				1		1					7
2.7.0	2	3		1			1						7
3.0.0		2				2			2		1		7
3.1.0		2			1	2			1	1			7
3.1.1		1				1	1		1	1	2		7
3.1.2						1		1	1	1	3		7
3.1.3						1		1	1	1	3		7
3.1.4								1	1	2	3		7
3.2.0								1	1	1	4		7
3.2.1						2			1		4		7
3.2.2		1						1	2	1	2		7
3.2.3		1				1	1		1		3		7
3.3.0	1				1				1		4		7
3.3.1		2								3	2		7
3.3.2	3				1			1			2		7
3.3.3		1				1			1	2	2		7
4.1.0	2	2				1				2			7
4.2.0	1	4			1		1						7
4.3.0		4			1		1			1			7
4.4.0		1				1				3	2		7
4.5.0		1				1		1		2	2		7
4.6.0						1				2	4		7
4.6.1	1								1	1	4		7
4.6.1.1	1								2		4		7
4.6.2	1	1						1	2		2		7
4.6.3	1	1				1		1	1	1	1		7
4.6.4	1	1		1		2			2				7
4.6.5	1								1	1	4		7
5.1.0		2		1		1			1	2			7

5.1.1		2	1	2	1		1		7	
5.2.0		2	1	2	1	1			7	
5.3.0		2	1	2	1	1			7	
5.4.0		2	1	2	1	1			7	
5.5.0		2	1	2	1		1		7	
6.0.0	3	1		1		1		1	7	
6.1.0	2				1	1		3	7	
6.1.1	3					1		1	2	7
6.2.0	3						2		2	7
6.2.1	4						2	1		7
6.2.2	3						2		2	7
6.2.3	3						1	1	2	7
6.3.0	3						1		3	7
6.3.1	3						1	2	1	7
6.3.2	3						2		2	7
6.3.3	3						1	1	2	7
6.3.4	3						2		2	7
6.3.5	3						1	1	2	7
6.3.6	3						1		3	7
6.4.0	3		1			1			2	7
6.4.1	3		1			1			2	7
7.0.0								1	6	7
7.1.0						1			6	7
7.1.1						1			6	7
7.2.0						1			6	7
8.0.0	1			1				3	2	7
8.1.0		1		1				2	3	7
8.1.1				1				2	4	7
9.0.0				1			1		5	7
9.1.0	2							1	4	7
9.1.1	3				1		1		2	7
9.2.0	1					1	1		4	7
9.2.1		1				1	1		4	7
9.2.2						1		2	4	7

Question: Implementation Time & Cost												
Count of Prin/Crit	Response											
Prin/Crit	0	1	2	3	4	5	6	7	8	9	10	Total Landowners
1.1.1			2			2	1		1		1	7
1.2.1				1	1	1			3		1	7
1.3.0	1			1		2		1	1		1	7
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9.1.1	2					1		1	1		2	7
9.2.0	1						1	2			3	7
9.2.1			1		1			2			3	7
9.2.2						1	2				4	7

Appendix H

California Energy Commission Title 20 California Code of Regulations Sections 3100-3108

**FINAL REGULATION LANGUAGE
ALTERNATIVE AND RENEWABLE FUELS
AND TECHNOLOGIES PROGRAM**

**TITLE 20 CALIFORNIA CODE OF
REGULATIONS
SECTIONS 3100 – 3108**

REGULATIONS

April 2009
CEC-600-2008-013-F



Arnold Schwarzenegger, *Governor*

CALIFORNIA ENERGY COMMISSION

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ADOPT NEW REGULATION AS FOLLOWS:

CHAPTER 12 Alternative and Renewable Fuel and Vehicle Technology Program Regulations

Article 1. General Provisions Regarding Project Funding

Section 3100 Advanced Vehicle Technology.

Projects that produce or manufacture vehicles and components as described in Health and Safety Code Section 44272 (d) shall be eligible for funding.

NOTE: Authority cited: Section 44272 (a), Health and Safety Code. Reference: Section 44272 (a), (b), (c), (d), Health and Safety Code.

Section 3101 Criteria for Project Funding.

(a) One or more of the following criteria, as applicable to the funding application, shall be used to determine which projects will receive funding. Preference will be given to project applications that can best:

(1) Provide economic benefits to California by promoting California-based technology firms, new job creation, new business development, economic benefit to low income communities, avoidance of disproportionate impacts to disadvantaged communities, and increased state revenue.

(2) Drive new technology advancement for vehicles, vessels, engines, and other equipment, and promote the deployment of such technologies in the marketplace.

(3) Provide a measurable transition from the nearly exclusive use of petroleum fuels to a diverse portfolio of viable alternative fuels that meet California's petroleum reduction and alternative fuel use goals.

(4) Use existing or proposed fueling infrastructure to maximize the outcome of the project.

(5) Use alternative fuel blends of at least 20 percent, with additional preference for projects with higher blends.

(6) Provide the largest amount of non-state matching funds.

(7) Demonstrate the ability and capacity to successfully implement and complete the project proposed for program funding.

(8) Demonstrate technical feasibility and market readiness of the proposed technology.

(9) Demonstrate the cost-effectiveness of the proposed technology in achieving greenhouse gas emissions reduction.

NOTE: Authority cited: Section 44272 (a), (b), (c) Health and Safety Code. Reference: Section 44272 (a), (b), (c), Health and Safety Code.

Section 3101.5 Sustainability Goals and Evaluation Criteria.

(a) As directed in Health and Safety Code Section 44271(a)(1), the commission establishes the following sustainability goals for the program. The sustainability goals described in this section shall guide the commission in ensuring that funded projects promote sustainable alternative fuels and vehicles and do not adversely affect natural resources. The criteria described in subpart (b) shall serve as the metrics by which the commission identifies projects that best achieve the sustainability goals.

(1) The first sustainability goal shall be the substantial reduction of greenhouse gas emissions associated with California's transportation system to help meet California's 2020 and 2050 targets as defined in Health and Safety Code Section 38550 and the Governor's Executive Order S-03-05.

(2) The second sustainability goal shall be to protect the environment, including all natural resources, from the effects of alternative and renewable fuel development and promote the superior environmental performance of alternative and renewable fuels, infrastructure and vehicle technologies.

(3) The third sustainability goal shall be to enhance market and public acceptance of sustainably produced alternative and renewable fuels by developing, promoting, and creating incentives for the production of such fuels in accordance with certified sustainable production practices and standards as established by government agencies, academic institutions, and nongovernmental organizations.

(b) In addition to the criteria listed in Section 3101, one or more of the following sustainability criteria shall be applied to each project, as appropriate, with the objective to fund only those projects that best exemplify attainment of the commission's sustainability goals, promote sustainable alternative fuels and vehicles, and do not adversely affect natural resources. Greater preference will be given to projects that incorporate or demonstrate the greatest number of sustainability criteria.

(1) Strong preference will be given to projects that can best contribute to meeting California's climate change policy goals as described in Health and Safety Code Section 38550, the Governor's Executive Order S-03-05, and the Low Carbon Fuel Standard when adopted by the Air Resources Board, and that demonstrate the best potential for substantial reduction of greenhouse gas emissions associated with California's transportation system.

(A) Applicants must provide sufficient information to determine the greenhouse gas emissions profile of the proposed project on a full fuel-cycle basis in accordance with the methodologies described in the August 2007 Full Fuel Cycle Assessment (CEC-600-2007-004-REV), or an alternative methodology approved by the commission. This information shall include an estimate of greenhouse gas emissions from indirect land use changes.

(B) Projects with the lowest greenhouse gas emissions from the petroleum baseline, as defined in the August 2007 Full Fuel Cycle Assessment (CEC-600-2007-004-REV), will demonstrate the best potential to contribute to state climate change policies.

(C) Projects with greenhouse gas emissions that exceed the petroleum baseline, on a full fuel-cycle basis, would not be eligible for funding consideration.

(2) Strong preference will be given to projects that demonstrate environmental protection, natural resource preservation, and superior environmental performance, by the use of manufacturing, production or agricultural technologies and practices which are more energy efficient and less environmentally damaging than current standard practices and technologies for the production of petroleum fuels, production of basic agricultural commodities and extraction of natural resources when measured on a life-cycle basis. The commission will fund projects that best demonstrate and implement practices that preserve ecosystem integrity, protect and enhance the resiliency of natural ecosystems, and respect the physical carrying capacity limits of natural systems at the local, regional, and global scale.

(A) Projects that maximize the use of waste stream materials as their feedstock are examples of technologies that further environmental protection and natural resource preservation goals.

(B) The use of existing Best Management Practices developed by natural resource and pollution control agencies, academic institutions, or non-governmental organizations and that exceed applicable Best Available Control Technologies are examples of appropriate means to protect the environment and natural resources.

(C) For projects using purpose-grown energy crops, furtherance of environmental protection and natural resource preservation goals would be demonstrated by:

- i. Development and implementation of a sustainability best management practices plan developed by institutions such as the University of California at Davis.
- ii. Use of lands historically used for agricultural purposes.
- iii. Use of marginal crop lands that are not used for food crops and that do not displace or disrupt cropping patterns for food production.
- iv. Use of crops uniquely suited to climate, water and natural resource constraints in California and the Arid West that require less irrigation water than commonly produced agricultural commodities.

(D) Infrastructure and agricultural projects that implement water efficiency and water use reduction measures, that use recycled or reclaimed water for industrial purposes, and that reduce or eliminate point source and non-point source wastewater discharge, are examples of appropriate resource protection practices.

(E) Projects that use renewable energy or cogeneration in the production, processing or distribution phase will demonstrate that the project implements environmental protection and natural resource preservation practices.

(F) Projects that use forest biomass resources as part of their feedstock, and that demonstrate the advancement of natural resource protection goals, are those that use forest biomass collection or harvesting practices that do not diminish the ecological values of forest stands, and that are consistent with forest restoration, fire risk management and ecosystem management goals.

(G) Projects that create benefits to state natural resources or that ameliorate degraded resources would demonstrate natural resource protection goals.

(H) Alternative fuel infrastructure projects that procure and distribute low carbon alternative fuels as described in 3101.5 (b)(1), or that are produced in accordance with the sustainability criteria described in sections 3101.5(b)(2) and (b)(3), would demonstrate furtherance of greenhouse gas reduction and natural resource protection goals.



NOTE: Authority cited: Section 44271 (a)(1), 44272(a), Health and Safety Code. Reference: Sections 44271 (a)(1), 44272 (a), (b), (c), (d), Health and Safety Code.

Section 3102 Definitions.

For purposes of Section 3101.5, the following definitions shall apply:

(a) "Natural resources" include forest lands, range lands, waters and watersheds, biodiversity resources (fish, wildlife, and flora) and their prime habitats, coastal lands and waters, minerals, and prime agricultural lands.

(b) "Environmental performance" denotes the relative environmental efficiency and levels of environmental impacts from industrial facilities, agricultural operations or natural resource extraction activities. Facilities with high levels of environmental performance use fewer natural resource and energy inputs per unit of fuel output, and have lower environmental impacts, than low environmentally performing facilities.

(c) "Carrying capacity" is the ability of an air basin, watershed, ecosystem, or landscape area to withstand resource extraction or absorb pollution loading until its basic functions are impaired.

NOTE: Authority cited: Section 44271 (a)(1), 44272(a), Health and Safety Code. Reference: Section 44271 (a)(1), 44272 (a), (b), (c), Health and Safety Code.

Section 3103 Funding Restrictions.

(a) A project shall not be eligible for funding if it is mandated by any local, regional, state, or federal law, rule, or regulation. If a project is one that helps the proposing entity meet a performance requirement mandated by local, regional, state, or federal law, rule, or regulation, the project shall not be eligible for funding. To the extent a project exceeds what is required for compliance with a legally enforceable requirement, it may receive funding for that part of the project that the applicant demonstrates is not mandated to meet the requirement. Credits generated by the excess, however, may not be used or sold by the proposing entity to offset a legally enforceable requirement, except to the extent allowed by subsection (b). For purposes of this section, a legally enforceable requirement refers to any requirement enforceable by a local, regional, state, or federal agency for the purpose of reducing the emission of one or more criteria pollutants, toxic air contaminants, or any greenhouse gas.

(b) A project that generates credits that the applicant plans to claim based on the reduction of criteria pollutants, toxic air contaminants, or greenhouse gases may not be eligible for funding unless all of the following occur:

(1) the applicant seeks funding for only a portion of the project;

(2) the applicant agrees in the funding agreement to discount emission credits at least in proportion to the amount of funding received;

(3) the project satisfies one or more of the criteria in sections 3101 and 3101.5, as appropriate.

NOTE: Authority cited: Section 44271(c), 44242(a) Health and Safety Code. Reference: Section 44271(c), Health and Safety Code.

Section 3104 Advisory Body.

The commission shall assign an appropriate policy committee to establish and maintain, as needed, an advisory committee for the Alternative and Renewable Fuel and Vehicle Technology Program. The advisory committee shall function as the advisory body required under Health and Safety Code Section 44272.5 (a-c).

NOTE: Authority cited: Section 44272(a), 44272.5(a-c), Health and Safety Code. Reference: Section 44272.5(a-c), Health and Safety Code.

Section 3105 Designation of Advisory Committee Presiding Member.

The presiding member of the assigned policy committee shall serve as the presiding member of the advisory committee and shall preside over its public meetings.

NOTE: Authority cited: Section 44272(a), 44272.5(a-c), Health and Safety Code. Reference: Section 44272.5(a-c), Health and Safety Code.

Section 3106 Selection of Advisory Committee Members.

(a) The assigned policy committee shall solicit applications from persons who wish to serve as a representative from one of the interest groups or agencies identified in Health and Safety Code Section 44272.5, and may solicit applications from other persons who wish to represent interest groups beyond those listed in Health and Safety Code Section 44272.5.

(b) Anyone wishing to serve on the advisory committee by representing an interest group not identified in Health and Safety Code Section 44272.5(b) may apply to the assigned policy committee during any solicitation for applications. The assigned policy committee shall have the discretion to allow for one or more additional interest groups to be represented on the advisory committee. Such a determination shall consider whether representation of an additional interest group serves to diversify input from the advisory committee and whether the applicant has particular knowledge or expertise that would benefit public discussions and recommendations.

(c) The assigned policy committee shall notify interested persons at least 14 days in advance of any opportunity to serve as a representative on the advisory committee. The notice shall describe the process for selecting representatives, any criteria that will be used to choose between two or more persons wishing to represent the same interest group, and the number of representatives to be selected. Those selected to serve on the advisory committee shall serve at the pleasure of the assigned policy committee, except that the policy committee shall ensure that each interest group identified in Health and Safety Code Section 44272.5(b) is represented on the advisory committee.

NOTE: Authority cited: Section 44272(a), 44272.5(a-c), Health and Safety Code. Reference: Section 44272.5(a-c), Health and Safety Code.

Section 3107 Advisory Committee Duties.

(a) The advisory committee shall meet at least twice a year to assist in the development of an investment plan and its updates. The presiding member, in consultation with advisory committee members, shall decide when to hold advisory committee meetings and whether additional meetings are needed.

(b) The role of the advisory committee shall be to participate in one or more public discussions and arrive at public recommendations, whether by consensus or otherwise, regarding one or more elements of the investment plan. All public discussions and recommendations shall serve to inform and advise the assigned policy committee in the drafting of a proposed investment plan. The assigned policy committee shall annually propose an investment plan, its update, or the lack of need for an update to the commission for approval.

(c) Each advisory committee meeting shall be open to the public. No less than 10 calendar days prior to each meeting, notice of the meeting shall be posted on the commission's website and mailed or otherwise sent to interested persons. The commission shall establish a list of persons who request notice in writing.

NOTE: Authority cited: Section 44272(a), 44272.5(a-c), Health and Safety Code. Reference: Sections 44272.5 (a-c), Health and Safety Code.

Section 3108 Purpose of Investment Plan.

(a) The investment plan shall be subject to commission approval and, as approved, shall determine priorities and opportunities for funding under the program for the ultimate purpose of developing and deploying innovative technologies that will transform the state's fuels and vehicles to help attain the state's climate change policies and achieve the other goals specified in Health and Safety Code Section 44272 et seq.

(b) The assigned policy committee shall be responsible for the preparation and publication of a draft investment plan or update, taking into consideration recommendations and input from public meetings with the advisory committee.

(c) The draft investment plan or update shall be available for public review and comment no less than 30 days prior to the meeting at which the commission considers approving the proposed investment plan or update. During the period of public review, the assigned policy committee shall hold at least one public workshop on the draft investment plan or update. The assigned policy committee may revise the draft investment plan based on comments received during the public review period. At least 14 days prior to the business meeting at which the investment plan will be considered for approval, the assigned policy committee shall publish a proposed investment plan.

(d) As part of the investment plan, the commission shall identify where existing public and private funding dollars are being invested; determine where public funding can be strategically used to encourage and support identified funding priorities of the investment plan including, but not limited to, consideration of potential for commercial viability, competitiveness and production expansion of alternative fuels, assess the need for public funding based on where existing public and private funding dollars are already being invested, and analyze opportunities to leverage additional public or private funding.

(e) All funding decisions made by the commission shall be consistent with the investment plan, which shall be updated as needed annually. The investment plan shall serve to give public notice as to the types of projects that would be eligible to receive funding under the program and to specify the categories of funding allocations.

(f) If the commission determines that adjustments are needed in the allocations made to funding categories, the commission shall submit a report to the advisory committee documenting the conditions that lead to the adjustments.

NOTE: Authority cited: Sections 44272(a), 44272.5(a) Health and Safety Code. Reference: Sections 44272.5(a), 44272 (a), (b), (c), (d), Health and Safety Code

Appendix I

Maurer-Stutz Investigation Report

Investigation Report

Prepared for:

The Council on Sustainable Biomass Production

Prepared by:



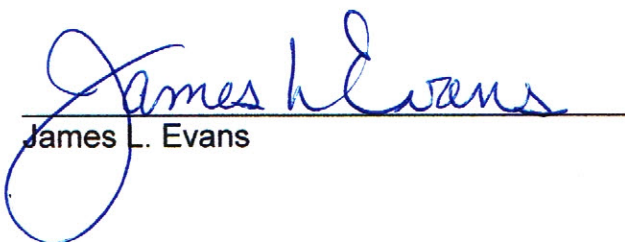
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Submitted April 9, 2012

MSI Project No. 23811030.00

Professional Design Firm No. 184-000177


James L. Evans

Project Scope of Work

In September of 2011, Maurer Stutz, Inc submitted a proposal in response to the Council on Sustainable Biomass Production's Request for Proposals for a Conservation Planning and Practices Expert to assist in the Development of a Sustainable Biomass Production Standard and Certification Program issued August 17, 2011.

In November of 2011, Maurer Stutz, Inc. (MSI) signed a contract with the Council on Sustainable Biomass Production for consulting services in support of the Council in development of a sustainable biomass production standard and certification program. Responsibilities of conservation planning expert set forth in the RFP were

1. Identify existing NRCS conservation planning protocols, tools, and practice standards that can currently help growers meet the requirements of the CSBP standard, including specifically those being used by successful BCAP project area funding recipients identify how existing NRCS conservation planning protocols, tools, and practice standards could be modified to assist in the production of sustainable biomass.
2. Identify data gaps that need to be filled in order for conservation planning tools to be useful to biomass growers.
3. Identify tools currently under development by NRCS or other federal agencies that can help growers meet the requirements of the CSBP standard.
4. Work with CSBP staff and other CSBP service providers to develop implementation guidance for CSBP participants.

Project Manager and Principal Investigator is James L. Evans, P.E., Senior Project manager and Agricultural Engineer for Maurer Stutz, Inc.

Investigative Activities

Responsibility 1

The Draft Provisional Standard for Sustainable Production of Agricultural Biomass (The Standard) was reviewed and a list of tools and protocols from, principally, the USDA NRCS was developed for Criteria under Principles 1 thru 5. Criteria under Principles 6 thru 9 were considered to be self explanatory and outside of the expertise of MSI. The Existing Tools for Assisting Producers Implementing the Biomass Production Standard is found in Appendix A.1.

The Existing Tools for Assisting Producers Implementing the Biomass Production Standard List was provided to the NRCS State Conservationists in the nine (9) states with Biomass Production Areas approved (USDA-FSA) under the USDA Biomass Conservation Assistance Program, as a questionnaire along with a request to suggest changes or additions to that list. A list of NRCS states receiving the letter, questionnaire and a copy of The Standard is found in Appendix A.2.

In addition, the Existing Tools for Assisting Producers Implementing the Biomass Production Standard List was also provided to nine (9) USDA technical specialists, as a questionnaire along with a request to suggest changes or additions to that list. A list of USDA technical specialists receiving the letter, questionnaire and a copy of The Standard is found in Appendix A.3.

Six (6) of the eighteen (18) States and Technical Specialists contacted responded with comments on the Existing Tools for Assisting Producers Implementing the Biomass Production Standard List – including tools they thought would be helpful, “gaps” they knew to exist in the tools proposed and tools they knew to be under development. Responses from NRCS States and Technical Specialists are in Appendix A.4.

Comments from NRCS States and the Technical Specialists were incorporated into the Existing Tools for Assisting Producers Implementing the Biomass Production Standard List. The List was also enhanced with “tools” that were identified by other members of the Field Testing Task Force (FTTF) and by other NRCS specialists that the investigator interviewed. A separate listing of most tools identified, along with links to web sites where those tools were available or explained was provided the members of the FTTF. This “Tools with Links” list is in Appendix A.5.

Responsibility 2

Each of the tools in the Existing Tools for Assisting Producers Implementing the Biomass Production Standard List was reviewed to determine its applicability for measuring performance under Criteria stated in The Standard. Several of the tools listed had the capability to produce measurements of performance in The Standard, but lacked data for biomass crops production or had other “Gaps” that limited the tools’ usefulness. These gaps were identified and a list of “Tools with Gaps” was produced. The “Tools with Gaps” document is found in Appendix B.1.

The “Tools with Gaps” document was shared with the FTTF members and suggestions for making the document more useable as part of a potential guidance document to supplement The Standard were received. A document titled “List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production” was produced and is found in Appendix B.2. The List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production includes the tools found to be most useful to a producer or auditor seeking to measure performance under the Criteria in The Standard, a web address where those tools may be found or are explained, a listing of the Criteria in The Standard where those tools may be applicable and Gaps found in the tools and or Comments.

A number of NRCS Practice Standards are referenced in the List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production. For reference, those Practice Standards are included, in Appendix B.3.

Fig 1. List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

USDA Tools	Description	Applicability	Gaps (Comments)
NRCS 633 Waste Recycling http://www.nrcs.usda.gov/wps/porta/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_026849	When manure or other wastes are used for plant nutrients the practice shall comply with conservation practice standard 590, Nutrient Management.	4.1.1, 4.1.3, 4.1.5	
USEPA – Methods for Biosolids Testing www.epa.gov/region8/water/biosolids/analyticalmethods.html	Lists analytical methods to be used when testing Biosolids.	4.1.4	
WINPST http://go.usa.gov/Kok	WIN-PST is an environmental risk screening tool for pesticides. Evaluates the potential of pesticides to move with water and eroded soil/organic matter and affect non-targeted organisms.	4.1.6, 4.1.7	(See for Biomass Crops - National Information System for the Regional IPM Centers – IPM Elements and Guidelines:) http://www.ipmcenters.org/ipmelements/index.cfm
NRCS 449 – Irrigation Water Management http://www.nrcs.usda.gov/wps/porta/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_026849	Lists Knowledge, Skills and Capabilities required of Irrigator. Includes criteria to Manage Soil Moisture to Promote Desired Crop Response, to Optimize Use of Water Supplies, to Minimize Irrigation Induced Soil Erosion, to Decrease Non-Point Source Pollution of Surface and Groundwater, to Manage Salts in the Crop Root Zone, to Manage Air, Soil or Plant Micro-Climature, to Reduce Particulate Matter Movement and to Reduce Energy Use.	4.2.1, 4.2.6	(Each NRCS state will have a state specific standard)

Responsibility 3

A short list of tools under development by the USDA and others was compiled and is found in Appendix C.

Responsibility 4

MSI principal investigator, James Evans has met with and will continue to consult with Council representatives and members of the FTTF. Mr. Evans will present results of the investigation into tools available to the full Council on Sustainable Biomass Production at the meeting in Virginia, April 18 and 19, 2012. Mr. Evans remains available for additional consultation.

Discussion and Recommendations

The Draft Provisional Standard for Sustainable Production of Agricultural Biomass, July 29, 2011 presents nine principles to which a grower wishing to participate in the anticipated certification program must adhere. The nine (9) Principles and the sixty six (66) Criteria outline practices and protocols which, if implemented, make a strong case for claiming the participant is producing biomass in a “sustainable” manner.

The last four (4) Principles in The Standard are:

6. Socio-Economic Well Being
7. Legality
8. Transparency
9. Continuous Improvement

Criteria associated with the last four (4) Principles in The Standard are all prescriptive and were not subject to the investigation conducted by MSI.

Documenting some of the Criteria in the first 5 Principles of The Standard may prove difficult for the producer, given that some of the available tools do not include data sets adequate to accurately model some biomass crops or do not model the operations common to agriculture. In order to provide some basis for an objective audit, a table was prepared which suggests implementation strategies for all Criteria under Principles 1 thru 5 that rely on either available tools or include alternative strategies that may be classified as best management practices. That list, which is titled Guidance for Implementing Criteria, is in Appendix D.

It is recommended that the CSBP encourage the developers of tools with gaps to enhance those models or guidance documents to include criteria for the most common biomass crops.

Some of the tools in the various lists provided will prove to be difficult to use for most producers and auditors. Predictive models such as RUSLE2, WEP, WEQ, WIN-PST, FIRI and CPED are not particularly user friendly. Obtaining repeatable results will require an experienced modeler. Even guidance documents like the CPPE sheets and Quality Criteria in the Field Office Technical Guide are not easily interpreted. Successful implementation of The Standard will require the availability of persons experienced in the models and guidance protocols.

Technical assistance in planning and implementing the IRMP required by The Standard may be available from the NRCS, the USFWS or the USFS, among others. Another source of technical assistance may be University Extension Services. In addition, the NRCS has certified, private Technical Service Providers, some of whom can provide the technical services necessary to document a producer's compliance with the provisions of The Standard.

In fiscal year 2012, the USDA NRCS is offering financial assistance to producers under the Environmental Quality Incentives Program (EQIP) to develop several categories of Conservation Activity Plans (CAP). Included in plans for which assistance is offered are:

1. Integrated Pest Management Plans
2. Irrigation Water Management Plans
3. Nutrient Management Plans

A Nutrient Management would include considerations for soils and water quality and would address several of the criteria associated with Principles 2 and 4. An Integrated Pest Management Plan would address several of the criteria associated with Principle 3.

It is recommended that the CSBP encourage producers considering biomass production to explore the possibility of completing Integrated Pest Management Plans and Nutrient Management Plans that include transition of applicable CMU's to biomass production.

It is also recommended that the CSBP encourage the USDA NRCS to consider offering a CAP Conservation Plan Supporting Transition to Biomass Production, using The Standard as a Statement of Work.

Appendix A Index

Appendix A.1 - Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Appendix A.2 - BCAP Project Area States

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Appendix A.4 - Responses from NRCS States and Technical Specialists

Appendix A.5 - Links to NRCS Tools with Potential for use with the Standard for Sustainable Biomass Production

Appendix A.1 - Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Principle	Criteria	Tools/Guidance Docs	Comment
Integrated Resource Management Planning	1.1.S1 – Baseline information is compiled for existing conditions	CSBP Producer Questionnaire	
	1.2.S1 – Alternatives are proposed and producer objectives are documented – landscape factors and environmental impact are considered	National Planning Procedures Handbook (NPPH)	
	1.3.S1 – Management actions for each CMU proposed for biomass production are developed	NPPH, Field Office Technical Guide (FOTG)	
	1.3. S2 - An implementation schedule and documentation requirements are developed.	NPPH, FOTG	
	1.3.S3 – An O&M and monitoring schedule is developed	NPPH, FOTG	
	1.3.S4 – Plan is monitored, adaptations, as necessary, are implemented	NPPH, FOTG	
	1.3.S5 - Management plans are reviewed at 5 year intervals		
Soil	2.1.S1 - Soils are tested annually (?) and management decisions are based on soil capabilities	Web Soil Survey (WSS), Geospatial Nutrient Tool (GNT), Soil Conditioning Index (SCI), Soil Management Assessment Framework (SMAF)	

Appendix A.1 - Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Principle	Criteria	Tools/Guidance Docs	Comment
	2.1.S2 – Nutrients are managed to reduce loss to air and water	NRCS 590	
	2.1.S3 – Residue removal will not reduce soil stability, health and organic matter content	Revised Universal Soil Loss Equation 2 (RUSLE2), SCI, SMAF	
	2.1.S5 – Soils vulnerable to compaction are identified and methods to avoid compaction are implemented	WSS	
	2.1.S6 – Field travel paths are limited		
	2.1.S7 – Average soil loss is less than or equal to “T”	RUSLE2	
	2.1.S8 – Maintain or improve soil carbon levels	Carbon Management Evaluation Tool-Voluntary Reporting (COMET-VR), CQESTR, SCI, SMAF	A zero or positive score on SCI is adequate
	2.1.G1 Additional management or practices improve soil function and productivity	SCI, SMAF	
Biological Diversity	3.1.S1 – Vegetation cover types and wildlife habitats are assessed and findings incorporated into plan	Habitat Assessment Model (HAM), CSBP Producer Questionnaire, NASDA Producer’s Guide to Resource Management Planning	HAM assessments can take 16 hrs/field?
	3.1.S2 – Develop and implement practices that contribute to the conservation of native vegetation and wildlife habitat	NRCS 645, Conservation Practice Physical Effects Worksheet (CPPE)	Some NRCS States have automated CPPE Worksheets Suite of practices has a net positive effect for all identified resource concerns.

Appendix A.1 - Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Principle	Criteria	Tools/Guidance Docs	Comment
	3.1.S4 - Develop and implement practices that contribute to the protection of rare, threatened and endangered wildlife and biodiversity.	NRCS 645, Federal and State Threatened and Endangered Species Publications	
	3.1.S5 – Adopt conservation practices to control invasive species	USDA Plants Database	www.invasivespecies.gov
	3.1.G1 – Implement practices which enhance wildlife habitat and biodiversity	NRCS 645, CPPE	Suite of practices has a net positive effect for all identified resource concerns.
	3.1.G4 – Management plans incorporate prescribed or natural fire or other ecological maintenance		
	3.1.G5 – Habitat quality improved by implementing practices designed to control the spread of and reduce the occurrence of non-crop invasive species	NRCS 595	www.invasivespecies.gov
	3.2.S1 – Program participant does not utilize species that are known to be invasive. An assessment is completed prior to planting by a third party.	NRCS 595, Weed Initiated Pest Risk Assessment Guidelines (APHIS)	

Appendix A.1 - Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Principle	Criteria	Tools/Guidance Docs	Comment
	3.2.S2 – Adhere to appropriate conservation practices, crop developer recommendations and federally mandated label requirements for species or cultivars employed.	NRCS 595, Weed Initiated Pest Risk Assessment Guidelines (APHIS)	
	3.2.S3 – The Integrated resource Management System Plan includes protocols for the biomass crop prior to cultivation that limit potential for the spread of the crop and conservation practices or chemical or cultural or physical control methods for removal of identified plants or pests	NRCS 595, Weed Initiated Pest Risk Assessment Guidelines (APHIS)	Where adoption of conservation practices do not prevent the establishment of a crop or its genetic material outside the production area; control measures taken fail to remediate the invasion of plants or genetic material within two growing seasons; and the invasion is considered problematic to neighbors or to the integrity of natural ecosystems, CSBP certification will be revoked.
	3.3.S1- Program participate can document vegetative category of enrolled acres as of (YEAR?) 2008.		
	3.3.S2 – Program Participation only shifts the intensity of the land management in accordance with the matrix in Appendix C	Standard for Sustainable Production of Agricultural Biomass, Appendix C.	

Appendix A.1 - Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Principle	Criteria	Tools/Guidance Docs	Comment
	3.3.S3 - Program participant protects known globally and state ranked G1-G3/S1 – S3 species and communities	NatureServe, State Natural Heritage Publications/Inventories	Global (G) ranks for standard national classification concepts provided by NatureServe. State (S) ranks for community types provided by state Natural Heritage pgms
Water	4.1.S1 Producer’s plan addresses nutrient (organic or inorganic) management and pesticides applications.	NRCS 590, NRCS 595, Windows Pesticide Screening Tool(WIN-PST)	
	4.1.S2 – Participant adopts erosion control practices	CPPE, RUSLE2, FOTG	Suite of practices has a net positive effect for all identified resource concerns.
	4.1.S3 – Waste water is tested and treated as needed prior to use for irrigation	State and Federal Clean water Act Rules	
	4.1.S4 – Test sludge and manure for heavy metals quarterly		
	4.1.S5 – Use a farm gate nitrogen budget to balance nitrogen	NRCS 590	
	4.1.S6 – Address P management. Score of low or medium risk on NRCS Phosphorus Index	NRCS 590, Phosphorus Index (PI)	
	4.1.S7 – Adopt pest management methods that effectively control outbreaks of pests, diseases, fire and introduction of invasive plants while not harming human health or the environment	NRCS 595, WIN-PST	

Appendix A.1 - Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Principle	Criteria	Tools/Guidance Docs	Comment
	4.1.S8 – Mitigate impacts on identified resource concerns when Risk Rating on WIN-PST are intermediate or more	NRCS 595, WIN-PST	
	4.1.S9 – Dispose of agricultural chemicals, containers and liquid or solid non organic wastes, including fuel and oil, offsite in compliance with federal and state laws.		
	4.1.G1 – Apply management practices demonstrated to improve surface and/or ground water quality.	CPPE, FOTG	Suite of practices has a net positive effect for all identified resource concerns.
	4.1.G2 – Achieve a score of Low Risk on WIN-PST	WINPST	
	4.1.G3 – IRMP includes Integrated Pest Management (IPM) with biological and/or cultural control methods	ARS, USDA Biologically Based IPM (B-IPM)	

Appendix A.1 - Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Principle	Criteria	Tools/Guidance Docs	Comment
	4.1.G4 – Use of precision agriculture or other equivalent applications appropriate		
	4.2.S1 – Annual documentation of compliance with and updates to a water management plan that ensures efficient use of water in irrigation practices.	FIRI 1.2, SPAW, CPED, State Irrigation Guide	
	4.2.S2 – Use for irrigation only water for which they hold legally valid use rights	State/District Water Use Rules	
	4.2.S3 – Where the local water authority determines ground or surface water is being depleted faster than naturally replenished, use only existing water rights for new irrigation	State Irrigation Guide, State/District Water Use Rules	
	4.2.S4 – Demonstrate compliance with local water laws	State/District Water Use Rules	
	4.2.S5 – Demonstrate that salinity of soils is within acceptable parameters for crop being produced	ESAP	

Appendix A.1 - Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Principle	Criteria	Tools/Guidance Docs	Comment
	4.2.S6 –Water use rate (gallons/acre) is consistent with water use rates for the most efficient irrigation technology available	FIRI 1.2, SPAW, State Irrigation Guide	
	4.2.G1 – Achieve a reduction in water use	FIRI1.2, SPAW	
	4.3.S1 – Comply with IRMP that addresses impacts on aquatic ecosystem health	CPPE, FOTG	Suite of practices has a net positive effect for all identified resource concerns.
	4.3.S2 – IRMP includes practices to avoid or mitigate negative impacts on local stream flows, stream channel morphology, flood storage and conveyance capacity and in-stream habitat practices.	TR55, EFH2	NRCS Runoff Curve Number changes by less than 5, plus or minus.
	4.3.S3 – IRMP includes practices to avoid or mitigate negative impacts on local stream temperature regimes	NRCS 395	
	4.3.S4 – Does not increase the risk of hypoxia in downstream environments		This indicator will be assumed met if all silver level water quality (4.1) indicators are met.

Appendix A.1 - Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Principle	Criteria	Tools/Guidance Docs	Comment
	4.3.S5 – IRMP includes relevant conservation practices and other measures to prevent negative impact on local wetlands	CPPE, NRCS 657, NRCS 659	Suite of practices has a net positive effect for all identified resource concerns.
	4.3.G1 – IRMP includes management practices demonstrated to improve the functions and/or values of aquatic ecosystems	CPPE, NRCS 657, NRCS 659, NRCS 395	Suite of practices has a net positive effect for all identified resource concerns.
Climate Change	5.1.S1 – Producer maintains yield records		
	5.1.S2 – Emissions resulting from the production of inputs (fertilizer, pesticides, fuel) is quantified and compared to pre-biomass crops produced	Greenhouse Gases, Regulated Emissions and Energy Use in Transportation (GREET)	
	5.1.S3 – Emissions resulting from land conversion, planting methods and tillage practices are quantified and compared to pre-biomass crops produced	GREET, USDA Energy Estimator-Tillage	

Appendix A.1 - Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Principle	Criteria	Tools/Guidance Docs	Comment
	5.1.S4 – Soil carbon depletion, including crop/forest residue removal is quantified and compared to pre-biomass crops produced	COMET-VR, CQESTER, SCI	
	5.1.S5 – Emissions from harvesting, collection, handling, processing and storage of biomass is quantified and compared to pre-biomass crops produced	GREET	
	5.1.S6 – Emissions resulting from transportation of biomass are quantified and compared to pre-biomass crops produced	GREET	
Socio Economic	6.1.S1	Prescriptive in the Standard	
	6.2.S1	Prescriptive in the Standard	
	6.2.S2	Prescriptive in the Standard	
	6.2.S3	Prescriptive in the Standard	
	6.3.S1	Prescriptive in the Standard	
	6.3.S2	Prescriptive in the Standard	
	6.3.S4	Prescriptive in the Standard	
	6.3.S5	Prescriptive in the Standard	
	6.3.S6	Prescriptive in the Standard	

Appendix A.1 - Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Principle	Criteria	Tools/Guidance Docs	Comment
	6.4.S1	Prescriptive in the Standard	
	6..5.S1	Prescriptive in the Standard	
Legality	7.1.S1	Prescriptive in the Standard	
	7.1.S2	Prescriptive in the Standard	
Transparency	8.1.S1	Prescriptive in the Standard	
	8.1.G1	Prescriptive in the Standard	
Continuous Improvement	9.1.S1	Prescriptive in the Standard	
	9.1.S2	Prescriptive in the Standard	
	9.1.S3	Prescriptive in the Standard	

Appendix A.2 - BCAP Project Area States

Missouri NRCS

J.R. Flores, State Conservationist
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Eric B. Banks, State Conservationist

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Appendix A.2 - BCAP Project Area States

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USDA-NRCS
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Appendix A.2 - BCAP Project Area States

Oklahoma NRCS

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Lincoln E. Burton, State Conservationist

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Richard E. Lyng USDA Service Center
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Appendix A.3 – Technical Specialists Recipients of Request Letter

Charles L. Walthall
USDA ARS National Climate Change, Soils and Emissions Pgm

Marlen Eve
USDA Climate Change Office

Mike Strobel, Director
National Water and Climate Center
USDA-NRCS

Dr. Gerry Moore
National Plant Data Team
USDA

Joseph K. Bagdon
Pest Mgt Specialist and NAPRA WIN-PST Team Leader
USDA-NRCS










Steven Brady
Wildlife Team
USDA-NRCS-CNTSC


Shaun McKinney
Water Quality and Quantity Development team
USDA-NRCS-WNTSC

Douglas Toews
National water Management Engineer
USDA-NRCS-CED

Dr. Susan Andrews
National Soil Quality and Ecosystems Branch
USDA-NRCS-NSSC

Appendix A.4 – Responses from NRCS States and Technical Specialists

 Reply  Reply to all  Forward    X   Close  Help

 You replied on 2/17/2012 10:58 AM.

From: Eve, Marlen - OCE [MEve@oce.usda.gov]

Sent: Fri 2/17/2012 10:34 AM

To: James L. Evans

Cc:

Subject: RE: Review of Suggested Tools for use with Standard for Sustainable Biomass Production

Attachments:

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Mr. Evans,

I have reviewed the materials you sent, paying most attention to the soils and GHG sections. I also focused primarily on the tools table. I hope that I interpreted your instructions correctly. I did not notice a questionnaire to use in my response comments, so I will include my comments below.

1. 2.1.S2 – Nutrients are managed to reduce loss to air and water. You should also look at the Nutrient Tracking Tool (NTT) developed by NRCS to track movement of nutrients from the field. The tool is still under development, but is being used in several watersheds across the US.
2. 2.1.S8 – Maintain or improve soil carbon levels. COMET-VR was replaced last year with COMET v. 2.0, which has significant improvements. Also, later this spring NRCS is planning release of a new tool called COMET farm. COMET farm will have expanded functionality and a vastly improved user interface that is more like a Google Maps type of interface. You should be watching for that to be release maybe in April/May timeframe.
3. A project that I am managing is working to develop science-based methods and user friendly tools for entity-scale (basically farm gate) estimation of GHG emissions and C sequestration. The UI will likely be very similar to the COMET farm tool. It will be specifically designed to integrate all aspects of a manager's operation including cropland, animal systems, forests and woodlands, and managed/restored wetlands. It will provide landowners with tools to do "what if" scenarios and see the potential implications of various management practices. We have assembled about 40 scientific experts to develop the guidelines and recommended methods. They have developed an initial draft that is now being revised. We plan that the guidelines document will be available for public review and comment this fall, following a scientific peer review. We are just beginning the design phase for the web based tools that will result from the guidelines report. The tool will not be available for testing or review until about a year from now. You can read a bit more about the project at www.usda.gov/oce/climate_change/techguide.

I hope my comments are helpful. Let me know if I can be of further assistance.

Regards,

Marlen

Marlen Eve

Environmental Scientist

USDA Climate Change Program Office

1400 Independence Ave SW, Rm 4407 South Bldg.

Washington, DC 20250

Ph 202.401.0979, Fax 202.401.1176

Email meve@oce.usda.gov

From: James L. Evans [mailto:jlevans@maurerstutzinc.com]

Sent: Tuesday, January 31, 2012 4:01 PM

To: Eve, Marlen - OCE

Subject: Review of Suggested Tools for use with Standard for Sustainable Biomass Production

Maurer-Stutz

7615 North Harker Drive

Peoria, IL 61615

Via email to:

Marlen Eve

USDA Climate Change Office

Dear Marlen,

The Council on Sustainable Biomass Production (CSBP) www.csbp.org has drafted and is testing a standard for Sustainable Production of Agricultural Biomass. Development of this standard is partly funded by a Conservation Innovation Grant (CIG) from the USDA-NRCS.

After a long career with NRCS, I now work with Maurer-Stutz, Inc. We have been engaged by the CSBP to work with the NRCS and other agencies and Universities to develop a list of tools and protocols which exist or are being developed to assist producers in quantifying or qualifying their

James L. Evans

From: Heiser, Janelle - NRCS, Salina, KS [janelle.heiser@ks.usda.gov]
Sent: Wednesday, February 29, 2012 11:40 AM
To: James L. Evans
Cc: Frees, Lyle - NRCS, Salina, KS; Krehbiel, Dean - NRCS, Salina, KS
Subject: TCH-NRCS Review of Tools/Protocols

Thank you for the opportunity to comment on tools use by the Natural Resources Conservation Service (NRCS) in Kansas which may have application to provide a provisional standard which can be used by the Council on Sustainable Biomass Production.

The following are tools which our Kansas field office staff are familiar with and are referenced in your enclosed material:

- National Planning Procedures Handbook
- Web Soil Survey
- Geospatial Nutrient Tool
- USDA Plants Database
- Conservation Practice Physical Effects
- Windows Pesticide Screening Tool
- TR55
- EFH2
- Field Office Technical Guide, specific emphasis on Conservation Practices 590, 645, 595, 395, and 657
- Soil Condition Index
- Revised Universal Soil Loss Version 2

I would encourage you to include the Wind Erosion Production System (WEPS) as an additional erosion prediction tool for those areas of Kansas where wind erosion is a resource concern.

Kansas NRCS has limited understanding and use of COMET-VR and the Soil Management Assessment Framework tools.

The remaining tools referenced are not used by NRCS is Kansas.

If you have further questions, please contact Lyle D. Frees, Natural Resource Specialist, at lyle.frees@ks.usda.gov or 785-823-4553.

(Signed)

ERIC B. BANKS
State Conservationist

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From: Moore, Gerry - NRCS, Greensboro, NC [Gerry.Moore@gnb.usda.gov]

Sent: Mon 2/27/2012 10:29 AM

To: James L. Evans

Cc: hnrc@volcano.net; Terry L. Feldmann

Subject: RE: Review of Suggested Tools for use with Standard for Sustainable Biomass
Production

Attachments:

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Hi James,

Sorry to be a bit slow in responding to this. I did review the documents you sent and have no concerns with any of them. Furthermore, the one citation of PLANTS in the Tools file is appropriate. I did note in Appendix A that in the second lines of some of the experts consulted their titles (or degree) is cited, whereas in most citations the second line is used to identify the person's job title. For example, Alan Weakley is cited as "Doctor" in the second line. Whereas, that may be his title that really isn't his job title. Also, note "PhD." listed on the second line for Christopher Hartley. I would try and list their actual job titles.

Cheers, Gerry

Gerry Moore

Team Leader

National Plant Data Team

East National Technology Support Center

Natural Resources Conservation Service

United States Department of Agriculture

2901 East Lee Street

Suite 2100

Greensboro, North Carolina 27401

336-370-3337 (o)

Reply Reply to all Forward X Close Help

Attachments can contain viruses that may harm your computer. Attachments may not display correctly.

From: Cindy S. Knickerbocker

Sent: Fri 2/24/2012 4:00 PM

To: James L. Evans

Cc:

Subject: FW: comments on Council on Sustainable Biomass Production (CSBP)

Attachments: [Draft Provisional Standard for Sustainable Production of Agricultural Biomass_comments.docx\(17KB\)](#) [existingtoolssurvey.pdf\(646KB\)](#)

[View As Web Page](#)

Cindy S. Knickerbocker

MAURER-STUTZ

7615 N. Harker Drive | Peoria, IL 61615

Ph: (309) 693-7615 | Fax: (309) 693-7616

Email: csknick@maurerstutzinc.com | Website: www.maurerstutzinc.com

From: Dostie, Daniel - NRCS, Harrisburg, PA [<mailto:Daniel.Dostie@pa.usda.gov>]

Sent: Friday, February 24, 2012 3:39 PM

To: Cindy S. Knickerbocker

Cc: Coleman, Denise - NRCS, Harrisburg, PA; Hardee, Gene - NRCS, Greensboro, NC; Henry, Hank - NRCS, Greensboro, NC

Subject: comments on Council on Sustainable Biomass Production (CSBP)

Cindy,

Thanks for the opportunity to provide comments about the provisional standard. We had our East Region Conservation Agronomist Gene Hardee and our East Region Biologist Hank Henry review the list of existing tools and they offer the attached suggestions.

Hope this helps. I have cced them so you may contact them about any questions you may have.

Dan

From: Coleman, Denise - NRCS, Harrisburg, PA

Sent: Wednesday, February 01, 2012 10:21 AM

“Draft Provisional Standard for Sustainable Production of Agricultural Biomass”

(Review Comments)

Gene Hardee and (Hank Henry)

(February 24, 2012)

- **General Comment** – (1) Is the development of the standard for certification of sustainable biomass production the only deliverable for the CIG? Are there also requirements to provide training, instruction tools for participants, or other educational materials? The draft standard is largely a document that borrows heavily from existing guidance, tools and criteria of various agencies, particularly NRCS. This appears to be rather weak for the deliverables of a CIG. (I will withhold my opinion of the utility of this tool until I can see it in a more workable form.)
- **“Integrated Resource Management Planning”** – (1) the tools/guidance documents section references the “CSBP Producer Questionnaire”. However, a copy of the questionnaire is not enclosed as an appendix with the “Draft Provisional Standard”. It appears that this form is intended for recording of baseline information. Is this form similar to NRCS’s CPA-52? I assume by the title that this form is used primarily for the producer to provide information relevant to the production aspects of the operation. There needs to also be a form or a section on this form that for noting resource conditions, referencing further evaluation with the noted tools, and documenting an environmental evaluation and compliance with environmental regulations. (2) This section cites the National Planning Procedures Handbook and the FOTG and the standard states that “agricultural program participants shall use planning protocols supported by NRCS.” The standard basically follows NRCS’s planning procedures process but consolidates the process into 7 steps rather than 9. The conservation planning process basically follows the problem solving process, whose application is certainly not limited to NRCS’s conservation planning. However, The NRCS guidelines are the only documents cited. Therefore, why not stick to the 9 step planning process and add addition notes/requirements specific to this program. (3) The document reference many documents and tools but doesn’t give an indication of where these are to be found. The document needs to give a more complete reference for the suggested guidance documents and tools (Block 1.1.S1 states that the baseline information is compiled by using the CSBP Producer Questionnaire – where is this? How thorough is this document? For quality resources management planning, I don’t have a lot of faith in the accuracy of the info provided by landowners. Not that the answers are intentionally misleading but many producers just don’t know what planners are looking for. CSP has shown us that.)
- **“Soil”** – (1) The listed criteria in (2.1.S1) is as follows: “Soils are tested annually (?) and management decisions are based on soil capabilities.” What type of soils testing is being referenced? Is the intent to reference soils nutrient analysis? This is only one aspect of the quality of the soil resource and doesn’t provide information on many of the soil quality related parameters such as compaction, organic matter, etc. If the intent is that the soil nutrient levels

will be monitored annually to assess the impact of the biomass removal and the nutrient management practices, the criteria need to be worded accordingly. (2) The criteria states that management decision are based on soil capabilities. This should be changed to "management decisions will be based on soil capabilities and resource needs". (3) The "tool/Guidance documents" include "Geospatial Nutrient Tool" which has little to do with assessment of the soil resource. (4) The erosion guidelines only reference RUSLE2 which is used for assessment of sheet and rill erosion. What about wind erosion (WEPS) and concentrated flow (gully) erosion on biomass production areas?

(5) The criteria under the erosion indicator in the standard specified that soil loss via RUSLE2 be at T or less or that USDA conservation practices and conservation systems be implemented. The assumption would be that UDSDA means NRCS. However, regardless the last wording is repetitious and not needed. The application of conservation practices or conservation systems is not an alternative to acceptable reductions in soil loss but rather the treatment for providing that soil loss will not be excessive.(6) Under "maintain or improve soil carbon levels" several tools are listed. I suggest limiting the assessment to one or two recognized tools rather than opening this to multiple possibilities of assessment tools. The comment for this item states that "a zero or positive score on SCI is adequate". The soil could have a declining soil conditions and still have a zero or greater score. The criteria should be expanded to state that the SCI after treatment cannot be less than the benchmark condition.








- ("Biological Diversity"-This section is missing a lot of Conservation Practices that benefit biological diversity. They only mention 645 and 595. How about 314, 327, 647, 386, 666, 380, 643, to name some others. Block 3.1.S1 references a HAM and the CSBP Producer Questionnaire. Couldn't find them. I would have liked to see how these are written. Why not reference Habitat Evaluation Procedures (HEP)? I think in the comment section of block 3.1.S4, it should at least mention that coordination with State and Federal Agencies might be required. I didn't see NEPA referenced anywhere. Block 3.1.S5 references the USDA Plants Database for practices to control invasive species. How about non-vegetative invasive species? NRCS is currently having an internal debate on how to address this issue (feral hogs, nutria, beaver, etc).)
- "Water" – (1) Related to use of wastewater and/or sludge from industrial municipal and industrial sources (4.1.S.3 and 4.1.S4), we recommend referencing the specific EPA regulation and state regulations related to testing for heavy metals. The guidance states to test sludge and manure for heavy metals quarterly. This would not meet EPA and stat regulations regarding control of heavy metals from municipal and industrial waste. (2) Section 4.1 S1 states that where manure is applied the participant will have a Comprehensive Nutrient Management Plan (CNMP). Actually a CNMP is only applicable if there is an animal feeding operation as part of the plan. If the producer is purchasing manure or acquiring manure by other means from a source than an animal feeding operation under control of the producer, a CNMP would not be applicable. For the purpose of this standard, the standard should only state that if nutrients from either organic or inorganic sources are applied, the producer will have a nutrient management plan that meets the NRCS conservation practice standard for nutrient management (590). That standard will steer the producer to development of a CNMP where applicable. (3) The standard references NRCS conservation practice standard 590 and includes

use of the phosphorus index. Note that current NRCS policy and the conservation practice standard also require use of a nitrate leaching index. (4) Regarding pesticide usage (4.1.S6) we adding a statement under implementation related proper licensing of pesticide applicators when pesticides are used. (5) The documents reference NRCS Conservation Practice standard for IPM (595) and WIN-PST. We suggest also referencing the conservation practice standards for Brush Management (314) and Herbaceous Weed Control (315) and NRCS Agronomy Tech Note 5 and the University/Extension pest management handbook/guidance documents for the respective states. (I think aquatic species/habitat are getting short changed in this section. Only about 3 of the 26 "blocks" for water quality address aquatic habitats. Blocks 4.3.S5 and 4.3.G1 seem to be catch-all blocks. Somewhere they need to address how upland practices can benefit aquatic habitats. While we know that practices that target soil will usually benefit aquatic habitats, I think this should at least be mentioned in the "Water" section. Also, don't forget 644 and 396.)

- "Climate Change" – (1) Item 5.1.S3) RUSLE2 and WEPS can also be used to provide comparative before and after assessment of fuel usage under the respective production system which provides information on energy use but can also provide information of emission form the production systems. (2) GREET is cited as a tool for use related to several parameters under this item, but I did not see an indication of the full name of this tool or any cited reference. This illustrates the failure to provide adequate references for the tools and documents cited throughout the document.

3/16/12

✓

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From: James L. Evans
To: Williams, Wendy - NRCS, Bozeman, MT
Cc:
Subject: RE: CSBP Query
Attachments:

Sent: Fri 2/17/2012 2:05 PM

[View As Web Page](#)

Wendy,

Thanks for your very useful comments.

James L. Evans, P.E.
Senior Project Manager
Maurer-Stutz, Inc.
7615 North Harker Dr.
Peoria, IL 61615
Cell: (309) 645-9849

-----Original Message-----

From: Williams, Wendy - NRCS, Bozeman, MT [<mailto:Wendy.Williams@mt.usda.gov>]
Sent: Fri 2/17/2012 12:11 PM
To: James L. Evans
Cc: Schaefer, Gerald - NRCS, Bozeman, MT
Subject: RE: CSBP Query

James,

I have made some comments and they are highlighted in blue. I am also attaching a work document that I created when I was learning more about BCAP. I am a recent transplant into the state office from the Bozeman Field Office. I talked to FSA yesterday and in Montana BCAP did not get funded for 2012 or at least not yet. As you probably know, BCAP is an FSA program and we are charged with writing the plan. It appeared from an FSA power point presentation that I came across, that they were at least thinking about having TSP's write the plans but that did not happen in Montana. In marriages like this, once we write the plan, FSA takes over all of the contractual duties, like certification, payments and modifications to the plan. In the word document, I have listed the "suite of practices" that were available to a BCAP producer when we were writing the plan. Under those practices I have listed the minimum requirements, which can be found in section IV of our eFOTG.

I hope that this is helpful

Wendy

From: James L. Evans [<mailto:jlevans@maurerstutzinc.com>]
Sent: Friday, February 17, 2012 9:10 AM
To: Williams, Wendy - NRCS, Bozeman, MT
Subject: RE: CSBP Query

Wendy,

So you're a "homie" to Peoria! If your Dad had purchased that valley, you'd not have to be reviewing this document right now!!

Existing Tools for Assisting Producers Implementing the Biomass Production Standard

Principle	Criteria	Tools/Guidance Documents	Comment
Integrated Resource Management Planning	1.1.S1 – Baseline information is compiled for existing conditions	CSBP Producer Questionnaire	NRCS Resource Inventory Worksheet
	1.2.S1 – Alternatives are proposed and producer objectives are documented – landscape factors and environmental impact are considered	National Planning Procedures Handbook (NPPH)	To satisfy NEPA, NRCS uses CPA-52 form
	1.3.S1 – Management actions for each CMU proposed for biomass production are developed	NPPH, Field Office Technical Guide (FOTG)	NRCS eFOTG section III Quality Criteria
	1.3. S2 - An implementation schedule and documentation requirements are developed.	NPPH, FOTG	A conservation plan spreadsheet (do not need toolkit for this) Conservation practice jobsheets. We use SCI, RUSLEII, EWQ, and WEPS to make sure that our planning process has taken us to the RMS, Resource Management System, level
	1.3.S3 – An O&M and monitoring schedule is developed	NPPH, FOTG	
	1.3.S4 – Plan is monitored, adaptations, as necessary, are implemented	NPPH, FOTG	
	1.3.S5 - Management plans are reviewed at 5 year intervals	NRCS Status Reviews	We review our plans/contracts annually

Soil	2.1.S1 - Soils are tested annually (?) and management decisions are based on soil capabilities	Web Soil Survey 590 (WSS), Geospatial Nutrient Tool (GNT), Soil Conditioning Index (SCI), Soil Management Assessment Framework (SMAF)	Nutrient Management worksheet for making fertilizer recommendations or for justifying reduced fertilizer inputs based on increasing OM levels
	2.1.S2 – Nutrients are managed to reduce loss to air and water	NRCS 590	
	2.1.S3 – Residue removal will not reduce soil stability, health and organic matter content	Revised Universal Soil Loss Equation 2 (RUSLE2), SCI, SMAF	
	2.1.S5 – Soils vulnerable to compaction are identified and methods to avoid compaction are implemented	WSS	
	2.1.S6 – Field travel paths are limited		
	2.1.S7 – Average soil loss is less than or equal to “T”	RUSLE2	WEPs or WEQ
	2.1.S8 – Maintain or improve soil carbon levels	Carbon Management Evaluation Tool-Voluntary Reporting (COMET-VR), CQESTR, SCI, SMAF, STIR	A zero or positive score on SCI is adequate- Positive Trend STIR-No greater than 30 for the rotation when residue is the goal
	2.1.G1 Additional management or practices improve soil function and productivity	SCI, SMAF	

Biological Diversity	3.1.S1 – Vegetation cover types and wildlife habitats are assessed and findings incorporated into plan	Habitat Assessment Model (HAM), CSBP Producer Questionnaire, NASDA Producer’s Guide to Resource Management Planning	HAM assessments can take 16 hrs/field? NRCS Wildlife Habitat Assessment Guide-less than 1 hour to fill out
	3.1.S2 – Develop and implement practices that contribute to the conservation of native vegetation and wildlife habitat	NRCS 645, Conservation Practice Physical Effects Worksheet (CPPE)	Some NRCS States have automated CPPE Worksheets Suite of practices has a net positive effect for all identified resource concerns. We have the suite of practices but they are nit fillable, Section III of eFOTG
	3.1.S4 - Develop and implement practices that contribute to the protection of rare, threatened and endangered wildlife and biodiversity.	NRCS 645, Federal and State Threatened and Endangered Species Publications	http://www.fws.gov/montanafieldoffice/Endangered_Species/Listed_Species.html
	3.1.S5 – Adopt conservation practices to control invasive species	USDA Plants Database	www.invasivespecies.gov http://montana.plant-life.org/page_weeds.htm
	3.1.G1 – Implement practices which enhance wildlife habitat and biodiversity	NRCS 645, CPPE	Suite of practices has a net positive effect for all identified resource concerns.
	3.1.G4 – Management plans incorporate prescribed or natural fire or other ecological maintenance		Book <u>Weeds of the West</u>
	3.1.G5 – Habitat quality improved by implementing practices designed to control the spread of and reduce the occurrence of non-crop invasive species	NRCS 595	www.invasivespecies.gov agr.mt.gov/weedpest/noxiousweeds.asp
	3.2.S1 – Program participant does	NRCS 595, Weed Initiated	Winpst

	not utilize species that are known to be invasive. An assessment is completed prior to planting by a third party.	Pest Risk Assessment Guidelines (APHIS)	
	3.2.S2 – Adhere to appropriate conservation practices, crop developer recommendations and federally mandated label requirements for species or cultivars employed.	NRCS 595, Weed Initiated Pest Risk Assessment Guidelines (APHIS)	
	3.2.S3 – The Integrated resource Management System Plan includes protocols for the biomass crop prior to cultivation that limit potential for the spread of the crop and conservation practices or chemical or cultural or physical control methods for removal of identified plants or pests	NRCS 595, Weed Initiated Pest Risk Assessment Guidelines (APHIS)	Where adoption of conservation practices do not prevent the establishment of a crop or its genetic material outside the production area; control measures taken fail to remediate the invasion of plants or genetic material within two growing seasons; and the invasion is considered problematic to neighbors or to the integrity of natural ecosystems, CSBP certification will be revoked.
	3.3.S1- Program participant can document vegetative category of enrolled acres as of (YEAR?) 2008.		
	3.3.S2 – Program Participation only shifts the intensity of the land management in accordance with the matrix in Appendix C	Standard for Sustainable Production of Agricultural Biomass, Appendix C.	
	3.3.S3 - Program participant protects known globally and state ranked G1-G3/S1 – S3 species and communities	NatureServe, State Natural Heritage Publications/Inventories	Global (G) ranks for standard national classification concepts provided by NatureServe. State (S) ranks for community types provided by state Natural Heritage programs http://mtnhp.org/

Water	4.1.S1 Producer's plan addresses nutrient (organic or inorganic) management and pesticides applications.	NRCS 590, NRCS 595, Windows Pesticide Screening Tool(WIN-PST)	
	4.1.S2 – Participant adopts erosion control practices	CPPE, RUSLE2, FOTG	Suite of practices has a net positive effect for all identified resource concerns.
	4.1.S3 – Waste water is tested and treated as needed prior to use for irrigation	State and Federal Clean water Act Rules	
	4.1.S4 – Test sludge and manure for heavy metals quarterly		
	4.1.S5 – Use a farm gate nitrogen budget to balance nitrogen	NRCS 590	NRCS Manure Mgt Plan and Comprehensive Nutrient Mgt Plan
	4.1.S6 – Address P management. Score of low or medium risk on NRCS Phosphorus Index	NRCS 590, Phosphorus Index (PI)	
	4.1.S7 – Adopt pest management methods that effectively control outbreaks of pests, diseases, fire and introduction of invasive plants while not harming human health or the environment	NRCS 595, WIN-PST	
	4.1.S8 – Mitigate impacts on identified resource concerns when Risk Rating on WIN-PST are intermediate or greater	NRCS 595, WIN-PST	
	4.1.S9 – Dispose of agricultural chemicals, containers and liquid or solid non organic wastes, including fuel and oil, offsite in compliance with federal and state laws.		

	4.1.G1 – Apply management practices demonstrated to improve surface and/or ground water quality.	CPPE, FOTG	Suite of practices has a net positive effect for all identified resource concerns.
	4.1.G2 – Achieve a score of Low Risk on WIN-PST	WINPST	
	4.1.G3 – IRMP includes Integrated Pest Management (IPM) with biological and/or cultural control methods	ARS, USDA Biologically Based IPM (B-IPM)	
	4.1.G4 – Use of precision agriculture or other equivalent applications appropriate		NRCS 590 for Precision Ag, Variable Rate Fertilizer App and Yield Monitoring
	4.2.S1 – Annual documentation of compliance with and updates to a water management plan that ensures efficient use of water in irrigation practices.	FIRI 1.2, SPAW, CPED, State Irrigation Guide, IWR	IWR, Irrigation Water Management Plan Date logger and soil moisture probes
	4.2.S2 – Use for irrigation only water for which they hold legally valid use rights	State/District Water Use Rules	In the west it is all decreed Water Rights, first in time first in use has seniority and all acre feet have been appropriated back to the 1860's
	4.2.S3 – Where the local water authority determines ground or surface water is being depleted faster than naturally replenished, use only existing water rights for new irrigation	State Irrigation Guide, State/District Water Use Rules	
	4.2.S4 – Demonstrate compliance with local water laws	State/District Water Use Rules	
	4.2.S5 – Demonstrate that salinity of soils is within acceptable parameters for crop being produced	ESAP	Soil Survey
	4.2.S6 – Water use rate (gallons/acre)	FIRI 1.2, SPAW, State	IWR, IWM, (the 3 Camalina BCAP plans that we

	is consistent with water use rates for the most efficient irrigation technology available	Irrigation Guide	have are on dryland)
	4.2.G1 – Achieve a net reduction in water use	FIRI1.2, SPAW	Flow meter to prove it Date logger/soil sensors, IWM
	4.3.S1 – Comply with IRMP that addresses impacts on aquatic ecosystem health	CPPE, FOTG	Suite of practices has a net positive effect for all identified resource concerns.
	4.3.S2 – IRMP includes practices to avoid or mitigate negative impacts on local stream flows, stream channel morphology, flood storage and conveyance capacity and in-stream habitat practices.	TR55, EFH2	NRCS Runoff Curve Number changes by less than 5, plus or minus.
	4.3.S3 – IRMP includes practices to avoid or mitigate negative impacts on local stream temperature regimes	NRCS 395	
	4.3.S4 – Does not increase the risk of hypoxia in downstream environments		This indicator will be assumed met if all silver level water quality (4.1) indicators are met.
	4.3.S5 – IRMP includes relevant conservation practices and other measures to prevent negative impact on local wetlands	CPPE, NRCS 657, NRCS 659 Riparian Herbaceous Cover (390) and filter strips (393), Field Border (386)	Suite of practices has a net positive effect for all identified resource concerns.
	4.3.G1 – IRMP includes management practices demonstrated to improve the functions and/or values of aquatic ecosystems	CPPE, NRCS 657, NRCS 659, NRCS 395	Suite of practices has a net positive effect for all identified resource concerns.

Climate Change	5.1.S1 – Producer maintains yield records		Yield Monitor Maps
	5.1.S2 – Emissions resulting from the production of inputs (fertilizer, pesticides, fuel) is quantified and compared to pre-biomass crops produced	Greenhouse Gases, Regulated Emissions and Energy Use in Transportation (GREET)	Cover Crops grown during the fallow year
	5.1.S3 – Emissions resulting from land conversion, planting methods and tillage practices are quantified and compared to pre-biomass crops produced	GREET, USDA Energy Estimator-Tillage	
	5.1.S4 – Soil carbon depletion, including crop/forest residue removal is quantified and compared to pre-biomass crops produced	COMET-VR, CQESTER, SCI	No till (329) and cover crops (340) soil testing and organic matter
	5.1.S5 – Emissions from harvesting, collection, handling, processing and storage of biomass is quantified and compared to pre-biomass crops produced	GREET	
	5.1.S6 – Emissions resulting from transportation of biomass are quantified and compared to pre-biomass crops produced	GREET	

Socio Economic	6.1.S1	Prescriptive in the Standard	
	6.2.S1	Prescriptive in the Standard	
	6.2.S2	Prescriptive in the Standard	
	6.2.S3	Prescriptive in the Standard	
	6.3.S1	Prescriptive in the Standard	
	6.3.S2	Prescriptive in the Standard	
	6.3.S4	Prescriptive in the Standard	
	6.3.S5	Prescriptive in the Standard	
	6.3.S6	Prescriptive in the Standard	
	6.4.S1	Prescriptive in the Standard	
	6.5.S1	Prescriptive in the Standard	
Legality	7.1.S1	Prescriptive in the Standard	
	7.1.S2	Prescriptive in the Standard	
Transparency	8.1.S1	Prescriptive in the Standard	
	8.1.G1	Prescriptive in the Standard	
Continuous Improvement	9.1.S1	Prescriptive in the Standard	
	9.1.S2	Prescriptive in the Standard	
	9.1.S3	Prescriptive in the Standard	

Appendix A.5 - Links to NRCS Tools with Potential for use with the Standard for Sustainable Biomass Production

NRCS CPA-52- Environmental Evaluation

www.ia.nrcs.usda.gov/technical/envircomp/NRCS-CPA-52.xlsx

Phosphorus Index

<http://www.nrcs.usda.gov/technical/ecs/nutrient/pindex.html>

USDA NRCS Energy Tools

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/energy/tools>

Includes: Energy Estimator: Nitrogen
 Energy Estimator: Tillage
 Energy Estimator: Irrigation

Climate Change

http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/resources/?&cid=nrcsdev11_001039

Includes: Comet VR
 NRCS Energy Estimators

WINPST3.1

<http://go.usa.gov/Kok>

CPED, ESAP, FIRI, SPAW, Wildlife habitat Index, RUSLE 2, WEP

<http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.HTML&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20%20NRCS>

RUSLE2/SCI

http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

Appendix A.5 - Links to NRCS Tools with Potential for use with the Standard for Sustainable Biomass Production

WEPS – Wind Erosion Prediction System

<http://www.weru.ksu.edu/nrcs/wepsnrcs.html>

WEQ – Wind Erosion Equation

<http://www.weru.ksu.edu/nrcs/wepsnrcs.html>

Soil Quality Test Kit

http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044789.pdf

Wildlife Habitat Assessment Forms – Oregon

<http://www.or.nrcs.usda.gov/technical/ecs/biology/biology-technotes.html>

Weed Initiated Pest Risk Assessment Guidelines

http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/wra.pdf

Biosolids Testing – Methods

<http://www.epa.gov/region8/water/biosolids/analyticalmethods.html>

Biologically Based IPM

<http://www.team.ars.usda.gov/ipm.html>

Energy (and GHG's?) to Produce Pesticides

<https://dspace.lib.cranfield.ac.uk/handle/1826/3913>

NRCS Econ Tools

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/econ/tools>

Appendix A.5 - Links to NRCS Tools with Potential for use with the Standard for Sustainable Biomass Production

National Conservation Practices

http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_026849

Threatened and Endangered Species

<http://www.fws.gov/endangered/>

Biosolids Testing Methods??

www.epa.gov/region8/water/biosolids/analyticalmethods.html

NRCS Soil Test Kit Guide

http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044790.pdf

NRCS EFH2

<http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/manage/?&cid=stelprdb1042921>

GHG Emissions Model Under development by USDA

http://www.usda.gov/oce/climate_change/techguide/TG_Fact%20Sheet_02172011%20%283%29.pdf

GREET - The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation Model

<http://greet.es.anl.gov/>

USDA Irrigation Energy Self Assessment

http://www.ruralenergy.wisc.edu/conservation/irrigation/default_irrigation.aspx

COLE (Carbon On Line Estimator): Web-based Tool for Forest Carbon Analysis

<http://www.ncasi2.org/COLE/>

Invasive Species

www.invasivespecies.gov

Appendix B Index

Appendix B.1 - List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

Appendix B.2 - List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

Appendix B.3 - Conservation Practice Standards

Appendix B.1 Tools with Gaps

USDA Tools	Gaps
NRCS CPA 52 www.ia.nrcs.usda.gov/technical/envircomp/NRCS-CPA-52.xlsx	
NRCS CPPE Worksheets http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/neps/?&cid=nrns143_026849	No CPPE for Establishment and Maintenance of Biomass Crops
Quality Criteria, Section 3, NRCS Field Office Technical Guide http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg	
NRCS CPA 1155	Need Copy accessible outside of ProTracs
State Agronomy Handbooks Example – Illinois Agronomy Handbook http://www.aces.uiuc.edu/iah	
NRCS 590 http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg	
Revised Universal Soil Loss Equation 2 (RUSLE2), SCI, STIR http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20%20NRCS	No Management Templates for Biomass Harvest – Camelina or Miscanthus?
WEP or WEQ http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20%20NRCS	No Management Templates for Biomass Harvest – Camelina or Miscanthus?

Appendix B.1 Tools with Gaps

USDA Tools	Gaps
State NRCS Wildlife Habitat Assessment Procedures Example: http://mtnhp.org	Varies by State
NRCS 647 – Early Successional Wildlife Habitat Development/Management http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/nrcs/?&cid=nr143_026849	
NRCS 386 – Field Border http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/nrcs/?&cid=nr143_026849	
NRCS 380 – Windbreak/Shelterbelt Establishment http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/nrcs/?&cid=nr143_026849	
Rare, Threatened and Endangered Species http://www.fws.gov/ endangered/	
Invasive Species www.invasivespecies.gov	
NRCS 595 – Pest Management http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/nrcs/?&cid=nr143_026849	See for Biomass Crops - National Information System for the Regional IPM Centers – IPM Elements and Guidelines: http://www.ipmcenters.org/ipmelements/index.cfm
Weed Initiated Pest Risk Assessment Guidelines (APHIS) http://www.or.nrcs.usda.gov/technical/ecs/biology/biology-technotes.html	
USDA FSA-578	Available to USDA Program Participants through Farm Services Agency?

Appendix B.1 Tools with Gaps

USDA Tools	Gaps
NRCS 633 Waste Recycling http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/nrcs/?&cid=nrcs143_026849	
USEPA – Methods for Biosolids Testing www.epa.gov/region8/water/biosolids/analyticalmethods.html	
WINPST http://go.usa.gov/Kok	See for Biomass Crops - National Information System for the Regional IPM Centers – IPM Elements and Guidelines: http://www.ipmcenters.org/ipmelements/index.cfm
NRCS 449 – Irrigation Water Management http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/nrcs/?&cid=nrcs143_026849	
FIRI 1.2, CPED http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20%20NRCS	Crop growth curves for Biomass Crops?
NRCS Soil Test Kit Guide http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044790.pdf	
NRCS EFH2 http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/water/manage/?&cid=stelprdb1042921	
NRCS 395 – Stream Habitat Improvement and Management http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/nrcs/?&cid=nrcs143_026849	

Appendix B.1 Tools with Gaps

USDA Tools	Gaps
NRCS 657 – Wetland Restoration http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/ncps/?&cid=nr143_026849	
NRCS 659 – Wetland Enhancement http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/ncps/?&cid=nr143_026849	
NRCS 396 – Riparian Herbaceous Cover http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/ncps/?&cid=nr143_026849	
Greenhouse Gases, Regulated Emissions and Energy Use in Transportation (GREET) http://greet.es.anl.gov/	Includes agricultural crop planting, managing, harvesting and transporting for processing?
USDA Energy Estimator-Tillage http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/resources/?&cid=nr143_dev11_001039	No Management Templates for Biomass Harvest – Camelina or Miscanthus?
COMET 2 http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/resources/?&cid=nr143_dev11_001039	No Management Templates for Biomass Harvest – Camelina or Miscanthus?

Appendix B.2 List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

USDA Tools	Description	Applicability	Gaps (Comments)
NRCS CPA 52 www.ia.nrcs.usda.gov/technical/environcomp/NRCS-CPA-52.xlsx	Provides for the documentation of the impacts of a planned action on people, their physical surrounding and nature and provides for documenting compliance with federal, state and local laws, regulations, (federal) Executive Orders and requirements.	1.1, 1.2, 1.3.5	Need guidance to persons only converting other crop fields to biomass production. (Cumbersome – much of information not needed where land use does not change?)
NRCS CPPE Worksheets http://www.nrcs.usda.gov/wps/portals/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_026849	Provide evaluation of the physical effects of implementing conservation practices on soil, water air plants and animals and human considerations.	1.3.4, 1.3.5, 4.1.2, 4.3.1, 4.3.5	No CPPE specifically for Establishment and Maintenance of Biomass Crops
Quality Criteria, Section 3, NRCS Field Office Technical Guide http://www.nrcs.usda.gov/wps/portals/nrcs/main/national/technical/fotg	The minimally acceptable level of treatment required to achieve a resource management system for identified resource considerations for a particular land use as defined in the technical guide of NRCS.	1.3.1, 1.3.4	
NRCS CPA 1155	A form for documenting producer’s Conservation Practice Implementation Schedule.	1.3.1, 1.3.2, 1.3.3, 1.3.4	Need Copy accessible outside of ProTracts. (Could use any acceptable schedule)
NRCS 590 http://www.nrcs.usda.gov/wps/portals/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_026849	Nutrient Management Practice Standard Includes considerations to Minimize Agricultural Non Point Source Pollution of Surface and Groundwater and to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere	2.1.2, 4.1.1, 4.1.3, 4.1.5	

Appendix B.2 List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

USDA Tools	Description	Applicability	Gaps (Comments)
<p>Revised Universal Soil Loss Equation 2 (RUSLE2), SCI, STIR http://www.nrcs.usda.gov/wps/porta/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20%20NRCS</p>	<p>Predicts sheet and rill erosion from rainfall or water, utilizing the soil condition index (SCI), the soil tillage intensity rating (STIR) and energy requirements for the planned crop system.</p>	<p>2.1.3, 2.1.6, 2.1.7, 4.1.2</p>	<p>No Management Templates for Biomass Harvest – Camelina or Miscanthus? (Some CMZ’s have templates for Switchgrass)</p>
<p>WEPS or WEQ http://www.nrcs.usda.gov/wps/porta/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20%20NRCS</p>	<p>WEPS predicts wind erosion on site and quantifies the offsite movement of soil and includes PM-10. WEQ erosion model is designed to predict long term, average annual soil losses from a field having specific characteristics.</p>	<p>2.1.3, 2.1.6, 2.1.7, 4.1.2</p>	<p>No Management Templates for Biomass Harvest – Camelina or Miscanthus? (Some states do not require calculation of wind erosion losses)</p>
<p>State NRCS Wildlife Habitat Assessment Procedures Example: http://www.or.nrcs.usda.gov/technical/ecs/biology/biology-technotes.html</p>	<p>Several Guides provide a relatively simple and objective means of determining the value of wildlife habitat. The guides can be used to determine if a CMU meets the minimum standard for wildlife conservation practices and measures can be identified to meet the minimum resource management system standard or to meet the wildlife habitat objectives of the land owner.</p>	<p>3.1.1, 3.1.2</p>	<p>Varies by State</p>

Appendix B.2 List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

USDA Tools	Description	Applicability	Gaps (Comments)
NRCS 647 – Early Successional Wildlife Habitat Development/Management http://www.nrcs.usda.gov/wps/porta/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_02_6849	Includes considerations for vegetative manipulation to maximize plant and animal diversity	3.1.2	(Each NRCS state will have a state specific standard)
NRCS 386 – Field Border http://www.nrcs.usda.gov/wps/porta/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_02_6849	Includes Criteria for Reducing Erosion from Wind and Water, Protecting Soil and Water, Managing Pest Populations, Providing Wildlife Food and Cover and Pollinator Habitat, Increasing Carbon Storage and Improving Air Quality	3.1.2	(Each NRCS state will have a state specific standard)
NRCS 380 – Windbreak/Shelterbelt Establishment http://www.nrcs.usda.gov/wps/porta/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_02_6849	Includes Criteria to Reduce Wind Erosion and Protect Growing Plants, Improve Air Quality Reducing and Intercepting Airborne Particulate Matter, Chemicals and Odors, Increasing Carbon Storage in Biomass and Soils, Enhancing Wildlife Habitat, Improving Irrigation Efficiency and Reduce Energy Use	3.1.2	(Each NRCS state will have a state specific standard)
Rare, Threatened and Endangered Species http://www.fws.gov/endangered/	Can search for County Distribution of Federally Threatened, Endangered and Candidate Species	3.1.3, 3.3.3	(User has to search site for state/county specific lists)
Invasive Species www.invasivespecies.gov	Can search for County lists of known invasive species	3.1.4, 3.2.1	(User has to search site for state/county specific lists)

Appendix B.2 List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

USDA Tools	Description	Applicability	Gaps (Comments)
NRCS 595 – Pest Management http://www.nrcs.usda.gov/wps/portals/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_02_6849	Includes Criteria to Prevent or Mitigate Off-site Pesticide Risks to Water Quality from Leaching, Solution Runoff and Adsorbed Runoff Losses, to Prevent Off-site Pesticide Risks to Soil, Water, Air, Plants, Animals and Humans from Drift and Volatilization Losses, and to Prevent or Mitigate Onsite Pesticide Risks to Pollinators and Other Beneficial Species through Direct Contact.	3.1.4, 3.2.1, 3.2.2, 4.1.6	(See for Biomass Crops - National Information System for the Regional IPM Centers – IPM Elements and Guidelines:) http://www.ipmcenters.org/ipmelements/index.cfm
Weed Initiated Pest Risk Assessment Guidelines (APHIS) http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/wra.pdf	Provides a template for conducting Food and Agriculture Organization Stage 1 and 2 assessments.	3.2.2	
USDA FSA-578 http://forms.sc.egov.usda.gov/efcommon/eFileServices/eFormsAdmin/FSA0578MANUAL_031015V01.pdf	A USDA FSA Form for reporting crops/land use by Tract and Field.	3.3.1, 5.1.1	Available to USDA Program Participants through Farm Services Agency?
NRCS 633 Waste Recycling http://www.nrcs.usda.gov/wps/portals/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_02_6849	When manure or other wastes are used for plant nutrients the practice shall comply with conservation practice standard 590, Nutrient Management.	4.1.1, 4.1.3, 4.1.5	
USEPA – Methods for Biosolids Testing www.epa.gov/region8/water/biosolids/analyticalmethods.html	Lists analytical methods to be used when testing Biosolids.	4.1.4	

Appendix B.2 Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

USDA Tools	Description	Applicability	Gaps (Comments)
WINPST http://go.usa.gov/Kok	WIN-PST is an environmental risk screening tool for pesticides. Evaluates the potential of pesticides to move with water and eroded soil/organic matter and affect non-targeted organisms.	4.1.6, 4.1.7	(See for Biomass Crops - National Information System for the Regional IPM Centers – IPM Elements and Guidelines:) http://www.ipmcenters.org/ipmelements/index.cfm
NRCS 449 – Irrigation Water Management http://www.nrcs.usda.gov/wps/portals/nrcs/detailfull/national/technical/alphabetical/nrcs/?&cid=nrcs143_026849	Lists Knowledge, Skills and Capabilities required of Irrigator. Includes criteria to Manage Soil Moisture to Promote Desired Crop Response, to Optimize Use of Water Supplies, to Minimize Irrigation Induced Soil Erosion, to Decrease Non-Point Source Pollution of Surface and Groundwater, to Manage Salts in the Crop Root Zone, to Manage Air, Soil or Plant Micro-Climate, to Reduce Particulate Matter Movement and to Reduce Energy Use.	4.2.1, 4.2.6	(Each NRCS state will have a state specific standard)

Appendix B.2 List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

USDA Tools	Description	Applicability	Gaps (Comments)
<p>FIRI 1.2, CPED http://www.nrcs.usda.gov/wps/porta/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=860000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20%20NRCS</p>	<p>FIRI is A procedure for comparing improvements or changes</p> <ul style="list-style-type: none"> * Year to year * Field, Farm and project level <p>Relative rating A season long evaluation not a single event Composed of three elements</p> <ul style="list-style-type: none"> * Management * System * Potential efficiency <p>CPED models water distribution under a Center Pivot or Linear Move sprinkler system.</p>	<p>4.2.1, 4.2.6</p>	<p>Crop growth curves for Biomass Crops?</p>
<p>NRCS Soil Test Kit Guide http://www.nrcs.usda.gov/Internet/SE_DOCUMENTS/stelprdb1044790.pdf</p>	<p>Describes procedures for 12 on-farm tests, includes an interpretive section for each test and data recording worksheets. Includes instructions for assembling a kit.</p>	<p>4.2.5</p>	
<p>NRCS EFH2 http://www.nrcs.usda.gov/wps/porta/nrcs/detailfull/national/water/management/?&cid=stelprdb1042921</p>	<p>A program for determining peak discharge as prescribed by Engineering Field Handbook Chapter 2. Includes procedure for computing Runoff Curve Number (RCN).</p>	<p>4.3.2</p>	

Appendix B.2 List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

USDA Tools	Description	Applicability	Gaps (Comments)
NRCS 395 – Stream Habitat Improvement and Management http://www.nrcs.usda.gov/wps/porta/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_026849	Lists 13 measures that may be taken singularly or in combination to improve stream habitat.	4.3.3	(Each NRCS state will have a state specific standard)
NRCS 657 – Wetland Restoration http://www.nrcs.usda.gov/wps/porta/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_026849	Includes criteria for Hydric Soil Restoration, Hydrology Restoration, and Vegetative Restoration and considerations for Soil and Hydrology.	4.3.5	(Each NRCS state will have a state specific standard)
NRCS 659 – Wetland Enhancement http://www.nrcs.usda.gov/wps/porta/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_026849	Includes criteria for Hydric Soil Enhancement, Hydrology Enhancement, and Vegetative Enhancement and considerations for Soil, Hydrology, Vegetation and Fish and Wildlife Habitat.	4.3.5	(Each NRCS state will have a state specific standard)
NRCS 396 – Riparian Herbaceous Cover http://www.nrcs.usda.gov/wps/porta/nrcs/detailfull/national/technical/alphabetical/neps/?&cid=nrcs143_026849	Includes criteria to Maintain or Improve Water Quality and Quantity, to Stabilize Streambanks and Shorelines, for Increasing Net Carbon Storage in Biomass and Soils, for Pollinator Habitat, for Terrestrial Wildlife and for Restoring Desired Plant Community	4.3.5	(Each NRCS state will have a state specific standard)

Appendix B.2 List of Tools from USDA and Others to Assist Participants in Using the Standard for Sustainable Biomass Production

USDA Tools	Description	Applicability	Gaps (Comments)
Greenhouse Gases, Regulated Emissions and Energy Use in Transportation (GREET) http://greet.es.anl.gov/	GREET1_2011 includes new pathways for bio-oil production from palm, rapeseed, jatropha and camelina and updated farming assumptions for corn stover, forest residue, switchgrass, sugarcane and soybean.	5.1.2 (?), 5.1.5(?), 5.1.6(?)	
USDA Energy Estimator-Tillage http://www.nrcs.usda.gov/wps/porta/nrcs/detail/national/climatechange/resources/?&cid=nrcsdev11_001039	Estimates diesel fuel use and costs in the production of key crops in crop management zones and compares energy savings between conventional and alternative tillage systems.	5.1.3	Crops covered are limited to the most prominent in 74 Crop Management Zones.
COMET 2 http://www.nrcs.usda.gov/wps/porta/nrcs/detail/national/climatechange/resources/?&cid=nrcsdev11_001039	Provides estimates of carbon sequestration and net green house gas emissions from soils and biomass for U.S. farms and ranches.	5.1.4	No Management Templates for Biomass Harvest – Camelina or Miscanthus?

APPENDIX B.3 CONSERVATION PRACTICE STANDARDS

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

WINDBREAK/SHELTERBELT ESTABLISHMENT

(Ft.)

CODE 380

DEFINITION

Windbreaks or shelterbelts are single or multiple rows of trees or shrubs in linear configurations.

PURPOSE

- Reduce soil erosion from wind.
- Protect plants from wind related damage.
- Alter the microenvironment for enhancing plant growth.
- Manage snow deposition.
- Provide shelter for structures, animals, and people.
- Enhance wildlife habitat.
- Provide noise screens.
- Provide visual screens.
- Improve air quality by reducing and intercepting air borne particulate matter, chemicals and odors.
- Delineate property and field boundaries.
- Improve irrigation efficiency.
- Increase carbon storage in biomass and soils.
- Reduce energy use

CONDITIONS WHERE PRACTICE APPLIES

Apply this practice on any areas where linear plantings of woody plants are desired and suited for controlling wind, noise, and visual resources. Use other tree/shrub practices when wind, noise and visual problems are not concerns.

CRITERIA

General Criteria Applicable to All Purposes

The location, layout and density of the planting will accomplish the purpose and function intended within a 20-year period.

Refer to Tree/Shrub Site Preparation Standard 490, for preparing site conditions for plant establishment.

The maximum design height (H) for the windbreak or shelterbelt shall be the expected height of the tallest row of trees or shrubs at age 20 for the given site.

Species must be adapted to the soils, climate and site conditions.

No plants on the Federal or state noxious weeds list shall be planted.

Spacing between individual plants shall be based on the needed growing space for plant type and species, the accommodation of maintenance equipment, and the desired characteristics of the stem(s), branches and canopy as required for a specific purpose.

The windbreak will be oriented as close to perpendicular to the troublesome wind as possible.

The length of the windbreak will be sufficient to protect the site including consideration for the “end effect” and changes in wind direction.

Avoid planting trees or shrubs where they will interfere with structures and above or below ground utilities.

Moisture conservation or supplemental watering shall be provided for plant establishment and growth where natural precipitation is too low for the selected species.

Refer to Tree/Shrub Establishment Standard 612 for further guidance on planting trees and shrubs.

Additional Criteria to Reduce Wind Erosion and Protect Growing Plants

The interval between windbreaks shall be determined using current, approved, wind erosion technology. Interval widths shall not exceed that permitted by the soil loss tolerance (T), or other planned soil loss objective. Calculations shall account for the effects of other practices in the conservation management system.

For wind erosion control, temporary measures will be installed to supplement the windbreak until it is fully functional.

Sites, fields, and plants are protected within an area 10 times the design height (H) on the leeward side and two times the design height (H) on the windward side of the windbreak.

Select species that are taller than the crops being protected.

Additional Criteria to Manage Snow Deposition

The windbreak will be oriented as close to perpendicular to the snow-bearing wind as possible.

For snow distribution across a field, the windbreak density (during expected snow-producing months) shall not be less than 25 percent or greater than 50 percent. The interval between barriers will not exceed 20H.

For snow accumulation, the minimum barrier density, during expected snow-producing months, will be 50 percent.

The length of the windbreak will extend beyond the area being protected to allow for end drifts.

Windbreaks will be located so that snow deposition will not pose a health or safety problem, management constraints, or obstruct human, livestock or vehicular traffic.

Where water erosion and/or runoff from melting snow is a hazard, it shall be controlled by supporting practices.

Additional Criteria to Provide Shelter for Structures, Livestock and People

For wind protection, the minimum barrier density will be 65 percent during the months of most troublesome wind.

The area to be protected will fall within a leeward distance of 10H.

Drainage of snowmelt from the windbreak shall not flow across the livestock area.

Drainage of livestock waste from the livestock area shall not flow into the windbreak.

Additional Criteria for Noise Screens

Noise screens shall be at least 65 percent dense during the time of the year when noise is a problem, as tall as, and as close to the noise source as practicable.

The length of the noise screen shall be twice as long as the distance from the noise source to the receiver.

For high-speed traffic noise, the barrier shall not be less than 65 feet wide. For moderate speed traffic noise, the barrier width shall not be less than 20 feet wide.

Species selected will be tolerant to noxious emissions, sand, gravel depositions or salt spray from traffic areas.

Additional Criteria for Visual Screens

Visual screens shall be located as close to the observer as possible with a density, height and width to sufficiently block the view between the area of concern and the sensitive area.

Additional Criteria to Improve Air Quality by Reducing and Intercepting Airborne Particulate Matter, Chemicals and Odors

The windbreak interval shall be less than or equal to 10h depending on site conditions and related supporting conservation practices.

Windbreak density on the windward side of the problem source, (i.e. particulate, chemical or odor) shall be greater than 50% to reduce the airflow into the source area.

Windbreak density on the leeward side of the problem source, and windward of the

area to be protected, shall be greater than 65%.

Select and maintain tree and shrub species with foliar and structural characteristics to optimize interception, adsorption and absorption of airborne chemicals or odors.

Additional Criteria for Increasing Carbon Storage in Biomass and Soils

Maximize width and length of the windbreak to fit the site.

For optimal carbon sequestration, select plants that have higher rates of sequestration in biomass and soils.

Plant and manage the appropriate plant spacing for the site that will maximize above and below ground biomass production

Minimize soil disturbance during establishment and maintenance of the windbreak/shelterbelt.

Additional Criteria for Enhancing Wildlife Habitat

Plant species selection shall benefit targeted wildlife species including pollinators.

Design dimensions of the planting shall be adequate for targeted wildlife species.

Additional Criteria for Improving Irrigation Efficiency

For sprinkler irrigation systems, the windbreak shall be taller than the spray height.

The windbreak shall not interfere with the operation of the irrigation system.

Additional Criteria to Reduce Energy Use

Orient the windbreak as close to perpendicular to the troublesome wind as possible

Use proper plant density to meet energy reduction needs.

Use plants with a potential height growth that will be taller than the structure or facility being protected.

CONSIDERATIONS

Consider enhancing aesthetics by using evergreen species or species with features such as showy flowers, brilliant fall foliage, or persistent colorful fruits.

When designing and locating a windbreak or shelterbelt, consider the impact upon the landowner's or public's view of the landscape.

Selection of plants for use in windbreaks should favor species or varieties tolerant to herbicides used in the area.

Plants that may be alternate hosts to undesirable pests should be avoided.

All plantings should complement natural features.

Tree or shrub rows should be oriented on or near the contour where water erosion is a concern. Where water erosion and/or runoff from melting snow is a hazard, it should be controlled by supporting practices.

Wildlife and pollinator needs should be considered when selecting or siting tree or shrub species. Species diversity, including use of native species, should be considered.

Species diversity, including use of native species, should be considered to avoid loss of function due to species-specific pests.

Consider the invasive potential when selecting plant species.

Windbreaks for odor and chemical control increase in effectiveness as the amount of foliage available for intercept increases. Multiple-row, wide plantings offer greater interception potential than do smaller plantings.

When using trees and shrubs for greenhouse gas reductions, prediction of carbon sequestration rates should be made using current, approved carbon sequestration modeling technology.

A shelterbelt can be used as a travel corridor to connect existing patches of wildlife habitat.

In cropping systems select windbreak and shelterbelt species that minimize adverse affects to crop growth (e.g. shade, allelopathy, competing root systems or root sprouts).

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

The following actions shall be carried out to insure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance).

Replacement of dead trees or shrubs will be continued until the windbreak/shelterbelt is functional.

Supplemental water will be provided as needed.

Thin or prune the windbreak/shelterbelt to maintain its function.

Inspect trees and shrubs periodically and protect from adverse impacts including insects, diseases or competing vegetation. The trees or shrubs will also be protected from fire and damage from livestock and wildlife.

Periodic applications of nutrients may be needed to maintain plant vigor.

REFERENCES

Bentrup, Gary 2008. Conservation buffers: design guidelines for buffers, corridors, and greenways. Gen. Tech. Rep. SRS-109. Asheville, NC: Department of Agriculture, Forest Service, Southern Research Station.

Brandle, J.R. et al. 1988. Windbreak technology. Agric. Ecosyst. Environ. Vol. 22-23.

APPENDIX B.3 CONSERVATION PRACTICE STANDARDS

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

FIELD BORDER

(Ac.)

CODE 386

DEFINITION

A strip of permanent vegetation established at the edge or around the perimeter of a field.

PURPOSE

This practice may be applied to accomplish one or more of the following:

- Reduce erosion from wind and water
- Protect soil and water quality
- Manage pest populations
- Provide wildlife food and cover and pollinator habitat
- Increase carbon storage
- Improve air quality

CONDITIONS WHERE PRACTICE APPLIES

This practice is applied around the perimeter of fields. Its use can support or connect other buffer practices within and between fields. This practice may also apply to recreation land or other land uses where agronomic crops including forages are grown.

CRITERIA

General Criteria Applicable to All Purposes

Field borders shall be established around the field edges to the extent needed to meet the resource needs and producer objectives. Minimum field border widths shall be based on local design criteria specific to the purpose or purposes for installing the practice.

The field borders shall be established to adapted species of permanent grass, legumes and/or shrubs that accomplish the design objective and do not function as host for diseases of the field crop.

Plants selected for field borders will have the physical characteristics necessary to control wind and water erosion to tolerable levels on the field border area.

Seedbed preparation, seeding rates, dates, depths, fertility requirements, and planting methods will be consistent with approved local criteria and site conditions.

Ephemeral gullies and rills present in the planned border area will be eliminated as part of seedbed preparation. If present, ephemeral gullies and rills located immediately upslope from the planned border area need to be treated to ensure

more of a sheet flow into the planned border area.

Additional Criteria to Reduce Erosion from Wind and Water

Field border establishment, in conjunction with other practices, will be timed so that the soil will be adequately protected during the critical erosion period(s).

Establish stiff-stemmed, upright grasses, grass/legumes or forbs to trap wind- or water-borne soil particles.

The amount of surface and/or canopy cover needed from the field border shall be determined using current approved water and wind erosion prediction technology. Calculations shall account for the effects of other practices in the management system.

Wind Erosion Reduction. Locate borders to provide a stable area on the windward edge of the field as determined by prevailing wind direction data.

Minimum height of grass or forbs shall be one foot during the critical erosion period.

Water Erosion Reduction. Locate borders to eliminate sloping end rows, headlands, and other areas where concentrated water flows will enter or exit the field.

Orient plant rows as closely as possible to perpendicular to sheet flow direction.

Additional Criteria to Protect Soil and Water Quality

Do not burn the field border if the main goal of the field border is to protect soil or water quality.

Reducing Runoff and Increasing Infiltration. Locate borders around the perimeter of the field, or as a minimum, install borders to eliminate sloping end rows, headlands and other areas where

concentrated water flows will enter or exit the field.

Water Quality – Adsorbed, Dissolved and Suspended Contaminants. As a minimum, locate field borders along the edge(s) of the field where runoff enters or leaves the field. The minimum width for this purpose shall be 30 feet and have a vegetation stem density/retardance of moderate to high (e.g. equivalent to a good stand of wheat).

Design border widths to comply with all applicable State and local regulations regarding manure and chemical application setbacks.

Reducing Soil Compaction from Equipment Parking and Traffic. Border widths will be designed to accommodate equipment turning, parking, loading/unloading equipment, grain harvest operations, etc.

Additional Criteria to Manage Pest Populations

Provide a Harbor for Beneficial organisms (e.g. insects, mites, etc.). Include appropriate plants that attract beneficial organisms that prey on target pests.

Mowing, harvesting, pesticide applications and other disturbance activities will be scheduled to accommodate life cycle requirements of the beneficial organisms.

Provide a Habitat to Cause Pests to Congregate. Select plants for the field border that attract pests (e.g. alfalfa strips planted to lure lygus bugs away from a cotton crop).

Additional Criteria to Provide Wildlife Food and Cover and Pollinator Habitat

Establish plant species that provide wildlife food and cover for the target wildlife species and/or pollinator habitat. [Each state should indicate here what documents are to be consulted by the planner to make the correct species choices for wildlife purposes or pollinator habitat.]

Schedule mowing, harvest, weed control, and other management activities within the field border to accommodate reproduction and other life cycle requirements of target wildlife species.

Vegetative successional state shall be maintained to accommodate target wildlife species requirements.

When wildlife and/or pollinators are a concern, a lower percent groundcover than would be needed if protecting soil and water quality was the only goal is acceptable as long as the soil resource concern is also adequately addressed (i.e. no excessive soil loss). This may be achieved by simply increasing the field border width.

Additional Criteria to Increase Carbon Storage

Establish plant species that will produce adequate above- and below-ground biomass for the site (i.e. a positive soil conditioning index).

Maximize the width and length of the herbaceous border to fit the site and increase total biomass production.

Do not burn if the main goal of the field border is carbon storage.

Do not disturb the roots of the established vegetation with tillage.

Additional Criteria to Improve Air Quality

Establish plant species with morphological characteristics that optimize interception and adhesion of airborne particulates. Select plants with persistent roots and residue that stabilize soil aggregates and capture airborne soil particles.

Establish species resistant to damage from equipment traffic.

CONSIDERATIONS

Consider planting field borders around the entire field, not just on the field edges where water enters or leaves the field, for maximizing multiple resource protection.

Establishing a narrow strip of stiff-stemmed upright grass at the crop/field border interface can increase soil particle trapping efficiency of the field border.

Native plants are best suited for wildlife and pollinator habitat enhancement and provide other ecological benefits where adapted to site conditions and when consistent with producer objectives.

Include native plants that provide diverse pollen and nectar sources to encourage local pollinator populations.

Use field borders as corridors to connect existing or planned habitat blocks.

Prescribed burning, strip disking, or selective herbicide applications are management tools that can be used to maintain suitable habitat for specifically desired wildlife species.

Overseed the field border with legumes for increased plant diversity, soil quality, pollinators, and wildlife benefits.

Waterbars or berms may be needed to breakup or redirect concentrated water flow within the borders.

In selecting plant species to establish in the field border, among other items, consider the plant's tolerance to:

- Sediment deposition and chemicals planned for application
- Drought in arid areas or where evapotranspiration can potentially exceed precipitation during the field border's active growing period(s).
- Equipment traffic.

Design border widths to match the required field application setback widths for easier management (i.e. land-use and management changes occur in the same location).

Establish plant species that will have the desired visual effects and that will not interfere with field operations or field border maintenance.

Consider the amount of shading that the field border or portions of the field border may experience and select species for those locations accordingly.

The use of native perennial plant species as opposed to annual species provides a longer period of resource protection.

Consider installing a contour buffer system, No Till practice or other conservation practices on adjacent upland areas to reduce surface runoff and excessive sedimentation of field borders.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or treatment unit according to the Criteria included in this Standard. Specifications shall describe the requirements for applying this practice to meet the intended purpose. Record practice specifications on the Field Border 386, Conservation Practice Job Sheet. The following components shall be included for recording this specification:

- Field Border widths and lengths based on local design criteria.
- Field Border location(s) within the field(s) or farm boundary.
- Species to be used and the location and planting density of the species used.
- Site preparation requirements.
- Timing of planting and planting method.
- Liming or fertilizer requirements.
- Operation and maintenance requirements.

OPERATION AND MAINTENANCE

Field borders require careful management and maintenance for performance and longevity. The following O&M activities will be planned and applied as needed:

- Repair storm damage.
- Remove sediment from above or within the field border when accumulated sediment either alters the function of the field border or threatens the degradation of the planted species' survival.
- Shut off sprayers and raise tillage equipment to avoid damage to field borders.
- Shape and reseed border areas damaged by animals, chemicals, tillage, or equipment traffic.
- Maintain desired vegetative communities and plant vigor by liming, fertilizing, mowing, disking, or burning and controlling noxious weeds to sustain effectiveness of the border.
- Repair and reseed ephemeral gullies and rills that develop in the border.
- Minimally invasive tillage (e.g. paraplowing) may be performed in rare

cases where compaction and vehicle traffic have degraded the field border function. The purpose of the tillage is strictly to decrease bulk density and increase infiltration rates so as to provide a better media for reestablishment of vegetation and field border function.

- Maintenance activities that result in disturbance of vegetation should not be conducted during the nesting season of grass nesting birds.
- Avoid vehicle traffic when soil moisture conditions are saturated.

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APPENDIX B.3 CONSERVATION PRACTICE STANDARDS

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

RIPARIAN HERBACEOUS COVER

(Ac.)

CODE 390

DEFINITION

Grasses, sedges, rushes, ferns, legumes, and forbs tolerant of intermittent flooding or saturated soils, established or managed as the dominant vegetation in the transitional zone between upland and aquatic habitats.

PURPOSE

This practice may be applied as part of a conservation management system to accomplish one or more of the following purposes

- Provide or improve food and cover for fish, wildlife and livestock,
- Improve and maintain water quality.
- Establish and maintain habitat corridors.
- Increase water storage on floodplains.
- Reduce erosion and improve stability to stream banks and shorelines.
- Increase net carbon storage in the biomass and soil.
- Enhance pollen, nectar, and nesting habitat for pollinators.
- Restore, improve or maintain the desired plant communities.
- Dissipate stream energy and trap sediment.

- Enhance stream bank protection as part of stream bank soil bioengineering practices.

CONDITIONS WHERE PRACTICE APPLIES

- Areas adjacent to perennial and intermittent watercourses or water bodies where the natural plant community is dominated by herbaceous vegetation that is tolerant of periodic flooding or saturated soils. For seasonal or ephemeral watercourses and water bodies, this zone extends to the center of the channel or basin.
- Where channel and stream bank stability is adequate to support this practice.
- Where the riparian area has been altered and the potential natural plant community has changed.

CRITERIA

General Criteria Applicable to All Purposes

Where available, use Ecological Site Description to guide restoration to appropriate vegetative community phase and include appropriate vegetative functional groups.

**NHCP, NRCS
Feb., 1998**

Select perennial plants that are adapted to site and hydrologic conditions and provide the structural and functional diversity preferred by fish and wildlife likely to benefit from the installation of the practice.

In areas where native seeds and propagules are present, natural regeneration can be used in lieu of planting. Planting is required if no native seed bank is present.

Protect riparian vegetation and water quality by reducing or excluding haying and grazing until the desired plant community is well established.

Stream type and site hydrology must be considered. Selected plant species must be adapted to the projected duration of saturation and inundation of the site.

Harmful pests present on the site will be controlled or eliminated as necessary to achieve and maintain the intended purpose.

Pest management will be conducted in a manner that mitigates impacts to pollinators.

Management systems applied will be designed to maintain or improve the vigor and reproduction of the desired plant community.

Necessary site preparation and planting shall be done at a time and manner to insure survival and growth of selected species. Only viable, high quality and site-adapted planting stock will be used.

Determine the width of the riparian herbaceous cover planting based on the geomorphic potential of the site and project purposes, including the life history requirements of local fish and wildlife species, including pollinators.

Existing underground functional drains that pass through these areas shall be replaced with rigid, non perforated pipe through the buffer or equipped with a

management regulating structure to allow control of overflow.

Domestic grazing should be deferred for a minimum of two years or until such time as the desired plant community is established.

Additional Criteria to Maintain or Improve Water Quality and Quantity

Minimum width shall be increased to 2.5 times the stream width (based on the horizontal distance between bank-full elevations) or 35 feet for water bodies. Concentrated flow erosion or mass soil movement shall be controlled in the up gradient area prior to establishment of the riparian herbaceous cover.

Species selected shall have stiff stems and high stem density near the ground surface to reduce water velocities and facilitate infiltration into the floodplain.

Additional Criteria to Stabilize Streambanks and Shorelines

Select native or accepted, introduced species that provide a deep, binding root mass to strengthen streambanks and improve soil health.

Additional Criteria for Increasing Net Carbon Storage in Biomass and Soils

Maximize width and length of the herbaceous riparian cover to fit the site.

Plant species used will have the highest rates of biomass production for the soil and other site conditions, consistent with meeting fish and wildlife habitat requirements.

Additional Criteria for Pollinator

Habitat Include forbs and legumes that provide pollen and nectar for native bees.

Utilize a diverse mix of plant species that bloom at different times throughout the year.

Additional Criteria for Terrestrial Wildlife

Select native species adapted to the site.

Density of the vegetative stand established for this purpose shall be managed for targeted wildlife habitat requirements and shall encourage plant diversity.

If mowing is necessary to maintain herbaceous cover it will occur outside the nesting and fawning season and allow for adequate re-growth for winter cover. To protect pollinators and maintain habitat with a diversity of plant structure, a third or less of the site should be disturbed (mowed, grazed, burned, etc.) each year, allowing for recolonization of pollinators from surrounding habitat.

The management plan shall consider habitat and wildlife objectives such as habitat diversity, habitat linkages, daily and seasonal habitat ranges, limiting factors and native plant communities.

Additional Criteria for Restoring Desired Plant Community

Use Ecological Site Description (ESD) State and Transition models, where available, to determine if proposed actions are ecologically sound and defensible. Treatments need to be congruent with dynamics of the ecological site(s) and keyed to states and plant community phases that have the potential and capability to support the desired plant community. If an ESD is not available, base design criteria on best approximation of the desired plant community composition, structure, and function.

CONSIDERATIONS

Selection of native plant species is preferred. All selected species should have multiple values such as those suited for biomass, wintering and nesting cover, aesthetics, forage value for aquatic invertebrates, and tolerance to locally used herbicides.

Other conservation practices that may facilitate the establishment of Riparian Herbaceous Cover or enhance its performance include:

- Stream Habitat Improvement and Management (395)
- Streambank and Shoreline Protection – (580)
- Fence – (382)
- Pasture and Hayland Planting – (512)
- Range Planting – (550)
- Filter Strip – (393)
- Access Control – (472)
- Prescribed Grazing – (528A)
- Brush/Shrub Management – (314)
- Stream Herbaceous Weed Control Management – (315)
- Heavy Use Area Protection (561)
- Critical Area Planting (342)
- Riparian Forest Buffer (391)
- Early Successional Habitat Improvement Development and Management (395- (643)
- Conservation Cover - (327)
- Restoration and Management of Rare and Declining Habitat - (647)
- Stream Crossing (578)
- Watering Facility (614)

Considerations should be given to how this practice will complement the functions of adjacent riparian, terrestrial and aquatic habitats.

Consider the effects of upstream and downstream conditions, structures, facilities, and constraints on the planned activities.

Control of invasive trees and shrubs may be required to prevent dominance of the riparian zone by woody plants and maintain openness in riparian system.

Establish alternative water sources or controlled access stream crossings to manage livestock access to the stream and riparian area.

Selection of native plant species is recommended. Introduced species may be used. All selected species should have multiple values such as those suited for biomass, wintering and nesting cover, aesthetics, forage value for aquatic invertebrates, and tolerance to locally used herbicides.

Herbaceous riparian areas can function to link pollinators with adjacent fragmented habitat, and can serve as a conduit to move pollinators into areas requiring insect pollination. Different flower sizes and shapes appeal to different categories of pollinators. To support many species, consider establishing the greatest diversity possible. Consider incorporating nesting habitat, including patches of unshaded bare soil for ground nesting bees or where bumble bee conservation is a priority, clump forming warm-season native grasses.

Avoid plant species which may be alternate hosts to pests. Species diversity should be considered to avoid loss of function due to species-specific pests.

The location, layout and vegetative structure and composition of the buffer should complement natural features.

Corridor configuration, establishment procedures and management should enhance habitats for threatened, endangered and other plant or animal species of concern, where applicable.

Use plant species that provide full ground coverage to reduce particulate matter generation during establishment and maintenance operations.

PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. Specification shall be recorded using approved specifications sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

The purpose of operation, maintenance and management is to insure that the practice functions as intended over time.

The riparian area will be inspected periodically in order to detect adverse impacts and make adjustments in management to maintain the intended purpose.

Control of concentrated flow erosion or mass soil movement shall be continued in the up-gradient area to maintain riparian function.

Any use of fertilizers, pesticides and other chemicals to assure riparian area function shall not compromise the intended purpose.

Harmful pests present on the site will be controlled or eliminated as necessary to achieve and maintain the intended purpose.

Pest management will be conducted in a manner that mitigates impacts to pollinators.

Avoid haying or grazing when streambanks and riparian areas are vulnerable to livestock or mechanical damage.

Manage grazing to sustain riparian functions and values.

Management systems will be designed and applied to maintain or improve the vigor and reproduction of the desired plant community, e.g., the riparian functions and values.

Where the primary purpose of the practice is to provide terrestrial wildlife habitat, the density of the vegetative stand shall be managed for targeted wildlife habitat requirements and shall encourage plant diversity. If mowing is necessary to maintain herbaceous cover, it will occur outside the nesting and fawning season and allow for adequate re-growth for winter cover.

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http://plants.usda.gov/pollinators/Using_Farm_Bill_Programs_for_Pollinator_Conservation.pdf

Agroforestry Notes on supporting
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[http://www.unl.edu/nac/agroforestrynotes.
htm](http://www.unl.edu/nac/agroforestrynotes.htm)

APPENDIX B.3 CONSERVATION PRACTICE STANDARDS

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

STREAM HABITAT IMPROVEMENT AND MANAGEMENT

(Ac.)

CODE 395

DEFINITION

Maintain, improve or restore physical, chemical and biological functions of a stream, and its associated riparian zone, necessary for meeting the life history requirements of desired aquatic species.

PURPOSE

1. Provide suitable habitat for desired fish and other aquatic species.
2. Provide stream channel and associated riparian conditions that maintain stream corridor ecological processes and hydrological connections of diverse stream habitat types important to aquatic species.

CONDITIONS WHERE PRACTICE APPLIES

All streams and their adjoining backwaters, floodplains, associated wetlands, and riparian areas where geomorphic conditions or habitat deficiencies limit reproduction, growth, survival and diversity of aquatic species.

CRITERIA

Planned stream habitat improvements will;

- address the aquatic species and life history stages for which the stream is being managed,
- be based on a site-specific assessment of local hydrology, channel morphology, geomorphic setting, fish and other aquatic species present, riparian and floodplain

conditions, and any habitat limitations including water quantity and quality, food supply, and restriction of upstream and downstream movement of aquatic species using the NRCS Stream Visual Assessment Protocol, Version 2 or comparable evaluation tool,

- when applied, result in a conservation system that meets or exceeds the minimum quality criteria for stream habitat established in Section III of the FOTG.

Manage adjoining riparian areas to support a diverse vegetation community suitable for the site conditions and desired ecological benefits. Such benefits include stream temperature moderation, recruitment of instream large wood and fine organic matter, input of riparian nutrients, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface runoff.

Design in-stream structures to be compatible with the dynamic nature of streams and rivers, facilitate natural geomorphic recovery when possible, and minimize disruption of recreational and other traditional uses of the stream corridor.

Structures installed for the purposes of this standard will not;

- impede or prevent passage of fish and other aquatic organisms at any time,

**NRCS, NHCP
February 2006**

unless intended to isolate populations of native species of conservation concern,

- cause excessive bank erosion,
- cause unintentional lateral migration, aggradation or degradation of the channel,
- hinder channel-floodplain interactions.

Where practical, restore or maintain stream habitat and channel forming processes such as natural flow regime, meander migration, sediment transport, recruitment and storage of large wood, and floodplain interactions with the stream.

All stream and riparian activities will occur within state and federal guidelines with regard to timing of spawning, incubation, and rearing of aquatic organisms, and breeding and nesting of terrestrial organisms.

Manage livestock to sustain a healthy stream corridor and associated habitats.

CONSIDERATIONS

Any stream habitat management project is most effective when applied within the context of overall watershed conditions and with clear objectives for stream management goals. Stream habitat management provisions should be planned in relation to other land uses that may affect stream corridors.

Before designing and implementing stream habitat improvements, consider the known or expected concerns within the watershed, such as: point and non-point source pollution; water diversions; and land management activities likely to influence stream habitat conditions. Additional measures that should be taken singularly or in combination to improve stream habitat include:

1. Complete a general assessment of watershed conditions that are likely to

affect the functions of the stream and its riparian area.

2. Incorporate stream habitat improvements into a conservation plan that addresses soil quality, prescribed grazing, nutrient management, pest management, and other management practices for reducing non-point sources of pollution.
3. Provide fish passage upstream and downstream and allow movement of other aquatic species and organic matter to the extent possible and when compatible with state and federal fish management objectives (see Code 396 – Fish Passage).
4. Reduce or manage excessive runoff due to watershed development, roads or land-use activities.
5. Restore or protect riparian and floodplain vegetation and associated riverine wetlands.
6. Maintain adequate in-stream flows to sustain diverse habitats for fish and other aquatic species, especially during critical life history stages of spawning, incubation and rearing.
7. Provide heterogeneous and complex physical habitat components consistent with the physiographic setting and important to fish and other aquatic species in the watershed. These include suitable spawning substrates, structural elements such as boulders and/or large wood where appropriate, resting pools, overhead cover, and diverse riparian plant communities.
8. Provide instream barriers to exclude aquatic nuisance species from upstream habitats where prescribed by state and federal fish management agencies to protect native fish populations.

9. Provide screens on water pumps, diversion ditches, or any area where unintentional entrainment of aquatic species is likely to occur
10. Improve floodplain-to-channel connectivity for development of seasonal or permanent backwater, wetland and off-channel habitats consistent with the local climate and hydrology of the stream.
11. Maintain natural surface water, hyporheic, and ground water interactions to the extent possible.
12. Control spread of exotic plant and animal species.
13. Manage recreational and other land use activities to minimize impacts on stream banks, riparian vegetation and water quality.

PLANS AND SPECIFICATIONS

Plans and specifications shall be developed for each site where stream corridor management and improvement actions are to be implemented.

The plan will include detailed goals and objectives of the planned actions, a site description, the dates and sequence in which improvements or management actions will be completed, a vegetation planting plan, maintenance requirements, and monitoring guidelines for evaluating the effectiveness of the conservation actions. The plan shall specify;

- (a) location and extent of modification of the stream reach to accomplish the planned purpose,
- (b) riparian plant species and stocking rates if needed to accomplish the planned purpose,
- (c) planting dates, as well as the care and handling of seed or other planted materials to ensure an acceptable rate of survival,

(d) site protection and preparation requirements for establishment or recruitment of riparian vegetation if needed,

(e) drawings to illustrate installation or implementation requirements.

OPERATION AND MAINTENANCE

A detailed operation and maintenance plan shall be developed for all applications. The plan shall provide for periodic inspection and prompt repair or modification of any structures that are found to cause excessive streambank or streambed instability. All structural measures shall be evaluated on an annual basis. Post-project monitoring and evaluation of stream and riparian habitat conditions shall be conducted to determine if actions implemented are providing for management of the stream corridor habitats as planned. Any repair actions, if needed, shall comply with state and federal guidelines for protecting spawning, incubation and rearing times of aquatic species and breeding and nesting times of terrestrial species

REFERENCES

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APPENDIX B.3 CONSERVATION PRACTICE STANDARDS

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

IRRIGATION WATER MANAGEMENT

(Ac.)

CODE 449

DEFINITION

The process of determining and controlling the volume, frequency and application rate of irrigation water in a planned, efficient manner.

PURPOSE

This practice may be applied as part of a resource management system to achieve one or more of the following purposes:

- Manage soil moisture to promote desired crop response.
- Optimize use of available water supplies.
- Minimize irrigation induced soil erosion.
- Decrease non-point source pollution of surface and groundwater resources.
- Manage salts in the crop root zone.
- Manage air, soil, or plant micro-climate.
- Proper and safe chemigation or fertigation.
- Improve air quality by managing soil moisture to reduce particulate matter movement.
- Reduce energy use.

CONDITIONS WHERE PRACTICE APPLIES

This practice is applicable to all irrigated lands.

An irrigation system adapted for site conditions (soil, slope, crop grown, climate, water quantity and quality, air quality, etc.) must be available and capable of efficiently applying water to meet the intended purpose(s).

CRITERIA

General Criteria Applicable to All Purposes

Irrigation water shall be applied in accordance with federal, state, and local rules, laws, and regulations. Water shall not be applied in excess of the needs to meet the intended purpose.

Measurement and determination of flow rate is a critical component of irrigation water management and shall be a part of all irrigation water management purposes.

The irrigator or decision-maker must possess the knowledge, skills, and capabilities of management coupled with a properly designed, efficient and functioning irrigation system to reasonably achieve the purposes of irrigation water management.

An “Irrigation Water Management Plan” shall be developed to assist the irrigator or decision-maker in the proper management and application of irrigation water.

Irrigator Skills and Capabilities. Proper irrigation scheduling, in both timing and amount, control of runoff, minimizing deep percolation, and the uniform application of water are of primary concern. The irrigator or decision-maker shall possess or obtain the knowledge and capability to accomplish the purposes which include:

A. General

1. How to determine when irrigation water should be applied, based on the rate of water used by crops and on the stages of plant growth and/or soil moisture monitoring.
2. How to determine the amount of water required for each irrigation, including any leaching needs.
3. How to recognize and control erosion caused by irrigation.
4. How to measure or determine the uniformity of application of an irrigation.
5. How to perform system maintenance to assure efficient operation.
6. Knowledge of “where the water goes” after it is applied considering soil surface and subsurface conditions, soil intake rates and permeability, crop root zones, and available water holding capacity.
7. How to manage salinity and shallow water tables through water management.
8. The capability to control the irrigation delivery.

B. Surface Systems

1. The relationship between advance rate, time of opportunity, intake rate, and other aspects of distribution uniformity and the amount of water infiltrated.
2. How to determine and control the amount of irrigation runoff.
3. How to adjust stream size, adjust irrigation time, or employ techniques such as “surge irrigation” to compensate for seasonal changes in intake rate or to improve efficiency of application.

C. Subsurface Systems

1. How to balance the relationship between water tables, leaching needs, and irrigation water requirements.
2. The relationship between the location of the subsurface system to normal farming operations.
3. How to locate and space the system to achieve uniformity of water application.
4. How to accomplish crop germination in arid climates and during dry periods.

D. Pressurized Systems

1. How to adjust the application rate and/or duration to apply the required amount of water.
2. How to recognize and control runoff.
3. How to identify and improve uniformity of water application.
4. How to account for surface storage due to residue and field slope in situations where sprinkler application rate exceeds soil intake rate.

5. How to identify and manage for weather conditions that adversely impact irrigation efficiency and uniformity of application.

System Capability. The irrigation system must be capable of applying water uniformly and efficiently and must provide the irrigator with adequate control over water application.

Additional Criteria to Manage Soil Moisture to Promote Desired Crop Response

The following principles shall be applied for various crop growth stages:

- The volume of water needed for each irrigation shall be based on plant available water-holding capacity of the soil for the crop rooting depth, management allowed soil water depletion, irrigation efficiency and water table contribution.
- The irrigation frequency shall be based on the volume of irrigation water needed and/or available to the crop, the rate of crop evapotranspiration, and effective precipitation.
- The application rate shall be based on the volume of water to be applied, the frequency of irrigation applications, soil infiltration and permeability characteristics, and the capacity of the irrigation system.

Appropriate field adjustments shall be made for seasonal variations and field variability.

Additional Criteria to Optimize Use of Water Supplies

Limited irrigation water supplies shall be managed to meet critical crop growth stages.

When water supplies are estimated to be insufficient to meet even the critical crop growth stage, the irrigator or decision-maker shall modify plant populations, crop and variety selection, and/or irrigated acres to match available or anticipated water supplies.

Additional Criteria to Minimize Irrigation-Induced Soil Erosion

Application rates shall be consistent with local field conditions for long-term productivity of the soil.

Additional Criteria to Decrease Non-Point Source Pollution of Surface and Groundwater Resources

Water application shall be at rates that minimize transport of sediment, nutrients and chemicals to surface waters and that minimize transport of nutrients and chemicals to groundwater.

Additional Criteria to Manage Salts in the Crop Root Zone

The irrigation application volume shall be increased by the amount required to maintain an appropriate salt balance in the soil profile.

The requirement shall be based on the leaching procedure contained in NRCS National Engineering Handbook (NEH), Part 623, Chapter 2, Irrigation Water Requirements, and NEH, Part 652, National Irrigation Guide, Chapters 3 and 13.

Additional Criteria to Manage Air, Soil or Plant Micro-Climate

The irrigation system shall have the capacity to apply the required rate of water for cold or heat protection as determined by the methodology contained in NEH, Part 623, Chapter 2, Irrigation Water Requirements.

Additional Criteria for Proper and Safe Chemigation or Fertigation

Chemigation or fertigation shall be done in accordance with all local, state and federal laws.

The scheduling of nutrient and chemical application should coincide with the irrigation cycle in a manner that will not cause excess leaching of nutrients or chemicals below the root zone to the groundwater or to cause excess runoff to surface waters.

Chemigation or fertigation should not be applied if rainfall is imminent. Application of chemicals or nutrients will be limited to the minimum length of time required to deliver them and flush the pipelines. Irrigation application amount shall be limited to the amount necessary to apply the chemicals or nutrients to the soil depth recommended by label. The timing and rate of application shall be based on the pest, herbicide, or nutrient management plan.

The irrigation and delivery system shall be equipped with properly designed and operating valves and components to prevent backflows into the water source(s) and/or contamination of groundwater, surface water, or the soil.

Additional Criteria to Reduce Particulate Matter Movement

Sprinkler irrigation water shall be applied at a rate and frequency sufficient to reduce the wind erodibility index (I Factor) of the soil by one class.

Additional Criteria Applicable to Reduce Energy Use

Provide analysis to demonstrate reduction of energy use from practice implementation.

Reduction of energy use is calculated as average annual or seasonal energy

reduction compared to previous operating conditions.

CONSIDERATIONS

The following items should be considered when planning irrigation water management:

- Consideration should be given to managing precipitation effectiveness, crop residues, and reducing system losses.
- Consider potential for spray drift and odors when applying agricultural and municipal waste waters. Timing of irrigation should be based on prevailing winds to reduce odor. In areas of high visibility, irrigating at night should be considered.
- Consider potential for overspray from end guns onto public roads.
- Equipment modifications and/or soil amendments such as polyacrylamides and mulches should be considered to decrease erosion.
- Consider the quality of water and the potential impact to crop quality and plant development.
- Quality of irrigation water should be considered relative to its potential effect on the soil's physical and chemical properties, such as soil crusting, pH, permeability, salinity, and structure.
- Avoid traffic on wet soils to minimize soil compaction.
- Consider the effects that irrigation water has on wetlands, water related wildlife habitats, riparian areas, cultural resources, and recreation opportunities.
- Management of nutrients and pesticides.

- Schedule salt leaching events to coincide with low residual soil nutrients and pesticides.
- Water should be managed in such a manner as to not drift or come in direct contact with surrounding electrical lines, supplies, devices, controls, or components that would cause shorts in the same or the creation of an electrical safety hazard to humans or animals.
- Consideration should be given to electrical load control/interruptible power schedules, repair and maintenance downtime, and harvest downtime.
- Consider improving the irrigation system to increase distribution uniformity or application efficiency of irrigation water applications.

PLANS AND SPECIFICATIONS

Application of this standard may include job sheets or similar documents that specify the applicable requirements, system operations, and components

necessary for applying and maintaining the practice to achieve its intended purpose(s).

OPERATION AND MAINTENANCE

The operation and maintenance (O&M) aspects applicable to this standard consist of evaluating available field soil moisture, changes in crop evapotranspiration rates and changes in soil intake rates and adjusting the volume, application rate, or frequency of water application to achieve the intended purpose(s). Other necessary O&M items are addressed in the physical component standards considered companions to this standard.

REFERENCES

USDA-NRCS, National Engineering Handbook, Part 623, Chapter 2, Irrigation Water Requirements.

USDA-NRCS, National Engineering Handbook, Part 652, National Irrigation Guide.

APPENDIX B.3 CONSERVATION PRACTICE STANDARDS

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

NUTRIENT MANAGEMENT

(Ac.)

CODE 590

DEFINITION

Managing the amount (rate), source, placement (method of application), and timing of plant nutrients and soil amendments.

PURPOSE

- To budget, supply, and conserve nutrients for plant production.
- To minimize agricultural nonpoint source pollution of surface and groundwater resources.
- To properly utilize manure or organic by-products as a plant nutrient source.
- To protect air quality by reducing odors, nitrogen emissions (ammonia, oxides of nitrogen), and the formation of atmospheric particulates.
- To maintain or improve the physical, chemical, and biological condition of soil.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all lands where plant nutrients and soil amendments are applied. This standard does not apply to one-time nutrient applications to establish perennial crops.

CRITERIA

General Criteria Applicable to All Purposes

A nutrient budget for nitrogen, phosphorus,

and potassium must be developed that considers all potential sources of nutrients including, but not limited to, green manures, legumes, crop residues, compost, animal manure, organic by-products, biosolids, waste water, organic matter, soil biological activity, commercial fertilizer, and irrigation water.

Enhanced efficiency fertilizers, used in the State must be defined by the Association of American Plant Food Control Officials (AAPFCO) and be accepted for use by the State fertilizer control official, or similar authority, with responsibility for verification of product guarantees, ingredients (by AAPFCO definition) and label claims.

For nutrient risk assessment policy and procedures see Title 190, General Manual (GM), Part 402, Nutrient Management, and Title 190, National Instruction (NI), Part 302, Nutrient Management Policy Implementation.

To avoid salt damage, the rate and placement of applied nitrogen and potassium in starter fertilizer must be consistent with land-grant university guidelines, or industry practice recognized by the land-grant university.

The NRCS-approved nutrient risk assessment for nitrogen must be completed on all sites unless the State NRCS, with the concurrence of State water quality control

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [Field Office Technical Guide](#).

authorities, has determined specific conditions where nitrogen leaching is not a risk to water quality, including drinking water.

The NRCS-approved nutrient risk assessment for phosphorus must be completed when:

- phosphorus application rate exceeds land-grant university fertility rate guidelines for the planned crop(s), or
- the planned area is within a phosphorus-impaired watershed (contributes to 303d-listed water bodies), or
- the NRCS and State water quality control authority have not determined specific conditions where the risk of phosphorus loss is low.

A phosphorus risk assessment will not be required when the State NRCS, with concurrence of the State water quality control authority, has determined specific conditions where the risk of phosphorus loss is low. These fields must have a documented agronomic need for phosphorus; based on soil test phosphorus (STP) and land-grant university nutrient recommendations. On organic operations, the nutrient sources and management must be consistent with the USDA's National Organic Program.

Areas contained within minimum application setbacks (e.g., sinkholes, wellheads, gullies, ditches, or surface inlets) must receive nutrients consistent with the setback restrictions.

Applications of irrigation water must minimize the risk of nutrient loss to surface and groundwater.

Soil pH must be maintained in a range that enhances an adequate level for crop nutrient availability and utilization. Refer to State land-grant university documentation for guidance.

Soil, Manure, and Tissue Sampling and Laboratory Analyses (Testing).

Nutrient planning must be based on current soil, manure, and (where used as supplemental information) tissue test results developed in accordance with land-grant university guidance, or industry practice, if recognized by the university.

Current soil tests are those that are no older than 3 years, but may be taken on an interval recommended by the land-grant university or as required by State code. The area represented by a soil test must be that acreage recommended by the land-grant university.

Where a conservation management unit (CMU) is used as the basis for a sampling unit, all acreage in the CMU must have similar soil type, cropping history, and management practice treatment.

The soil and tissue tests must include analyses pertinent to monitoring or amending the annual nutrient budget, e.g., pH, electrical conductivity (EC) and sodicity where salts are a concern, soil organic matter, phosphorus, potassium, or other nutrients and test for nitrogen where applicable. Follow land-grant university guidelines regarding required analyses.

Soil test analyses must be performed by laboratories successfully meeting the requirements and performance standards of the North American Proficiency Testing Program-Performance Assessment Program (NAPT-PAP) under the auspices of the Soil Science Society of America (SSSA) and NRCS, or other NRCS-approved program that considers laboratory performance and proficiency to assure accuracy of soil test results. Alternate proficiency testing programs must have solid stakeholder (e.g., water quality control entity, NRCS State staff, growers, and others) support and be regional in scope.

Nutrient values of manure, organic by-products and biosolids must be determined prior to land application.

Manure analyses must include, at minimum, total nitrogen (N), ammonium N, total phosphorus (P) or P_2O_5 , total potassium (K) or K_2O , and percent solids, or follow land-grant university guidance regarding required analyses.

Manure, organic by-products, and biosolids samples must be collected and analyzed at least annually, or more frequently if needed to account for operational changes (feed management, animal type, manure handling strategy, etc.) impacting manure nutrient concentrations. If no operational changes occur, less frequent manure testing is allowable where operations can document a stable level of nutrient concentrations for the preceding three consecutive years, unless federal, State, or local regulations require more frequent testing.

Samples must be collected, prepared, stored, and shipped, following land-grant university guidance or industry practice.

When planning for new or modified livestock operations, acceptable “book values” recognized by the NRCS (e.g., NRCS Agricultural Waste Management Field Handbook) and the land-grant university, or analyses from similar operations in the geographical area, may be used if they accurately estimate nutrient output from the proposed operation.

Manure testing analyses must be performed by laboratories successfully meeting the requirements and performance standards of the Manure Testing Laboratory Certification program (MTLCP) under the auspices of the Minnesota Department of Agriculture, or other NRCS- approved program that considers laboratory performance and proficiency to assure accurate manure test results.

Nutrient Application Rates.

Planned nutrient application rates for nitrogen, phosphorus, and potassium must not exceed land-grant university guidelines or industry practice when recognized by the university.

At a minimum, determination of rate must be based on crop/cropping sequence, current soil test results, realistic yield goals, and NRCS- approved nutrient risk assessments.

If the land-grant university does not provide specific guidance that meets these criteria, application rates must be based on plans that consider realistic yield goals and associated plant nutrient uptake rates.

Realistic yield goals must be established based on historical yield data, soil productivity information, climatic conditions, nutrient test results, level of management, and local research results considering comparable production conditions.

Estimates of yield response must consider factors such as poor soil quality, drainage, pH, salinity, etc., prior to assuming that nitrogen and/or phosphorus are deficient.

For new crops or varieties, industry-demonstrated yield, and nutrient utilization information may be used until land-grant university information is available.

Lower-than-recommended nutrient application rates are permissible if the grower's objectives are met.

Applications of biosolids, starter fertilizers, or pop-up fertilizers must be accounted for in the nutrient budget.

Nutrient Sources.

Nutrient sources utilized must be compatible with the application timing, tillage and planting system, soil properties, crop, crop

rotation, soil organic content, and local climate to minimize risk to the environment.

Nutrient Application Timing and Placement.

Timing and placement of all nutrients must correspond as closely as practical with plant nutrient uptake (utilization by crops), and consider nutrient source, cropping system limitations, soil properties, weather conditions, drainage system, soil biology, and nutrient risk assessment results.

Nutrients must not be surface-applied if nutrient losses offsite are likely. This precludes spreading on:

- frozen and/or snow-covered soils, and
- when the top 2 inches of soil are saturated from rainfall or snow melt.

Exceptions for the above criteria can be made for surface-applied manure when specified conditions are met and adequate conservation measures are installed to prevent the offsite delivery of nutrients. The adequate treatment level and specified conditions for winter applications of manure must be defined by NRCS in concurrence with the water quality control authority in the State. At a minimum, the following site and management factors must be considered:

- slope,
- organic residue and living covers,
- amount and form of nutrients to be applied, and
- adequate setback distances to protect local water quality.

Additional Criteria to Minimize Agricultural Nonpoint Source Pollution of Surface and Groundwater

Planners must use the current NRCS-approved nitrogen, phosphorus, and soil

erosion risk assessment tools to assess the risk of nutrient and soil loss. Identified resource concerns must be addressed to meet current planning criteria (quality criteria). Technical criteria for risk assessments can be found in NI-190-302.

When there is a high risk of transport of nutrients, conservation practices must be coordinated to avoid, control, or trap manure and nutrients before they can leave the field by surface or subsurface drainage (e.g., tile). The number of applications and the application rates must also be considered to limit the transport of nutrients to tile.

Nutrients must be applied with the right placement, in the right amount, at the right time, and from the right source to minimize nutrient losses to surface and groundwater. The following nutrient use efficiency strategies or technologies must be considered:

- slow and controlled release fertilizers
- nitrification and urease inhibitors
- enhanced efficiency fertilizers
- incorporation or injection
- timing and number of applications
- soil nitrate and organic N testing
- coordinate nutrient applications with optimum crop nutrient uptake
- Corn Stalk Nitrate Test (CSNT), Pre-Sidedress Nitrate Test (PSNT), and Pre-Plant Soil Nitrate Test (PPSN)
- tissue testing, chlorophyll meters, and spectral analysis technologies
- other land-grant university recommended technologies that improve nutrient use efficiency and minimize surface or groundwater resource concerns.

Additional Criteria Applicable to Properly Utilize Manure or Organic By-Products as a Plant Nutrient Source

When manures are applied, and soil salinity is a concern, salt concentrations must be monitored to prevent potential crop damage and/or reduced soil quality.

The total single application of liquid manure:

- must not exceed the soil's infiltration or water holding capacity
- be based on crop rooting depth
- must be adjusted to avoid runoff or loss to subsurface tile drains.

Crop production activities and nutrient use efficiency technologies must be coordinated to take advantage of mineralized plant-available nitrogen to minimize the potential for nitrogen losses due to denitrification or ammonia volatilization.

Nitrogen and phosphorus application rates must be planned based on risk assessment results as determined by NRCS-approved nitrogen and phosphorus risk assessment tools.

For fields receiving manure, where phosphorus risk assessment results equate to LOW risk, additional phosphorus and potassium can be applied at rates greater than crop requirement not to exceed the nitrogen requirement for the succeeding crop. For fields receiving manure, where phosphorus risk assessment results equate to MODERATE risk, additional phosphorus and potassium may be applied at a phosphorus crop requirement rate for the planned crops in the rotation. When phosphorus risk assessment results equate to HIGH risk, additional phosphorus and potassium may be applied at phosphorus

crop removal rates if the following requirements are met:

- a soil phosphorus drawdown strategy has been implemented, and
- a site assessment for nutrients and soil loss has been conducted to determine if mitigation practices are required to protect water quality.
- any deviation from these high risk requirements must have the approval of the Chief of the NRCS.

Manure or organic by-products may be applied on legumes at rates equal to the estimated removal of nitrogen in harvested plant biomass, not to exceed land grant university recommendations.

Manure may be applied at a rate equal to the recommended phosphorus application, or estimated phosphorus removal in harvested plant biomass for the crop rotation, or multiple years in the crop sequence at one time. When such applications are made, the application rate must not exceed the acceptable phosphorus risk assessment criteria, must not exceed the recommended nitrogen application rate during the year of application or harvest cycle, and no additional phosphorus must be applied in the current year and any additional years for which the single application of phosphorus is supplying nutrients.

Additional Criteria to Protect Air Quality by Reducing Odors, Nitrogen Emissions and the Formation of Atmospheric Particulates

To address air quality concerns caused by odor, nitrogen, sulfur, and/or particulate emissions; the source, timing, amount, and placement of nutrients must be adjusted to minimize the negative impact of these emissions on the environment and human

health. One or more of the following may be used:

- slow or controlled release fertilizers
- nitrification inhibitors
- urease inhibitors
- nutrient enhancement technologies
- incorporation
- injection
- stabilized nitrogen fertilizers
- residue and tillage management
- no-till or strip-till
- other technologies that minimize the impact of these emissions

Do not apply poultry litter, manure, or organic by-products of similar dryness/density when there is a high probability that wind will blow the material offsite.

Additional Criteria to Improve or Maintain the Physical, Chemical, and Biological Condition of the Soil to Enhance Soil Quality for Crop Production and Environmental Protection

Time the application of nutrients to avoid periods when field activities will result in soil compaction.

In areas where salinity is a concern, select nutrient sources that minimize the buildup of soil salts.

CONSIDERATIONS

Elevated soil test phosphorus levels are detrimental to soil biota. Soil test phosphorus levels should not exceed State-approved soil test thresholds established to protect the environment.

Use no-till/strip-till in combination with cover crops to sequester nutrients, increase soil organic matter, increase aggregate stability, reduce compaction, improve infiltration, and enhance soil biological activity to improve nutrient use efficiency.

Use nutrient management strategies such as cover crops, crop rotations, and crop rotations with perennials to improve nutrient cycling and reduce energy inputs.

Use variable-rate nitrogen application based on expected crop yields, soil variability, soil nitrate or organic N supply levels, or chlorophyll concentration.

Use variable-rate nitrogen, phosphorus, and potassium application rates based on site-specific variability in crop yield, soil characteristics, soil test values, and other soil productivity factors.

Develop site-specific yield maps using a yield monitoring system. Use the data to further diagnose low- and high- yield areas, or zones, and make the necessary management changes. See Title 190, Agronomy Technical Note (TN) 190.AGR.3, Precision Nutrient Management Planning.

Use manure management conservation practices to manage manure nutrients to limit losses prior to nutrient utilization.

Apply manure at a rate that will result in an “improving” Soil Conditioning Index (SCI) without exceeding acceptable risk of nitrogen or phosphorus loss.

Use legume crops and cover crops to provide nitrogen through biological fixation and nutrient recycling.

Modify animal feed diets to reduce the nutrient content of manure following guidance contained in Conservation Practice Standard (CPS) Code 592, Feed Management.

Soil test information should be no older than 1 year when developing new plans.

Excessive levels of some nutrients can cause induced deficiencies of other nutrients, e.g., high soil test phosphorus levels can result in zinc deficiency in corn.

Use soil tests, plant tissue analyses, and field observations to check for secondary plant nutrient deficiencies or toxicity that may impact plant growth or availability of the primary nutrients.

Use the adaptive nutrient management learning process to improve nutrient use efficiency on farms as outlined in the NRCS’ National Nutrient Policy in GM 190, Part 402, Nutrient Management.

Potassium should not be applied in situations where an excess (greater than soil test potassium recommendation) causes nutrient imbalances in crops or forages.

Workers should be protected from and avoid unnecessary contact with plant nutrient sources. Extra caution must be taken when handling anhydrous ammonia or when dealing with organic wastes stored in unventilated enclosures.

Material generated from cleaning nutrient application equipment should be utilized in an environmentally safe manner. Excess material should be collected and stored or field applied in an appropriate manner.

Nutrient containers should be recycled in compliance with State and local guidelines or regulations.

Considerations to Minimize Agricultural Nonpoint Source Pollution of Surface and Groundwater.

Use conservation practices that slow runoff, reduce erosion, and increase infiltration, e.g., filter strip, contour farming, or contour buffer strips. These practices can also reduce the loss of nitrates or soluble phosphorus.

Use application methods and timing strategies that reduce the risk of nutrient transport by ground and surface waters, such as:

- split applications of nitrogen to deliver nutrients during periods of maximum crop utilization,
- banded applications of nitrogen and/or phosphorus to improve nutrient availability,
- drainage water management to reduce nutrient discharge through drainage systems, and
- incorporation of surface-applied manures or organic by-products if precipitation capable of producing runoff or erosion is forecast within the time of planned application.

Use the agricultural chemical storage facility conservation practice to protect air, soil, and water quality.

Use bioreactors and multistage drainage strategies when approved by the land-grant university.

Considerations to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere.

Avoid applying manure and other by-products upwind of inhabited areas.

Use high-efficiency irrigation technologies (e.g., reduced-pressure drop nozzles for center pivots) to reduce the potential for nutrient losses.

PLANS AND SPECIFICATIONS

The following components must be included in the nutrient management plan:

- aerial site photograph(s)/imagery or site map(s), and a soil survey map of the site,
- soil information including: soil type surface texture, pH, drainage class, permeability, available water capacity, depth to water table, restrictive features, and flooding and/or ponding frequency,

- location of designated sensitive areas and the associated nutrient application restrictions and setbacks,
- for manure applications, location of nearby residences, or other locations where humans may be present on a regular basis, and any identified meteorological (e.g., prevailing winds at different times of the year), or topographical influences that may affect the transport of odors to those locations,
- results of approved risk assessment tools for nitrogen, phosphorus, and erosion losses,
- documentation establishing that the application site presents low risk for phosphorus transport to local water when phosphorus is applied in excess of crop requirement.
- current and/or planned plant production sequence or crop rotation,
- soil, water, compost, manure, organic by-product, and plant tissue sample analyses applicable to the plan,
- when soil phosphorus levels are increasing, include a discussion of the risk associated with phosphorus accumulation and a proposed phosphorus draw-down strategy,
- realistic yield goals for the crops,
- complete nutrient budget for nitrogen, phosphorus, and potassium for the plant production sequence or crop rotation,
- listing and quantification of all nutrient sources and form,
- all enhanced efficiency fertilizer products that are planned for use,
- in accordance with the nitrogen and phosphorus risk assessment tool(s), specify the recommended nutrient application source, timing, amount (except for precision/variable rate applications specify method used to determine rate), and placement of plant nutrients for each field or management unit, and
- guidance for implementation, operation and maintenance, and recordkeeping.

In addition, the following components must be included in a precision/variable rate nutrient management plan:

- Document the geo-referenced field boundary and data collected that was processed and analyzed as a GIS layer or layers to generate nutrient or soil amendment recommendations.
- Document the nutrient recommendation guidance and recommendation equations used to convert the GIS base data layer or layers to a nutrient source material recommendation GIS layer or layers.
- Document if a variable rate nutrient or soil amendment application was made.
- Provide application records per management zone or as applied map within individual field boundaries (or electronic records) documenting source, timing, method, and rate of all applications that resulted from use of the precision agriculture process for nutrient or soil amendment applications.
- Maintain the electronic records of the GIS data layers and nutrient applications for at least 5 years.

If increases in soil phosphorus levels are expected (i.e., when N-based rates are used), the nutrient management plan must document:

- the soil phosphorus levels at which it is desirable to convert to phosphorus based planning,
- the potential plan for soil test phosphorus drawdown from the production and harvesting of crops, and
- management activities or techniques used to reduce the potential for phosphorus transport and loss,
- for AFOs, a quantification of manure produced in excess of crop nutrient requirements, and

- a long-term strategy and proposed implementation timeline for reducing soil P to levels that protect water quality,

OPERATION AND MAINTENANCE

Conduct periodic plan reviews to determine if adjustments or modifications to the plan are needed. At a minimum, plans must be reviewed and revised, as needed with each soil test cycle, changes in manure volume or analysis, crops, or crop management.

Fields receiving animal manures and/or biosolids must be monitored for the accumulation of heavy metals and phosphorus in accordance with land- grant university guidance and State law.

Significant changes in animal numbers, management, and feed management will necessitate additional manure analyses to establish a revised average nutrient content.

Calibrate application equipment to ensure accurate distribution of material at planned rates.

Document the nutrient application rate. When the applied rate differs from the planned rate, provide appropriate documentation for the change.

Records must be maintained for at least 5 years to document plan implementation and maintenance. As applicable, records include:

- soil, plant tissue, water, manure, and organic by-product analyses resulting in recommendations for nutrient application,
- quantities, analyses and sources of nutrients applied,
- dates, and method(s) of nutrient applications, source of nutrients, and rates of application,
- weather conditions and soil moisture at the time of application; lapsed time to manure incorporation; rainfall or irrigation event,
- crops planted, planting and harvest dates, yields, nutrient analyses of harvested biomass, and crop residues removed,

- dates of plan review, name of reviewer, and recommended changes resulting from the review, and
- all enhanced efficiency fertilizer products used.

Additional records for precision/variable rate sites must include:

- maps identifying the variable application source, timing, amount, and placement of all plant nutrients applied, and
- GPS-based yield maps for crops where yields can be digitally collected.

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Association of American Plant Food Control Officials (AAPFCO). 2011. AAPFCO Official Publication no. 64. AAPFCO Inc., Little Rock, AR.

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Schepers, J.S., and W.R. Ruan, (eds.) 2008. Nitrogen in agricultural systems. Agron. Monogr. no. 49, American Society of Agronomy (ASA), Crop Science Society of America (CSSA), Soil Science Society of America (SSSA). Madison, WI.

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APPENDIX B.3 CONSERVATION PRACTICE STANDARDS

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

INTEGRATED PEST MANAGEMENT (IPM)

(Ac.)

CODE 595

DEFINITION

A site-specific combination of pest prevention, pest avoidance, pest monitoring, and pest suppression strategies.

PURPOSE

1. Prevent or mitigate off-site pesticide risks to water quality from leaching, solution runoff and adsorbed runoff losses.
2. Prevent or mitigate off-site pesticide risks to soil, water, air, plants, animals and humans from drift and volatilization losses.
3. Prevent or mitigate on-site pesticide risks to pollinators and other beneficial species through direct contact.
4. Prevent or mitigate cultural, mechanical and biological pest suppression risks to soil, water, air, plants, animals and humans.

CONDITIONS WHERE PRACTICE APPLIES

On all lands where pests will be managed.

CRITERIA

General Criteria Applicable to All Purposes

IPM strategies (Prevention, Avoidance, Monitoring and Suppression or “PAMS”) shall be employed to prevent or mitigate pest management risks for identified natural resource concerns.

A comprehensive IPM plan utilizing PAM’s strategies will be developed in accordance with this standard to document how specific pest management risks will be prevented or mitigated. The IPM plan must be crop and/or land use specific and adhere to applicable elements and guidelines accepted by the local Land Grant University or Extension.

If a comprehensive IPM system is not feasible, utilize appropriate IPM techniques to adequately prevent or mitigate pest management risks for identified natural resource concerns.

Additional Criteria to Prevent or Mitigate Off-site Pesticide Risks to Water Quality from Leaching, Solution Runoff and Adsorbed Runoff Losses

For identified water quality concerns related to pesticide leaching, solution

runoff and adsorbed runoff, the current version of the USDA-NRCS WIN-PST program will be used to evaluate potential risks to humans and/or fish, as appropriate, for each pesticide to be used.

The minimum level of mitigation required for each resource concern is based on the final risk ratings in the “WIN-PST Soil/Pesticide Interaction Hazard Ratings” Table below:

WIN-PST Identified Hazard Rating	Minimum Mitigation Index Score Level Needed
Low or Very Low	None Needed
Intermediate	20
High	40
Extra High	60

Use Agronomy Technical Note 5, Pest Management in the Conservation Planning Process - Table II to determine if planned conservation practices provide adequate mitigation. If they do not, use Agronomy Technical Note 5 - Table I to apply appropriate IPM techniques with this practice.

Additional Criteria to Prevent or Mitigate Off-site Pesticide Risks to Soil, Water, Air, Plants, Animals and Humans from Drift and Volatilization Losses

For identified natural resource concerns related to pesticide drift, use Agronomy Technical Note 5, Pest Management in the Conservation Planning Process – Table II to determine if planned conservation practices provide adequate mitigation. If they do not, use Agronomy Technical Note 5 - Table I to apply appropriate IPM techniques with this practice. The minimum level of mitigation required for drift is an index score of 20.

For Volatile Organic Compound (VOC) emission concerns, apply at least one IPM mitigation technique from the Pesticide Volatilization section of Agronomy Technical Note 5 - Pest Management in the Conservation Planning Process.

Additional Criteria to Prevent or Mitigate On-site Pesticide Risks to Pollinators and Other Beneficial Species through Direct Contact

For direct contact pesticide risks to pollinators and other beneficial species in the application area, apply at least two IPM mitigation techniques from the Pesticide Direct Contact section of Agronomy Technical Note 5 - Pest Management in the Conservation Planning Process.

Additional Criteria to Prevent or Mitigate Cultural, Mechanical and Biological

Pest Suppression Risks to Soil, Water, Air, Plants and Animals

For identified natural resource concerns related to cultural, mechanical and biological pest suppression, (e.g. air quality concerns with burning for weed control or soil erosion concerns with tillage for weed control), natural resource concerns shall be addressed to FOTG quality criteria levels.

CONSIDERATIONS

IPM strategies that keep pest populations below economically damaging levels and minimize pest resistance should be utilized because they also help prevent unnecessary pest management risks to natural resources and humans.

For noxious weed and invasive species control, the minimum level of pest suppression necessary to meet natural resource objectives should be used, however, for the eradication of invasive species, the acceptable pest threshold may be zero.

IPM Prevention, Avoidance, Monitoring, and Suppression (PAMS) techniques include:

- Prevention – Activities such as cleaning equipment and gear when leaving an infested area, using pest-free seeds and transplants, and irrigation scheduling to limit situations that are conducive to disease development.
- Avoidance – Activities such as maintaining healthy and diverse plant communities, using pest resistant varieties, crop rotation, and refuge management.

- Monitoring – Activities such as pest scouting, degree-day modeling, and weather forecasting to help target suppression strategies and avoid routine preventative treatments.
- Suppression – Activities such as the judicious use of cultural, mechanical, biological and chemical control methods that reduce or eliminate a pest population or its impacts while minimizing risks to non-target organisms.

IPM guidelines from the local Land Grant University or Extension may be supplemented with information from appropriately certified professionals.

When providing technical assistance to organic producers, the IPM approach to managing pests should be consistent with the USDA-Agricultural Marketing Service National Organic Program standard which includes:

- A diverse crop rotation that reduces habitat for major pests and increases habitat for natural enemies
- Use of “farmscaping” principles to create borders of beneficial species habitat
- Farming techniques to improve soil quality
- Planting of locally adapted, pest resistant crop cultivars.

Adequate plant nutrients and soil moisture, including favorable pH and soil quality, can reduce plant stress, improve plant vigor and increase the plant's overall ability to tolerate pests.

On irrigated land, irrigation water management should be designed to avoid conditions conducive to disease development and minimize offsite contaminant movement.

Producers should be reminded that they are responsible for following all pesticide label instructions and complying with all applicable Federal, state and local regulations, including those that protect Threatened and Endangered Species.

Enhancement Considerations

1. A more intensive level of IPM focused primarily on prevention and avoidance strategies can further minimize pest management risks to natural resources and humans.
2. Precision pesticide application techniques in an IPM system can further minimize pesticide risks to natural resources and humans.

PLANS AND SPECIFICATIONS

The IPM plan shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

The IPM plan shall include at a minimum:

1. Plan map and soil map of site/affected area, if applicable (use conservation plan maps if available).
2. Location of sensitive resources and setbacks, if applicable (use conservation plan maps if available).
3. Interpretation of the environmental risk analysis. Note: all pesticide label requirements and federal, state, and local regulations must be followed for all pesticide applications.
4. Identification of appropriate mitigation techniques. See Agronomy Technical Note 5 - Table I for pesticide risk mitigation management techniques.
5. A list of pest prevention and avoidance strategies that will be implemented, if applicable.

6. A scouting plan and threshold levels for each pest, if applicable.
7. Other monitoring plans, if applicable, such as weather monitoring to indicate when pesticide application for prevention is warranted.
8. A list of accepted pest thresholds or methods to determine thresholds that warrant treatment, if applicable.

Note: Items 5, 6, 7 and 8 are required to document a comprehensive IPM system, but they may not be applicable when only a limited number of mitigation techniques are sufficient to address identified natural resource concerns.

Record Keeping. The following records, where applicable, shall be maintained by the producer:

1. Monitoring or scouting results including the date, pest population/degree of infestation, and the crop or plant community condition.
2. When and where each pest suppression technique was implemented.
3. When and where special IPM techniques were implemented to mitigate site-specific risks (e.g. soil incorporation of a pesticide to reduce its surface runoff to a nearby stream).

Note: Applicability will depend on the level of IPM adoption and mitigation requirements.

OPERATION AND MAINTENANCE

The IPM plan shall include appropriate operation and maintenance items for the client. These may include:

- Review and update the plan periodically in order to incorporate new IPM strategies, respond to cropping system and pest complex

changes, and avoid the development of pest resistance.

- Maintain mitigation techniques identified in the plan in order to ensure continued effectiveness.
- Calibrate application equipment according to Extension and/or manufacturer recommendations before each season of use and with each major chemical change.
- Maintain records of pest management for at least two years. Pesticide application records shall be in accordance with USDA Agricultural Marketing Service's Pesticide Recording Keeping Program and site specific requirements.

REFERENCES

National Information System for the Regional IPM Centers – IPM Elements and Guidelines:

<http://www.ipmcenters.org/ipmelements/index.cfm>

USDA-AMS National Organic Program, National List of Allowed and Prohibited Substances.

<http://www.ams.usda.gov/AMSV1.0/ams.fetchTemplateData.do?template=TemplateN&navID=NationalListLinkNOPNationalOrganicProgramHome&rightNav1=NationalListLinkNOPNationalOrganicProgramHome&topNav=&leftNav=NationalOrganicProgram&page=NOPNationalList&resultType=&acct=nopgeninfo>

USDA-NRCS GM-190-404 Pest Management Policy:

<http://directives.sc.egov.usda.gov/RollupViewer.aspx?hid=17015>

Using Farming Bill Programs for Pollinator Conservation:

http://plants.usda.gov/pollinators/Using_Farm_Bill_Programs_for_Pollinator_Conservation.pdf

[rvation.pdf](http://plants.usda.gov/pollinators/Using_Farm_Bill_Programs_for_Pollinator_Conservation.pdf)

APPENDIX B.3 CONSERVATION PRACTICE STANDARDS

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

WASTE RECYCLING

(Tons)

CODE 633

DEFINITION

The use of the by-products of agricultural production or the agricultural use of non-agricultural by-products.

PURPOSE

- Protect or improve the quality of natural resources and the environment
- Provide or reduce energy use

CONDITIONS WHERE PRACTICE APPLIES

Where waste can be processed and recycled to prevent a resource problem or provide a conservation benefit.

Where the intended recycling activity is identified in a waste management system plan or an equivalent plan.

CRITERIA

General Criteria Applicable to All Purposes

Comply with all federal, state, local and tribal laws, rules and regulations governing waste management, pollution abatement, health and safety.

The owner or operator shall be responsible for securing all required permits or approvals related to waste recycling, and for operating and maintaining any

components in accordance with applicable laws and regulations.

Perform at least one analysis of the waste to determine the characteristics that are critical to its use and base the use of the waste on the analysis. Use a laboratory certified by a State recognized program that considers laboratory performance and proficiency to assure accuracy of testing results.

When manure or other wastes are used for plant nutrients the practice shall comply with conservation practice standard 590, Nutrient Management.

When wastes are used for animal feed the practice shall comply with the criteria in conservation practice standard 592, Feed Management.

Manage residuals generated by waste processing and recycling activities in a manner that prevents degradation of natural resources and the environment.

CONSIDERATIONS

Consider treatments that add value to agricultural waste and that meet local market criteria.

Consider recycling used containers by returning them to the suppliers or manufacturers that have a recycling program.

Consider recycling water used in agricultural produce processing.

Consider using organic waste for bedding, feed, mulch, energy production, or soil quality improvement.

Consider the net effect of waste recycling on greenhouse gas emissions and carbon sequestration.

PLANS AND SPECIFICATIONS

Plans and specifications for Waste Recycling shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. The waste management system plan is to account for the use, recycling or disposal of all wastes produced or received by the agricultural operation.

OPERATION AND MAINTENANCE

Records shall be kept for a period of at least five years, and include when appropriate:

- The dates and quantities of waste imported to or exported from the agricultural production system.
- Analysis of critical waste characteristics.
- A description of how the waste recycled and the conservation benefit achieved.

The operation and maintenance plan shall include the dates of periodic inspections and maintenance of equipment and facilities used in recycling of the waste. The plan should include what is to be inspected or maintained, and a general time frame for preventive maintenance.

APPENDIX B.3 CONSERVATION PRACTICE STANDARDS

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

EARLY SUCCESSIONAL HABITAT DEVELOPMENT/MANAGEMENT

(Ac.)

CODE 647

DEFINITION

Manage plant succession to develop and maintain early successional habitat to benefit desired wildlife and/or natural communities.

PURPOSE

To provide habitat for species requiring early successional habitat for all or part of their life cycle.

CONDITIONS WHERE PRACTICE APPLIES

On all lands that are suitable for the kinds of desired wildlife and plant species.

CRITERIA

Management will be designed to achieve the desired plant community structure (e.g., density, vertical and horizontal cover) and plant species diversity.

Where planting is needed, regionally adapted plant materials will be used.

Site preparation, planting dates, and planting methods shall optimize survival.

Planting of noxious weeds and invasive species is prohibited.

Measures must be provided to control noxious weeds and invasive species.

If using chemical methods of control, Pesticide Screening Tool (WinPST) shall be used to assess risks, and appropriate

mitigation to reduce known risks shall be employed.

To benefit insect food sources for grassland nesting birds, spraying or other control of noxious weeds will be in a targeted manner through the use of spot spraying, mechanical or hand wick applicators, or other approved methods to protect grasses, forbs and legumes that benefit native pollinators and other wildlife.

Management will be timed to minimize negative impacts to wildlife. Disturbance to habitat shall be restricted during critical periods (e.g., wildlife nesting, brood rearing, fawning or calving seasons).

Minimize soil disturbance in natural communities where soil integrity is essential, on steep slopes, on highly erodible soil, and where establishment of invasive species is likely.

When grazing is used as a management tool, a prescribed grazing plan developed to specifically meet the intent and objective(s) of this practice standard is required.

CONSIDERATIONS

Vegetative manipulation to maximize plant and animal diversity can be accomplished by disturbance practices that include, but are not limited to: selected herbicide

techniques, brush management prescribed burning, light disking, mowing, prescribed grazing, or a combination of these.

This practice should be applied periodically to maintain the desired early successional plant community and rotated throughout the managed area.

Wildlife habitat purposes often require lighter seeding rates than specified to prevent soil erosion.

Design and install the treatment layout to facilitate:

- operation of machinery
- use of natural firebreaks or development and maintenance of bare soil firebreaks when prescribed burning.

When prescribed grazing, consider setting aside a paddock near the center of the pasture and defer grazing until after the critical nest and brood rearing period. Many grassland birds require more than 40 days to fledge their young.

When selecting plants and designing management for this practice, consider the needs of pollinators and incorporate to the maximum extent practicable.

PLANS AND SPECIFICATIONS

Written specifications, application schedules and maps shall be prepared for each site. Specifications shall identify the amounts and kinds of habitat elements, locations and management actions necessary to achieve management objectives.

Specifications shall be transmitted to clients using approved specification sheets, job sheets, and customized practice narratives or by other written documentation approved by NRCS.

OPERATION AND MAINTENANCE

The following actions shall be carried out to insure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance).

Occasional disturbance may be incorporated into the management plan to ensure the intended purpose of this practice.

Any use of fertilizers, pesticides and other chemicals shall not compromise the intended purpose.

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APPENDIX B.3 CONSERVATION PRACTICE STANDARDS

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WETLAND RESTORATION

(Ac.)

CODE 657

DEFINITION

The return of a wetland and its functions to a close approximation of its original condition as it existed prior to disturbance on a former or degraded wetland site.

PURPOSE

To restore wetland function, value, habitat, diversity, and capacity to a close approximation of the pre-disturbance conditions by restoring:

- Conditions conducive to hydric soil maintenance.
- Wetland hydrology (dominant water source, hydroperiod, and hydrodynamics).
- Native hydrophytic vegetation (including the removal of undesired species, and/or seeding or planting of desired species).
- Original fish and wildlife habitats.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies only to natural wetland sites with hydric soils which have been subject to the degradation of hydrology, vegetation, or soils.

This practice is applicable only where the natural hydrologic conditions can be approximated by actions such as

modifying drainage, restoring stream/floodplain connectivity, removing diversions, dikes, and levees, and/or by using a natural or artificial water source to provide conditions similar to the original, natural conditions.

This practice does not apply to:

- The treatment of point and non-point sources of water pollution (Constructed Wetland - 656);
- The rehabilitation of a degraded wetland, the reestablishment of a former wetland, or the modification of an existing wetland, where specific wetland functions are augmented beyond the original natural conditions; possibly at the expense of other functions. (Wetland Enhancement - 659);
- The creation of a wetland on a site location which was historically non-wetland (Wetland Creation - 658).
- The management of fish and wildlife habitat on wetlands restored under this standard.

NRCS, NHCP
August, 1998

CRITERIA

General Criteria Applicable to All Purposes

The purpose, goals, and objectives of the restoration shall be clearly defined in the restoration plan, including soils, hydrology, vegetation, and fish and wildlife habitat criteria that are to be met and are appropriate for the site and the project objectives.

These planning steps shall be done with the use of a functional assessment-type procedure, or a state approved equivalent. The objectives will be determined by an analysis of current and historic site functions. They will be based on those functions which can reasonably be supported by current site constraints. Data from historic and recent aerial photography and/or other remotely sensed data, soil maps, topographic maps, stream gage data, intact reference wetlands, and historical records shall be gathered.

The soils, hydrology and vegetative conditions existing on the site, the adjacent landscape, and the contributing watershed shall be documented in the planning process.

The nutrient and pesticide tolerance of the plant and animal species likely to occur shall be evaluated where known nutrient and pesticide contamination exists. Sites suspected of containing hazardous material shall be tested to identify appropriate remedial measures. If remedial measures are not possible or practicable, the practice shall not be planned.

The availability of sufficient water rights should be reviewed prior to restoration.

Upon completion, the site shall meet soil, hydrology, vegetation and habitat conditions of the wetland that previously existed on the site to the extent practicable.

Where offsite hydrologic alterations or the presence of invasive species impact the site, the design shall compensate for these impacts to the extent practicable.

Invasive species, federal/state listed noxious plant species, and nuisance species (e.g., those whose presence or overpopulation jeopardize the practice) shall be controlled on the site as necessary to restore wetland functions. The establishment and/or use of non-native plant species shall be discouraged.

Criteria for Hydric Soil Restoration

Restoration sites will be located on soils that are hydric.

If the hydric soil is covered by fill, sediment, spoil, or other depositional material, the material covering the hydric soil shall be removed to the extent needed to restore the original soil functions.

Soil hydrodynamic and bio-geochemical properties such as permeability, porosity, pH, or soil organic carbon levels shall be restored to the extent needed to restore hydric soil functions.

Criteria for Hydrology Restoration

The hydroperiod, hydrodynamics, and dominant water source of the restored site shall approximate the conditions that existed before alteration. The restoration plan shall document the adequacy of available water sources based on groundwater investigation, stream gage data, water budgeting, or other appropriate means.

The work associated with the wetland shall not adversely affect adjacent properties or other water users unless agreed to by signed written letter, easement or permit.

Timing and level setting of water control structures, if needed, will be based on the actions needed to maintain a close approximation of the original, natural hydrologic conditions.

The original natural water supply should be used to reestablish the site's hydrology to approximate the hydrologic conditions of the wetland type. If this is not possible, an alternate natural or artificial water supply can be used; however, these sources shall not be diverted from other wetland resources. If the alternate water source requires energy inputs, these shall be estimated and documented in the restoration plan.

To the extent technically feasible reestablish macrotopography and/or microtopography. Use reference sites within the local area to determine desired topographic relief. The location, size, and geometry of earthen structures, if needed, shall match that of the original macrotopographic features to the extent practicable.

Macrotopographic features, including ditch plugs installed in lieu of re-filling surface drainage ditches, shall meet the requirements of other practice standards to which they may apply due to purpose, size, water storage capacity, hazard class, or other parameters. If no other practice standard applies, they shall meet the requirements for Dike – 356 unless there is no potential for damage to the feature or other areas on or off site due to erosion, breaching, or overtopping.

Excavations from within the wetland shall remove sediment to approximate the original topography or establish a water level that will compensate for the sediment that remains.

Water control structures that may impede the movement of target aquatic species or

species of concern shall meet the criteria in Fish Passage, Code 396.

Wetland restoration sites that exhibit soil oxidation and/or subsidence, resulting in a lower surface elevation compared to pre-disturbance, shall take into account the appropriate hydrologic regime needed to support the original wetland functions.

Criteria for Vegetative Restoration

Hydrophytic vegetation restoration shall be of species typical for the wetland type(s) being established and the varying hydrologic regimes and soil types within the wetland. Preference shall be given to native wetland plants with localized genetic material.

Where natural colonization of acceptable species can realistically be expected to occur within 5 years, sites may be left to revegetate naturally. If not, the appropriate species will be established by seeding or planting.

Adequate substrate material and site preparation necessary for proper establishment of the selected plant species shall be included in the plan.

Where planting and/or seeding is necessary, the minimum number of native species to be established shall be based on a reference wetland with the type of vegetative communities and species planned on the restoration site:

- Where the dominant vegetation will be herbaceous community types, a subset of the original vegetative community shall be established within 5 years, or a suitable precursor to the original community will be established within 5 years that creates conditions suitable for the establishment of the native community. Species richness shall be addressed in the planning of

herbaceous communities. Seeding rates shall be based upon the percentage of pure live seed and labeled with a current seed tag from a registered seed laboratory identifying the germination rate, purity analysis, and other seed statistics.

- Where the dominant vegetation will be forest or woodland community types, vegetation establishment will include a mix of woody species (trees and/or shrubs) adequate to establish the reference wetland community.

CONSIDERATIONS

Soil Considerations

Consider making changes to physical soil properties, including:

- Increasing or decreasing saturated hydraulic conductivity by mechanical compaction or tillage, as appropriate.
- Incorporating soil amendments.
- The effect of construction equipment on soil density, infiltration, and structure.

Consider changes in soil bio-geochemical properties, including:

- Increasing soil organic carbon by incorporating compost.

Increasing or decreasing soil pH with lime, gypsum, or other compounds

Hydrology Considerations

Consider the general hydrologic effects of the restoration, including:

- Impacts on downstream stream hydrographs, volumes of surface runoff, and groundwater resources due to changes of water use and movement created by the restoration.

Consider the impacts of water level management, including:

- Increased predation due to concentrating aquatic organisms, including herptivores, in small pool areas during draw downs
- Increased predation of amphibians due to high water levels that can sustain predators.
- Decreased ability of aquatic organisms to move within the wetland and from the wetland area to adjacent habitats, including fish and amphibians as water levels are decreased.
- Increases in water temperature on-site, and in off-site receiving waters.
- Changes in the quantity and direction of movement of subsurface flows due to increases or decreases in water depth.
- The effect changes in hydrologic regime have on soil bio-geochemical properties, including: oxidation/reduction; maintenance of organic soils; and salinity increase or decrease on site and on adjacent areas.

Vegetation Considerations

Consider:

- The relative effects of planting density on fish and wildlife habitat versus production rates in woody plantings.
- The potential for vegetative buffers to increase function by trapping sediment, cycling nutrients, and removing pesticides.
- The selection of vegetation for the protection of structural measures that is appropriate for wetland function.
- The potential for invasive or noxious plant species to establish on bare soils after construction and before the planned plant community is established.
- The use of prescribed burning to restore wetland and adjacent upland plant communities.

Fish and Wildlife Habitat Considerations

Consider:

- The addition of coarse woody debris on sites to be restored to woody plant

communities for an initial carbon source and fish and wildlife cover.

- The potential to restore habitat capable of supporting fish and wildlife with the ability to control disease vectors such as mosquitoes.
- The potential to establish fish and wildlife corridors to link the site to adjacent landscapes, streams, and water bodies and to increase the sites colonization by native flora.
- The need to provide barriers to passage for unwanted or predatory species.

PLANS AND SPECIFICATIONS

Plans and specifications for this practice shall be prepared for each site. Plans and specifications shall be recorded using approved specifications sheets, job sheets, or other documentation. The plans and specifications for structural features will include, at a minimum, a plan view, quantities, and sufficient profiles and cross-sections to define the location, line, and grade for stakeout and checkout. Plans and specifications shall be reviewed and approved by staff with appropriate job approval authority.

OPERATION AND MAINTENANCE

A separate Operation and Maintenance Plan will be prepared for sites that have structural features. The plan will include specific actions for the normal and repetitive operation of installed structural items, especially water control structures, if included in the project. The plan will also include the maintenance actions necessary to assure that constructed items are maintained for the life of the project. It will include the inspection schedule, a list of items to inspect, a checklist of potential damages to look for, recommended repairs, and procedures for documentation.

Management and monitoring activities needed to ensure the continued success of

the wetland functions may be included in the above plan, or in a separate Management and Monitoring Plan. In addition to the monitoring schedule, this plan may include the following:

- The timing and methods for the use of fertilizers, pesticides, prescribed burning, or mechanical treatments.
- Circumstances when the use of biological control of undesirable plant species and pests (e.g. using predator or parasitic species) is appropriate, and the approved methods.
- Actions which specifically address any expected problems from invasive or noxious species.
- The circumstances which require the removal of accumulated sediment.
- Conditions which indicate the need to use haying or grazing as a management tool, including timing and methods.

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APPENDIX B.3 CONSERVATION PRACTICE STANDARDS

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

WETLAND ENHANCEMENT

(Ac.)

CODE 659

DEFINITION

The augmentation of wetland functions beyond the original natural conditions on a former, degraded, or naturally functioning wetland site; sometimes at the expense of other functions.

PURPOSE

To increase the capacity of specific wetland functions (such as habitat for targeted species, and recreational and educational opportunities) by enhancing:

- Hydric soil functions (changing soil hydrodynamic and/or bio-geochemical properties).
- Hydrology (dominant water source, hydroperiod, and hydrodynamics).
- Vegetation (including the removal of undesired species, and/or seeding or planting of desired species).
- Enhancing plant and animal habitats.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to any degraded or non-degraded wetland sites with hydric soils, where the objective is to enhance selected wetland functions to conditions different than those that originally existed on the site.

This practice does not apply to:

- The treatment of point and non-point sources of water pollution (Constructed Wetland – Code 656);
- The rehabilitation of a degraded wetland or the reestablishment of a former wetland so that soils, hydrology, vegetative community, and habitat are a close approximation of the original natural condition and boundary that existed prior to the modification (Wetland Restoration – Code 657).
- The creation of a wetland on a site location that was historically non-wetland. (Wetland Creation – Code 658).
- The management of fish and wildlife habitat on wetlands enhanced under this standard.

CRITERIA

General Criteria Applicable to All Purposes

The purpose, goals, and objectives of the enhancement shall be clearly defined in the enhancement plan, including soils, hydrology, vegetation, and fish and wildlife habitat criteria that are to be met and are appropriate for the site and the project objectives.

The planning process will evaluate the impact of this practice on existing non-degraded wetland functions and/or values. The relative increase or decrease in functions will be assessed with the use of a functional assessment procedure or state approved equivalent. The functions to be increased or decreased on wetlands found to be currently functioning at or near a “reference” condition will be documented.

The soils, hydrology, and vegetative conditions existing on the site, the adjacent landscape, and the contributing watershed shall be documented in the planning process.

The nutrient and pesticide tolerance of the plant and animal species likely to occur shall be evaluated where known nutrient and pesticide contamination exists. Sites suspected of containing hazardous material shall be tested to identify appropriate remedial measures. If remedial measures are not possible or practicable, the practice shall not be planned.

The availability of sufficient water rights should be reviewed prior to enhancement.

Upon completion, the site shall meet the appropriate wetland criteria and provide wetland functions as defined in the project’s objectives.

Invasive species, federal/state listed noxious plant species, and nuisance species (e.g., those whose presence or overpopulation jeopardize the practice) shall be controlled on the site as necessary to enhance wetland functions. The establishment and/or use of non-native plant species shall be discouraged.

Criteria for Hydric Soil Enhancement

Enhancement sites will be located on soils that are hydric.

Changes to soil hydrodynamic and biogeochemical properties such as permeability, porosity, pH, or soil organic carbon levels shall be made as needed to meet the planned objectives.

Criteria for Hydrology Enhancement

The hydroperiod, hydrodynamics, and dominant water source of the enhanced site shall meet the project objectives. The enhancement plan shall document the adequacy of available water sources based on groundwater investigation, stream gage data, water budgeting, or other appropriate means.

The work associated with the wetland shall not adversely affect adjacent properties or other water users unless agreed to by signed written letter, easement or permit.

Timing and level setting of water control structures required for the establishment and maintenance of vegetation, soil, and wildlife and fish habitat functions shall be determined.

Other structural practices, macrotopography and/or microtopography may be used to meet the planned objectives.

Macrotopographic features, including ditch plugs installed in lieu of re-filling surface drainage ditches, shall meet the requirements of other practice standards to which they may apply due to purpose, size, water storage capacity, hazard class, or other parameters. If no other practice standard applies, they shall meet the requirements for Dike – Code 356 unless there is no potential for damage to the feature or other areas on or off site due to erosion, breaching, or overtopping.

Water control structures that may impede the movement of target aquatic species or

species of concern shall meet the criteria in Fish Passage – Code 396.

Criteria for Vegetative Enhancement

Hydrophytic vegetation restoration shall be of species typical for the wetland type(s) being established and the varying hydrologic regimes and soil types within the wetland. Preference shall be given to native wetland plants with localized genetic material.

Where natural colonization of acceptable species can realistically be expected to occur within 5 years, sites may be left to re-vegetate naturally. If not, the appropriate species will be established by seeding or planting.

Adequate substrate material and site preparation necessary for proper establishment of the selected plant species shall be included in the plan.

Where planting and/or seeding is necessary, the minimum number of native species to be established shall be based on a reference wetland unless the objectives require a different plant community.

- If the targeted hydrophytic vegetation is predominantly herbaceous, species diversity will be maximized as appropriate to meet the targeted functions. Seeding rates shall be based upon the percentage of pure live seed and labeled with a current seed tag from a registered seed laboratory identifying the germination rate, purity analysis, and other seed statistics.
- Where the dominant vegetation will be forest or woodland community types, vegetation establishment will include a mix of woody species (trees and/or shrubs) adequate to establish the reference wetland community.

CONSIDERATIONS

Soil Considerations

Consider making changes to physical soil properties, including:

- Increasing or decreasing saturated hydraulic conductivity by mechanical compaction or tillage, as appropriate
- Incorporating soil amendments.
- The effect of construction equipment on soil density, infiltration, and structure.

Consider changes in soil bio-geochemical properties, including:

- Increasing soil organic carbon by incorporating compost.
- Increasing or decreasing soil pH with lime, gypsum, or other compounds.

Hydrology Considerations

Consider the general hydrologic effects of the enhancement, including:

- Impacts on downstream stream hydrographs, volumes of surface runoff, and groundwater resources due to changes of water use and movement created by the enhancement.

Consider the impacts of water level management, including:

- Increased predation due to concentrating aquatic organisms, including herptivores, in small pool areas during draw downs.
- Increased predation of amphibians due to high water levels that can sustain predator fish.
- Decreased ability of aquatic organisms to move within the wetland and from the wetland area to adjacent habitats, including fish and amphibians, as water levels are decreased.
- Increases in water temperature on-site, and in off-site receiving waters.
- Changes in the quantity and direction of movement of subsurface flows due to increases or decreases in water depth.
- The effect changes in anaerobic conditions have on soil bio-geochemical properties;

including oxidation/reduction, and maintenance of organic soils.

- The potential for water control structures, dikes, and macrotopographic features to negatively impact the movement of non-target aquatic organisms.

Vegetation Considerations

Consider:

- The relative effects of planting density on fish and wildlife habitat versus production rates in woody plantings.
- The potential for vegetative buffers to increase function by trapping sediment, cycling nutrients, and removing pesticides.
- The selection of vegetation for the protection of structural measures that is appropriate for wetland function.
- The potential for invasive or noxious plant species to establish on bare soils after construction and before the planned plant community is established.
- The use of prescribed burning to maintain wetland and adjacent upland plant communities.

Fish and Wildlife Habitat Considerations

Consider:

- The addition of coarse woody debris to provide an initial carbon source and fish and wildlife cover.
- The potential to restore habitat capable of supporting fish and wildlife with the ability to control disease vectors such as mosquitoes.
- The potential to establish fish and wildlife corridors linking the site to adjacent landscapes, streams, and water bodies and to increase the sites colonization by native flora.
- The need to provide barriers to passage for unwanted or predatory fish and wildlife species.

PLANS AND SPECIFICATIONS

Plans and specifications for this practice shall be prepared for each site. Plans and

specifications shall be recorded using approved specifications sheets, job sheets, or other documentation. The plans and specifications for structural features will include, at a minimum, a plan view, quantities, and sufficient profiles and cross-sections to define the location, line, and grade for stakeout and checkout. Plans and specifications shall be reviewed and approved by staff with appropriate job approval authority.

OPERATION AND MAINTENANCE

A separate Operation and Maintenance Plan will be prepared for sites that have structural features. The plan will include specific actions for the normal and repetitive operation of installed structural items, especially water control structures, if included in the project. The plan will also include the actions necessary to assure that constructed items are maintained for the life of the project. It will include the inspection schedule, a list of items to inspect, a checklist of potential damages to look for, recommended repairs, and procedures for documentation.

Management and monitoring activities needed to ensure the continued success of the wetland enhancement objectives may be included in the above plan, or in a separate Management and Monitoring Plan. In addition to the monitoring schedule, this plan may include the following:

- The timing and methods for the use of fertilizers, pesticides, prescribed burning, or mechanical treatments.
- Circumstances when the use of biological control of undesirable plant species and pests (e.g. using predator or parasitic species) is appropriate, and the approved methods.
- Actions which specifically address any expected problems from invasive or noxious species

- The circumstances which require the removal of accumulated sediment.
- Conditions which indicate the need to use haying or grazing as a management tool, including timing and methods.

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Appendix C. – Index

Appendix C Tools Under Development

Appendix C. Tools Under Development

Tools Under Development	Location of Information
Comet Farm	http://cometfarm.nrel.colostate.edu/
USDA Technical Methods and Tools for Farm-Scale GHG Estimation	http://www.usda.gov/oce/climate_cjange/techguide
DOE Applied Terrestrial Carbon Sequestration	http://www.netl.doe.gov/publications/factsheets/project/Proj286.pdf

Appendix D – Index

Appendix D - Guidance for Implementing Criteria in the Sustainable Biomass Production Standard

Appendix D Guidance for Implementing Criteria in the Sustainable Biomass Production Standard

Principle	Criteria	Tools/Guidance Documents/Source	Documentation Required
1.Integrated Resource Management Planning	1.1 – Baseline information is compiled for existing conditions	SCS – Antares Producer Questionnaire (Source) NRCS CPA 52 www.ia.nrcs.usda.gov/technical/envircomp/NRCS-CPA-52.xlsx	Complete a recognized Assessment
	1.2 – Alternatives are proposed and producer objectives are documented – landscape factors and environmental impact are considered	SCS – Antares Producer Questionnaire (Source) NRCS–CPA-52 www.ia.nrcs.usda.gov/technical/envircomp/NRCS-CPA-52.xlsx NRCS CPPE Worksheets http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcps/?&cid=nrcs143_026849	Alternatives and Objectives and Resource Concerns are Identified in Assessment
	1.3.1 – Management actions for each CMU proposed for biomass production are developed	NRCS CPA 1155 or other schedule Quality Criteria, Section 3, NRCS Field Office Technical Guide http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg	Actions proposed accomplish Quality Criteria for Identified Resource Concerns
	1.3. 2 - An implementation schedule and documentation requirements are developed.	NRCS CPA 1155 or other schedule	An Implementation Schedule is Completed
	1.3. 3 – An O&M and monitoring schedule is developed	NRCS CPA 1155 or other schedule	Conservation Plan of Operations Includes a Monitoring Schedule

Appendix D Guidance for Implementing Criteria in the Sustainable Biomass Production Standard

	1.3.4 – Plan is monitored, adaptations, as necessary, are implemented	<p>NRCS CPA 1155 (Source)</p> <p>Quality Criteria, Section 3, NRCS Field Office Technical Guide http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg</p> <p>NRCS CPPE Worksheets http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcps/?&cid=nrcs143_026849</p>	Implementation Plan is Reviewed Yearly – New Resource Concerns are Identified and Addressed
	1.3.5 - Management plans are reviewed at 5 year intervals	<p>SCS – Antares Producer Questionnaire (Source?)</p> <p>NRCS–CPA-52 www.ia.nrcs.usda.gov/technical/envircomp/NRCS-CPA-52.xlsx</p> <p>NRCS CPPE Worksheets http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcps/?&cid=nrcs143_026849</p>	Management Plan is reassessed at 5 year intervals.
2.Soil	2.1.1 - Soils are tested and management decisions are based on soil capabilities	<p>State Agronomy Handbooks Example – Illinois Agronomy Handbook http://www.aces.uiuc.edu/iah</p>	Soils are tested the first year of plan implementation and, each 5 years thereafter, as per recommendations in State Agronomy Handbooks or other state requirements.

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	2.1.2 – Nutrients are managed to reduce loss to air and water	NRCS 590 http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcs/?&cid=nrcs143_026849	Producers follow the requirements of their NRCS State 590 Standard
	2.1.3 – Residue removal will not reduce soil stability, health and organic matter content	Revised Universal Soil Loss Equation 2 (RUSLE2), SCI http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20%20NRCs	Soil Loss is less than “T” and SCI is > 0.
	2.1.4 – Identify soils vulnerable to compaction and use appropriate methods to reduce compaction if necessary and maintain site productivity.		Limit defined travel paths within the CMU. Avoid traffic on saturated soils. Convert from annually planted crops to perennial vegetation.
	2.1.5 – Field travel paths are limited		
	2.1.6 – Average soil loss is less than or equal to “T”	RUSLE2, WEP or WEQ http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20%20NRCs	Soil Loss is less than “T” and gully erosion, if identified as a resource concern in the IRMP is addressed OR CMU is established in perennial vegetation.

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	2.1.7 – Maintain or improve soil carbon levels	RUSLE2/SCI http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20%20NRCs	A zero or positive score on SCI is adequate
3. Biological Diversity	3.1.1 – Vegetation cover types and wildlife habitats are assessed and findings incorporated into plan	State NRCS Wildlife Habitat Assessment Procedures or F&WS Habitat Models – for species of concern	Assessment includes known rare, threatened and endangered species.
	3.1.S2 – Develop and implement practices that contribute to the conservation of native vegetation and wildlife habitat	NRCS 645-Upland Wildlife Habitat Management NRCS 647 – Early Successional Wildlife Habitat Development/Management NRCS 386 – Field Border NRCS 380 – Windbreak/Shelterbelt Establishment http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_026849	Producers implements one or more referenced NRCS Conservation Practices

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	<p>3.1.3 - Develop and implement practices that contribute to the protection of rare, threatened and endangered wildlife and biodiversity.</p>	<p>Rare, Threatened and Endangered Species http://www.fws.gov/angered/</p>	<p>IRMP includes measures needed to protect known rare, threatened and endangered species</p>
	<p>3.1.4 – Adopt conservation practices to control invasive species</p>	<p>Invasive Species www.invasivespecies.gov NRCS 595 – Pest Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcs/?&cid=nrcs143_026849</p>	<p>IRMP includes measures needed to protect from observed invasive species</p>
	<p>3.2.1 – Program participant does not utilize species that are known to be invasive. An assessment is completed prior to planting by a third party.</p>	<p>Invasive Species www.invasivespecies.gov NRCS 595 – Pest Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcs/?&cid=nrcs143_026849 Weed Initiated Pest Risk Assessment Guidelines (APHIS) http://www.or.nrcs.usda.gov/technical/ecs/biology/biology-technotes.html</p>	<p>See Implementation, Part 4, 3.2.1</p>

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	3.2.2 – Avoid introduction of invasive feed stock species	<p>Invasive Species www.invasivespecies.gov</p> <p>NRCS 595 – Pest Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcps/?&cid=nrcs143_026849</p> <p>Weed Initiated Pest Risk Assessment Guidelines (APHIS) http://www.or.nrcs.usda.gov/technical/ecs/biology/biology-technotes.html</p>	See Implementation, Part 4, 3.2.2
	3.2.3 – Crop Spread		See Discussion, Part 4, 3.2.3
	3.3.1 – Documentation of Vegetative Category	<p>USDA FSA-578 http://forms.sc.egov.usda.gov/efcommon/efFileServices/eFormsAdmin/FSA0578MANUAL_031015V01.pdf</p>	Program participant documents in IRMP vegetative category of enrolled acres as of (YEAR?) 2008.
	3.3.2 – Lands Eligible for Conversion	Standard for Sustainable Production of Agricultural Biomass, Appendix C.	Program Participation only shifts the intensity of the land management in accordance with the matrix in Appendix C
	3.3.3 – Protection of Known Communities	Global (G) ranks for standard national classification concepts provided by NatureServe. State (S) ranks for community types provided by state Natural Heritage programs	Program participant protects known globally and state ranked G1-G3/S1 – S3 species and communities (HOW?)
4. Water	4.1.1 Water Quality Management Plan	<p>NRCS 590 Nutrient Management NRCS 633 Waste Recycling</p> <p>http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcps/?&cid=nrcs143_026849</p>	Producer implements a Nutrient Management Plan that meets NRCS – 590 or 633.

Appendix D Guidance for Implementing Criteria in the Sustainable Biomass Production Standard

	4.1.2 – Participant adopts erosion control practices	<p>NRCS CPPE Worksheets http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/ncps/?&cid=nrcs143_026849 RUSLE2 http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pnam</p>	Soil loss less than “T” and Gully Erosion, if a resource concern, is addressed OR CMU is established in perennial vegetation.
	4.1.3 – Waste water is tested and treated as needed prior to use for irrigation	<p>State and Federal Clean Water Act Rules NRCS 590 Nutrient Management NRCS 633 Waste Recycling http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/ncps/?&cid=nrcs143_026849</p>	See Implementation, Part 4, 4.1.3
	4.1.4 – Test sludge and manure for heavy metals quarterly	<p>USEPA – Methods for Biosolids Testing www.epa.gov/region8/water/biosolids/analyticalmethods.html</p>	Test sludge for arsenic, mercury and selenium quarterly
	4.1.5 – Preserve nitrogen and Phosphorus on site for plant uptake	<p>NRCS 590 Nutrient Management NRCS 633 Waste Recycling http://www.nrcs.usda.gov/wps/portal/nrcs/detail/full/national/technical/alphabetical/ncps/?&cid=nrcs143_026849</p>	Implement a NRCS 590 or NRCS 633 plan or document testing and nutrient management.

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	<p>4.1.6 – Adopt pest management methods that effectively control outbreaks of pests, diseases, fire and introduction of invasive plants while not harming human health or the environment</p>	<p>NRCS 595 – Pest Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_026849 WINPST http://go.usa.gov/Kok</p>	<p>Implement an Integrated Pest Management Plan</p>
	<p>4.1.7 – Mitigate Potential Pesticide Impacts</p>	<p>WINPST http://go.usa.gov/Kok NRCS 595 – Pest Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_026849</p>	<p>Mitigate impacts on identified resource concerns when Risk Rating on WINPST is intermediate or greater</p>
	<p>4.1.8 - Waste Disposal</p>		<p>Dispose of agricultural chemicals, containers and liquid or solid non organic wastes, including fuel and oil, offsite in compliance with federal and state laws.</p>
	<p>4.2.1 – Annual documentation of compliance with and updates to a water management plant that ensures efficient use of water in irrigation practices.</p>	<p>NRCS 449 – Irrigation Water Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/ncps/?&cid=nrcs143_026849 FIRI 1.2, CPED http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20%20NRC State Irrigation Guide</p>	<p>Producer implements a recognized water management plan</p>

Appendix D Guidance for Implementing Criteria in the Sustainable Biomass Production Standard

	4.2.2 – Use for irrigation only water for which they hold legally valid use rights	State/District Water Use Rules	See Discussion, Part 4, 4.2.2
	4.2.3 – Where the local water authority determines ground or surface water is being depleted faster than naturally replenished, use only existing water rights for new irrigation	State Irrigation Guide, State/District Water Use Rules	See Implementation, Part 4, 4.2.3
	4.2.4 – Demonstrate compliance with local water laws	State/District Water Use Rules	See Implementation, Part 4, 4.2.4
	4.2.5 – Demonstrate that salinity of soils is within acceptable parameters for crop being produced	NRCS Soil Test Kit Guide http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044790.pdf	Conductivity less than 1.5 dS/m or mitigation strategies are implemented
	4.2.6 –Water use rate (gallons/acre) is consistent with water use rates for the most efficient irrigation technology available	NRCS 449 – Irrigation Water Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcs/?&cid=nrcs143_026849 FIRI 1.2, CPED http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=TOPNAVIGATION&cid=stelprdb1042198&navid=8600000000000000&pnavid=null&position=Not%20Yet%20Determined.Html&ttype=detail&pname=Science%20and%20Technology%20Conservation%20Tools%20Software%20%20NRC State Irrigation Guide	Producer follows a recognized Irrigation Water Management Plan or documents that water use rate (gallons/acre) is consistent with water use rates for the most efficient irrigation technology available

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	4.3.1 – Comply with IRMP that addresses impacts on aquatic ecosystem health in the watershed	NRCS CPPE Worksheets http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcps/?&cid=nrcs143_026849	Suite of practices has a net positive effect for all identified resource concerns.
	4.3.2 – IRMP includes practices to avoid or mitigate negative impacts on local stream flows, stream channel morphology, flood storage and conveyance capacity and in-stream habitat practices.	NRCS EFH2 http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/manage/?&cid=stelp_rdb1042921	NRCS Runoff Curve Number changes by less than 5, plus or minus.
	4.3.3 – IRMP includes practices to avoid or mitigate negative impacts on local stream temperature regimes	NRCS 395 – Stream Habitat Improvement and Management http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcps/?&cid=nrcs143_026849	Riparian vegetation does not change within 10 feet of stream bank, or is mitigated.
	4.3.4 – Does not increase the risk of hypoxia in downstream environments		This indicator will be assumed met if all water quality (4.1) indicators are met.
	4.3.5 – IRMP includes relevant conservation practices and other measures to prevent negative impact on local wetlands	NRCS CPPE Worksheets http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcps/?&cid=nrcs143_026849 NRCS 657 – Wetland Restoration, NRCS 659 – Wetland Enhancement, NRCS 396 – Riparian Herbaceous Cover http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/nrcps/?&cid=nrcs143_026849	Suite of practices has a net positive effect for all identified resource concerns.
5. Air Quality and Emissions	5.1.1 – Producer maintains yield records	USDA FSA-578 http://forms.sc.egov.usda.gov/efcommon/efFileServices/eFormsAdmin/FSA0578MANUAL_031015V01.pdf	

Appendix D Guidance for Implementing Criteria in the Sustainable Biomass Production Standard

	<p>5.1.2 – Emissions resulting from the production of inputs (fertilizer, pesticides, fuel) is quantified and compared to pre-biomass crops produced</p>	<p>Greenhouse Gases, Regulated Emissions and Energy Use in Transportation (GREET) http://greet.es.anl.gov/ + ??</p>	<p>Emissions from proposed production are not more than for baseline or Fertilizer and pesticide use and tillage does not increase.</p>
	<p>5.1.3 – Emissions resulting from land conversion, planting methods and tillage practices are quantified and compared to pre-biomass crops produced</p>	<p>USDA Energy Estimator-Tillage http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/resources/?&cid=nrcsdev11_001039</p>	<p>Fuel used for tillage does not increase</p>
	<p>5.1.4 – Soil carbon depletion, including crop/forest residue removal is quantified and compared to pre-biomass crops produced</p>	<p>COMET 2 http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/resources/?&cid=nrcsdev11_001039</p>	<p>Carbon Sequestration is not increased.</p>
	<p>5.1. 5 – Emissions from harvesting, collection, handling, processing and storage of biomass is quantified and compared to pre-biomass crops produced</p>	<p>GREET http://greet.es.anl.gov/</p>	<p>Fuel use for harvesting, collecting, handling processing and storage of biomass crops is not an increase over the base cropping system</p>
	<p>5.1.6 – Emissions resulting from transportation of biomass are quantified and compared to pre-biomass crops produced</p>	<p>GREET http://greet.es.anl.gov/</p>	<p>Emissions resulting from transportation of biomass are is not an increase over the base cropping system</p>

Appendix D Guidance for Implementing Criteria in the Sustainable Biomass Production Standard

6.Socio Economic	6.1.1	Prescriptive in the Standard	
	6.2.1	Prescriptive in the Standard	
	6.2.2	Prescriptive in the Standard	
	6.2.3	Prescriptive in the Standard	
	6.3.1	Prescriptive in the Standard	
	6.3.2	Prescriptive in the Standard	
	6.3.3	Prescriptive in the Standard	
	6.3.4	Prescriptive in the Standard	
	6.3.5	Prescriptive in the Standard	
	6.3.6	Prescriptive in the Standard	
	6.4.1	Prescriptive in the Standard	
7.Legality	7.1.1	Prescriptive in the Standard	
	7.1.2	Prescriptive in the Standard	
8.Transpare ncy	8.1.1	Prescriptive in the Standard	
9.Improve ment	9.1.1	Prescriptive in the Standard	
	9.2.1	Prescriptive in the Standard	
	9.2.2	Prescriptive in the Standard	

Appendix J
CSBP Fact Sheet



Developing Sustainability Standards For the Second Generation Cellulosic Bioenergy Industry

The Council on Sustainable Biomass Production (CSBP) is a multi-stakeholder organization established in 2007 to develop voluntary sustainability standards for the production of second generation, cellulosic biomass and its conversion to bioenergy. This effort will set the emerging cellulosic bioenergy industry on a course of continuous improvement with support from growers, all sectors of industry including refineries, and social and environmental interests.

With the bioenergy industry under a high level scrutiny regarding its social, economic and environmental impacts, the cellulosic bioenergy industry must be sustainable in order to achieve U.S. energy goals.

Development of a Sustainability Standard

Implementation of any standard in advance of, or parallel with, an emerging industry is unprecedented here in the United States. The barriers to implementation of sustainability standards include a host of business considerations within the industry. CSBP seeks to maintain a standard that will be cost effective and widely implemented, while assuring truly sustainable production of bioenergy.

CSBP is approaching the biomass to bioenergy sustainability standard in two phases: first from field to energy production facility entry gate (biomass producer standard), and second for energy production facilities (biomass consumer drivers).

Biomass Producer Standard

CSBP has issued a *Standard for Sustainable Production of Agricultural Biomass* (Standard) after completing three rounds of field testing. Feedstocks included under the provisional standard include dedicated fuel crops, crop residues, short rotation woody crops, interplanted crops, and native vegetation.

The CSBP standard addresses the full complement of sustainability issues through principles, criteria, and indicators applicable to both agriculture and silviculture. The key categories of criteria include:

Integrated Resources Management Planning: Effective management planning to ensure continuous improvement from a carefully measured baseline is the foundation of sustainable biomass production for agricultural land.

Soil Quality: The standard promotes protection of soil fertility, water-holding capacity, and carbon content.

Biological Diversity and Productivity: The Standard promotes conservation and, where possible, enhancement of biological productivity and diversity. The standard prohibits conversion of lands of high priority for meeting conservation goals, and will limit use of potentially invasive feedstock species.

Water Quality and Quantity: The standard promotes protection of surface and ground water.

Climate Change: The Standard requires greenhouse gas accounting by producers based on widely-accepted lifecycle analysis.

Socio-Economic Well-Being: The standard promotes rural development as well as strict compliance with all U.S. human rights and labor protections laws.

Biomass Consumer Drivers

The CSBP has developed a chain of custody standard to provide a structure and accountability for the sale of CSBP-certified biomass. The success of the Standard is dependent on the market demand by biomass consumers for CSBP-certified material. Feedback and field testing of the Standard and chain of custody will determine the next steps forward for expanding the CSBP standards.

Greenhouse Gases

CSBP is establishing benchmarks for lifecycle greenhouse gas emissions for liquid fuel and electricity. Biomass growers are responsible for delivering to bioenergy facilities data concerning production practices that are relevant to lifecycle analysis. Growers are not required to meet specific GHG benchmarks, rather bioenergy facilities will be responsible for conducting GHG lifecycle analysis on the energy they seek to certify. CSBP's work in this area is supported by a GHG Expert Panel, on which serve leading experts in relevant fields.

Membership Involvement

All members of CSBP are encouraged to serve on any of the standing work groups. All members may participate in nominating representatives of their stakeholder group and at-large representatives for the CSBP board, comprised of three members each of four stakeholder groups – biomass producer, biomass consumer, environmental, and social and three at-large members. All members pay dues according to a schedule established by the Board, which is based on the type and size of organization.

The members of the CSBP are committed to the development of standards well in advance of full-scale production of cellulosic bioenergy to help ensure that sustainability is part of the platform on which this industry is built.

For More Information:

www.csbp.org

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Organizations Involved in the 2012 Development of the CSBP Agricultural Standard

BIOMASS PRODUCERS

ArborGen, LLC
BioResource Management, Inc.
Ceres, Inc.
Genera Biomass LLC
Mendel Biotechnology, Inc.
Monona Farms /Switchgrass for Bioenergy
Prairie Lands Bio-Products, Inc.
Show Me Energy Cooperative

BIOMASS CONSUMERS

DuPont Danisco Cellulosic Ethanol
Duke Energy
Chevron

ENVIRONMENT

Environmental Defense Fund
National Wildlife Federation
Natural Resources Defense Council
The Nature Conservancy
Theodore Roosevelt Conservation Partnership

SOCIO-ECONOMIC /AT-LARGE

American Forest Foundation
Association of Fish & Wildlife Agencies
Center for BioEnergy Sustainability,
Oak Ridge National Laboratory
Energy Biosciences Institute, University of Illinois
Great Plains Institute
Institute of Renewable Natural Resources,
Texas A&M University
National Association of State Foresters

CSBP Technical Advisors

Agricultural Research Service (USDA)
National Agroforestry Center (USDA)
Natural Resource Conservation Service (USDA)
Office of the Biomass Program,
U.S. Department of Energy
U.S. Forest Service (USDA)