Agricultural BMP Verification Guidance: Version 3.6.0

Chesapeake Bay Program's Agriculture Workgroup (AgWG)

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Summary

In response to an independent program evaluation by the National Academy of Sciences, and the federal documentation requirements of the EPA Chesapeake Bay TMDL, the Chesapeake Bay Program (CBP) partnership has set in motion a partnership led process for developing a programmatic BMP data verification standard. The partnership's Agriculture Workgroup (AgWG) has subsequently taken responsibility for developing verification guidance for providing agricultural BMP data to the EPA Chesapeake Bay Program Office (CBPO) for representing actions to address both nutrient and sediment sources of contributions to the Bay. The following paper is intended to provide background information on the workgroup's development of agricultural BMP verification guidance, document the multiple approaches deliberated by the partnership and their positive and negative attributes, and provide additional detailed verification guidance based on the supplementary document entitled "***Draft Agricultural BMP Verification Guidance: Version 3.6.0***" dated January 24, 2014. The Version 3.6.0 represents multiple months of discussions and suggestions by the diverse membership of the AgWG and the review comments of the partnership's independent BMP Verification Review Panel in order to create a programmatic verification standard for implementation by the partnership.

Part 1: The Need for Agricultural BMP Verification and the CBP Process

The case for a adopting a universal approach to BMP verification across the sectors has been building for the nearly thirty-year history of the Chesapeake Bay Program partnership. The development and implementation of the Chesapeake Bay TMDL has brought the requirement for reasonable assurance, the adoption of two-year milestones to track progress, and the interrelationship of trading and offset state programs. The need for expanding the tracking and reporting of implemented BMPs primarily from traditional agency incentive programs to private non-cost shared and functional equivalent BMPs, all while improving public confidence in the water quality benefits being obtained from traditional and new sources of BMPs, has necessitated an new approach to verification.

The desire to quantify the progress toward achieving the goals of the Bay TMDL has as a focus the implementation, tracking and reporting of conservation practices across the watershed. Within the past several years, the partnership has come under increasing scrutiny and requests to improve the accountability of its actions to address the commitments made to the restoration goals. A few examples of this increasing interest in BMP verification include:

- The Chesapeake Bay Independent Evaluation Report developed by the National Research Council's (NRC) panel identified five specific science-based conclusions. These conclusions focused on the finding that "accurate tracking of BMPs is of paramount importance because the CBP relies upon the resulting data to estimate current and future nutrient and

sediment loads to the Bay."

- President Obama's Chesapeake Bay Executive Order Strategy committed relevant federal agencies, including the U.S. Department of Agriculture (USDA) and the U.S. Environmental Protection Agency (EPA), to develop and implement "mechanisms of for tracking and reporting of voluntary conservation practices and other best management practices installed on agricultural lands" by July 2012.

- EPA's Chesapeake Bay TMDL's Appendix S outlined the common elements for the jurisdictions to develop and implement trading and offset programs in conjunction with the requirements of the TMDL.

- Several of the Chesapeake Bay Program's independent advisory committees, including the Scientific and Technical Advisory Committee (STAC) and the Citizen's Advisory Committee (CAC), have consistently requested the partnership to develop and implement an open and transparent process to verify cost-share and non-cost shared BMPs being annually tracked and reported by the jurisdictions to the Chesapeake Bay Program Office (CBPO).

At the bequest of EPA, the partnership's Water Quality Goal Implementation Team (WQGIT) has requested its sector workgroups, including the Agriculture Workgroup (AgWG), to cooperatively develop BMP verification guidance for implementation by the partnership. Since 2012, the AgWG in particular has been focused on developing detailed verification guidance for BMPs implemented on agricultural land uses, researching examples of agricultural verification across the United States and interviewing identified experts in the field, and developing a proto-type management tool to assist partners in evaluating existing verification programs and identifying opportunities for improvements.

Part 2: Background of Agricultural BMP Verification Developments

The Water Quality Goal Implementation Team (WQGIT) foresaw the need for providing assistance and guidance to its affiliated sector workgroup in the development of compatible BMP verification guidance documents. Consequently, the BMP Verification Committee and its associated BMP Verification Review Panel were formed. The Committee has since developed the document entitled "Appendix G: Chesapeake Bay Program Partnership's BMP Verification Principles" to provide cross-sector verification guidance. Utilizing the five identified principles, the AgWG has considered a series of potential options for developing agricultural BMP verification guidance. Each potential option considered by the workgroup has been weighed on their individual merits, and both positive and non-positive attributes identified.

- Version 1: Create a uniform BMP verification guidance standard for all practices and programs.

- Version 2.1: Create diverse BMP verification guidance options and identify the levels of confidence for each method. Limit the units of BMP implementation reported by the degree of relative data confidence (e.g. 90% relative data confidence x tracked units = reported units). The standard model BMP effectiveness values would be applied to the reported units.

- Version 2.2: Create diverse BMP verification guidance options and identify the levels of confidence for each method. Limit the model reduction credits for the units of BMP implementation reported by the degree of relative data confidence (e.g. 90% relative data confidence x BMP effectiveness values = modified BMP effectiveness values to be applied).

- Version 3: Create diverse protocol options and apply a standard minimum threshold of relative data confidence to allow 100% of tracked BMP units to be reported and receive 100% of BMP effectiveness values.

In considering the above BMP verification guidance options, the membership of the AgWG identified concerns with Version 1 in that it did not conform to the diversity of agricultural practices and implementation programs across six jurisdictions. Implementing a limited verification guidance standard would likely not offer sufficient capacity to allow adequate BMP implementation reporting. Of the positive considerations, Version 1 option would provide 100% acceptance of tracked and reported practices and the application of 100% of the model BMP effectiveness values.

In contrast with Version 1, Versions 2.1 and 2.2 offered multiple potential BMP verification guidance options that are more reflective of the diversity of agricultural practices and programs. The multiple verification method options also produce varying levels of relative data confidence between the guidance options, as well as between practice types within a single method. To address the issue of widely varying relative data confidence levels, the Version 2.1 implemented a calculation method to align the verification method's attained level of confidence to the units of reported BMPs. The foremost concern of this method by the AgWG was that by limiting the units of tracked BMPs that could be reported to the CBP models could jeopardize local community support. In addition, the verification literature search and national expert interview process that was implemented by the AgWG did not yield adequate scientific documentation to assign defensible relative data verification levels to all verification method options for all practices.

Version 2.2 addressed the issue of widely varying relative data confidence levels by implementing a calculation method similar to Version 2.2. Instead of aligning the verification method's level of confidence to the units of reported BMPs, this version applied the alignment to the model BMP effectiveness values. Version 2.2 allowed all tracked practices to be reported for nutrient and sediment reduction credits, however, the BMP effectiveness values would be reflective of the associated level of data confidence. Verification protocols yielding lower relative data confidence levels would receive reduced compensate model BMP effectiveness credits. The chief concern of the AgWG was that the verification literature search and national expert interview process that was implemented by the workgroup did not yield adequate scientific documentation to assign defensible relative data verification levels to all verification method options for all practices.

The current Version 3 protocol encompasses the positive benefits of Versions 2.1 and 2.2 by incorporating multiple verification method pitons' to address the diversity of agricultural practices and jurisdictions. In contrast to the earlier versions, Version 3 recognizes the widely varying relative data confidence levels between verification method options, as well as between practices within a single

method, by establishing an up-front standard confidence level threshold for 100% model BMP effectiveness credit. All protocol options are available to the partnership, but a minimum data confidence threshold is required to be met to allow all tracked BMPs to be reported for full model credit. The verification literature search and national expert interview process that was implemented by the AgWG appears capable to yield adequate scientific documentation to assign a defensible threshold relative data verification levels to all protocol options for all practices. The AgWG recognizes benefits in exceeding the minimum data confidence threshold, and could encourage higher levels by the partnership where possible.

Part 3: Defining Agricultural BMPs

Partnership approved agricultural BMPs represent the largest and most diverse of conservation practices and land use conversions for any sector currently represented in the Chesapeake Bay Program Partnership's Phase 5.3.2 Watershed Modeling Suite. The diversity of BMPs is reflective of the corresponding diversity of agricultural production and land uses across the Bay watershed, a diversity not replicated by any other sector within the partnership. Consequently, the challenge of providing verification guidance for multiple methods in a simple format lead to the organization of agricultural BMPs into four BMP categories. These generalist BMP categories are based on the respective life spans or permanence on the landscape, as well as their physical presence.

- Annual BMPs: A category of BMPs which have a very limited physical presence on the landscape, lasting as short as several months to a single growing season. In order to retain their nutrient and sediment load reduction benefits, this class of BMPs are required to be re-implemented on an annual basis.

- Structural BMPs: A category of BMPs which have a relatively protracted physical presence on the landscape and can be more easily detected for verification than most other BMP types. These BMPs are typically more intensive of technical and financial resources to implement, but can achieve both nutrient and sediment load reductions for multiple years if properly maintained and operated.

- Management Plan BMPs - Plans: A limited category of BMPs which have a diverse life span ranging from a single growing season to multiple years. Due to their nature as a management system vs. a physical BMP, this class of BMPs creates the most challenge in implementing an effective verification method. However, these BMPs can generate considerable model credits in reducing nutrient and sediment loads.

- Management Plan BMPs - Practices: This category of BMPs is reflective of conservation practices associated with management systems which are physically present on the landscape. These BMPs typically have moderate to protracted physical life spans and are diverse in their ability to be detected for verification.

Example Agricultural Best Management Practices by Category

Annual	Structural	Management Plan - Plans	Management Plan - Practices
Conservation Tillage	**Animal Waste Management Systems**	**Decision/Precision Agriculture**	**Alternative Crops**
Traditional/Commodity Cover Crops	**Barnyard Runoff Control**	**Enhanced Nutrient Management Plans**	**Continuous No-Till**
Dairy Precision Feeding	**Bio-filters**	**Horse Pasture Management**	**Grass Buffers**
Manure Transport	**Mortality Composters**	**Prescribed Grazing**	**Stream-Side Grass Buffers**
Swine Phytase	**Water Control Structures**	**Soil Conservation and Water Quality Plans**	**Stream-Side Forest Buffers**

Part 4: Defining Sources and Oversight of Agricultural BMPs

The diversity of agricultural BMPs is also reflected in the corresponding diversity of sources of implementation and oversight across the Bay watershed. The partnership's primary source of BMP implementation data has historically originated from publicly funded financial incentive or cost-share programs managed by federal, state, and county agencies. BMPs implemented through these programs typically have contractual oversight from certified engineers, planners, and technicians using approved design standards to ensure that the practices are installed and maintained over the life span of the agreement. Verification to some degree typically accompanies this oversight due to the expenditure of public funds for the cost-share. Consequently, BMPs implemented through public cost-share programs and under contractual agreements are more easily tracked and reported for representation in the partnership models.

A second important source of BMP implementation data is through federal and state agricultural regulatory programs. Two major types of regularly programs fall under this category; i.e. permitting and general regulatory oversight. An example of permitting is the federal CAFO program which is normally administered by the state agencies under agreement with U.S. EPA. Agricultural operations meeting the thresholds of the CAFO program are required to develop and submit operational plans, as well as implemented BMPs where needed to address nutrient losses. Federal, state, and/or county agency oversight to verify compliance with the permit requirements may also provide useful BMP verification information.

The second type within the category represents a general regulatory oversight of particular agricultural production systems or management practices effecting nutrient and sediment losses. This type of regulatory programs is chiefly the domain of state policies, and is administered by both state and county agencies. Since regulations differ by state, there is a wide diversity of regulatory programs across the Bay watershed. The level of oversight and verification by public agencies also varies widely, with some programs requiring operators to submit report annually followed by detailed inspections and others focusing on responses to complaints and easily identified environmental impacts from major spills or

runoff events. The ability to track and report BMP information from general regulatory programs differs due to the level of oversight by public entities.

An emerging source of agricultural BMP implementation is from practices that were installed without public cost-share, and may not be part of an operational permit or regulatory oversight program. They are typically financed by the operator, and may or may not meet the practice standards associated with federal and state cost-share programs. BMPs that do not meet a federal or state practice standard but which provide the same level of environmental protection on an annual basis are known as "functional equivalent" (FE) BMPs. Identifying, verifying, tracking, and reporting non-cost shared BMPs is more challenging than the other sources of BMP information for a number of reasons, including voluntary reporting and access by operators, potentially non-standard materials and designs, and at times the absence of an obligation to maintain the practice.

An additional complicating factor is that overlaps exist between all sources and oversights ob BMPs. Practices that were originally cost-shared can function similarly to non-cost shared BMPs after their contractual obligations are satisfied and they become the sole responsibility of the operator. Both cost-shared and non-cost shared practices can co-exist to satisfy regulatory program requirements. Depending on the jurisdiction, a significant population of agricultural farms can potentially legally operate outside of federal and state permitting and regulatory oversight programs.

The challenge of providing verification guidance for multiple BMP sources and oversight for the diversity of agricultural production systems found in the Bay watershed can be somewhat daunting. The approach the AgWG can taken is to create a multi-optioned but uniform approach to the range of BMP sources and oversight using the annual environmental benefits as a guide post. Thus as an example, cost-shared and non-cost shared BMPs can both be verified using different methodologies but meet the same verification standard.

Part 5: BMP Verification Guidance Matrix Elements: Version 3.6.0

1) Agricultural BMP Verification Methods (Column 1)
   Lists identified general categories of verification based on the type of tracking assessment and the type of entity that would be collecting and verifying the data.
2) Assessment Method (Column 2)
   Describes in greater detail the general verification method and the entity that would be collecting and verifying the data.
3) Verification Expectations (Column 3)
   Identifies additional expectations for completing a sufficient verification based on BMP life span and frequency of assessments.
4) Conservation Practice Category (Column 4)
   The appropriate assessment method and its associated verification confidence level is affected by the type of agricultural BMPs being assessed. The appropriate verification method for annual practices such as cover crops would likely be different from structural or management BMPs. Management BMPs were further subdivided into Plans and Practices due to the same differences as

noted above. Each verification protocol method has been reviewed in terms of the conservation practice categories to determine if the assessment method is appropriate and realistically able to achieve a sufficient verification confidence. Categories with an "Eligible" are viewed as appropriate and those with a "Not Eligible" are not. Even if an assessment method is noted as being appropriate for a category of BMPs, significant verification efforts may still be required to meet a sufficient verification confidence, such as increased percentages of QA/QC spot checks or more frequent compliance inspections for example.

5) Cost-Sharing Information (Columns 5-9)
   These columns denote the potential differences for BMPs designed and financed through federal, state, NGO and private sources for each assessment method. Not all methods are appropriate to track and verify practices implemented, operated, and maintained under these categories.
6) BMP Performance Information (Columns 10-16)
   This section of the verification matrix describe the ability of each assessment method to verify if the tracked practice meets the appropriate BMP specification, or if it represents a functional equivalent or non-functional equivalent BMP. In addition, the identification of the date of practice implementation is critical to determining if the BMP is considered part of the model calibration period or afterward for reporting purposes.

Part 6: Agricultural Verification In Practice

Part 7: Intended Use of the Verification Matrix and Supporting Documentation

The final approved agricultural verification guidance matrix with supporting documentation is intended to provide the partnership with the structure and expectations of verifying tracked data for reporting to the Chesapeake Bay Program for nutrient and sediment reduction credits. The completed verification guidance package will include the approved guidance matrix, an expanded version of this document, and the completed Tetra Tech summary verification report providing the documented findings from the national literature search and expert interviews. The protocol package will be designed to provide the guidance for agencies and partners to develop more program specific and detailed data verification plans for submission to the Chesapeake Bay Program partnership and the independent verification review panel for review and acceptance. In the absence of documented statistical data confidence information, the services of a qualified statistician could be invaluable to demonstrate that a verification method meets a sufficient verification confidence. Agency or partner verification plans that fail to provide a sufficient confidence level will need to consider implementing increased levels of QA/QC procedures, or adopting a more robust assessment method for the particular practice as examples. Verified tracked data that meets the criteria of the approved agricultural verification guidance will be eligible for reporting to the Chesapeake Bay Program models for full BMP credit reduction values.