

**Charge and Scope of Work**  
**Manure Injection and Incorporation Phase 6.0 Expert Panel**  
Prepared for the Chesapeake Bay Program Partnership's Agriculture Workgroup by the  
Manure Injection and Incorporation Expert Panel Establishment Group  
March 6, 2015

**Background**

In the current version of the Chesapeake Bay Program (CBP) partnership's Watershed Model (version 5.3.2), manure injection is recognized as an interim practice used for planning purposes only. Manure injection incorporates multiple application methods for the subsurface upper soil horizon placement of solid, semi-solid, or liquid livestock manures. These methods are used to reduce organic nutrient losses to the environment from both atmospheric and surface runoff pathways, as well as reduce odor concerns. Injection application methods may also minimize soil surface crop residue losses over incorporation application methods. The placeholder effectiveness values are 25% TN, 0% TP and 0% TSS. Effectiveness values were based on a conservative estimate informed by university and USDA-ARS research from the Beltsville Agricultural Research Center.

The practice of manure incorporation is not currently recognized in the Phase 5.3.2 Model as an existing or interim BMP. Manure incorporation involves multiple application methods for the mixing of solid, semi-solid or liquid livestock manures in the upper soil horizon and available crop residues. These methods are used to reduce organic nutrient losses to the environment from both atmospheric and surface runoff pathways, as well reduce odor concerns. Incorporation application methods may also substantially reduce soil surface crop residues over injection methods. Due to recent increased implementation of this practice by recommendation of several state nutrient management programs, the Agriculture Workgroup has requested a review for the Phase 6.0 Model.

The Manure Injection and Incorporation Expert Panel Establishment Group (EPEG) was formed to:

- Identify priority tasks for the first Phase 6.0 (P6.0) Manure Injection and Incorporation Expert Panel (EP),
- Recommend areas of expertise that should be included on the Manure Injection and Incorporation EP, and
- Draft the Manure Injection and Incorporation EP's charge for the review process.

From February 10, 2015 through March 6, 2015 the EPEG met 3 times by conference call and worked collaboratively to complete this charge for presentation to the Agriculture Workgroup (AgWG) on March 18-19, 2015. Members of the EPEG are listed in Table 1.

**Table 1. Manure Injection and Incorporation Expert Panel Establishment Group membership and affiliations.**

<b>Member</b>	<b>Affiliation</b>
Kristen Hughes Evans	Sustainable Chesapeake
Dwight Dotterer	Maryland Department of Agriculture
Rory Maguire	Virginia Tech University
Kenneth W. Staver Jr	University of Maryland
EPEG Support Staff	
Emma Giese	Chesapeake Research Consortium
Mark Dubin	University of Maryland
Don Meals	Tetra Tech, Inc.

## **Method**

The Manure Injection and Incorporation EPEG developed its recommendations in accordance with the process specified by the AgWG (AgWG 2014). This process was informed by the [strawman proposal](#) presented at the December 11, 2014 AgWG meeting, the Water Quality Goal Implementation Team ([WQGIT](#)) Best Management Practice ([BMP](#)) [protocol](#), input from existing panelists and chairs, and the process recently undertaken by the [AgWG](#) to develop the charge for the Manure Treatment Technologies EP.

The collective knowledge and expertise of EPEG members formed the basis for the recommendations contained herein. A number of EPEG members have had experience on BMP expert panels. Other EPEG members have knowledge and/or expertise in state and federal programs, the Chesapeake Bay model, and manure injection and incorporation practices within the Chesapeake Bay watershed.

Communication among EPEG members was by conference call and email. All decisions were consensus-based.

## **Recommendations for Expert Panel Member Expertise**

The AgWG expert panel organization process directs that each expert panel is to include eight members, including one non-voting representative each from the Watershed Technical Workgroup (WTWG) and Chesapeake Bay Program modeling team. Panels are also expected to include three recognized topic experts and three individuals with expertise in environmental and water quality-related issues. A representative of USDA who is familiar with the USDA-Natural Resources Conservation Service (NRCS) conservation practice standards should be included as one of the six individuals who have topic- or other expertise. Panelists' areas of expertise may overlap.

In accordance with the [WQGIT BMP protocol](#), panel members should not represent entities with potential conflicts of interest, such as entities that could receive a financial benefit from Panel recommendations or where there is a conflict between the private interests and the official

responsibilities of those entities. All Panelists are required to identify any potential financial or other conflicts of interest prior to serving on the Panel. These conditions will minimize the risk that Expert Panels are biased toward particular interests or regions.

The Manure Injection and Incorporation EPEG recommends that the P6.0 Manure Injection and Incorporation EP should include members with the following areas of expertise:

- Manure injection and incorporation technologies for both liquid and dry manures and their practical application.
- Nutrient and sediment transport (via air and water) associated with the application of manure injection and incorporation technologies.
- Various physiographic regions of the Chesapeake Bay and their relationship to nutrient and sediment transport.
- How BMPs are tracked and reported, and the Chesapeake Bay Program partnership's modeling tools.
- Knowledge of and experience with NRCS practice standards and codes.

The collective expertise of panel members should cover the range of the physiographic regions found and the agricultural crops produced within the Chesapeake Bay watershed.

### **Expert Panel Scope of Work**

The general scope of work for the Manure Injection and Incorporation P6.0 EP will be to define and configure the Manure Injection and Incorporation BMPs in the P6.0 model. Specifically, the EP will develop definitions, and loading or effectiveness estimates for manure injection and manure incorporation practices.

1. Identification and definition of appropriate manure injection and incorporation technology categories for liquid, solid and semi-solid manures.
2. Evaluation of nutrient and sediment transport (via air and water) associated with the application of manure injection and incorporation technology categories for relevant effectiveness estimates.
3. Consider potential variations of technology applications and effectiveness estimates associated with the physiographic regions and cropping systems of the Chesapeake Bay, and their relationship to nutrient and sediment transport.

In defining the practice(s), the EP shall consider the following issues (among others):

- Compatibility with the NRCS definitions of manure injection and incorporation and how the recommended practice(s) will impact residue management and soil disturbance, as defined by either NRCS or the states. For example, the NRCS Practice Standard 345 for reduced till requires that no full-width tillage occurs during the time interval starting with harvest or termination of the previous crop until harvest or termination of the reduced-till crop, regardless of the depth of the tillage operation. The only soil disturbance during this time interval is tillage in strips and slots. Tilled strips or slots are no wider than one third of the row width. Furthermore, the potential for incorporation to influence the efficiency of previously applied BMPs during a given year (e.g., practices designed to promote high-residue/minimum soil disturbance) should be considered;

- The effect of the recommended practice(s) on sediment losses with regard to assigning reduction efficiencies for incorporation. As erosion potential increases, incorporation will increase the potential for sediment and sediment-bound nutrient losses, which will offset reductions in dissolved nutrient losses; and
- The permissible elapsed time between initial manure application and incorporation.

The Expert Panel will be provided a project timeline for the development of the panel recommendations based on the Phase 6 development schedule. This timeline may include the development of a provisional recommendation for this BMP prior to the finalization of a fully documented recommendation report with effectiveness values. Provisional panel recommendations will be used only for initial Phase 6 model development and calibration, and not for future implementation progress reporting by the jurisdictions.

The panel will work with the Agriculture Workgroup and Watershed Technical Workgroup to develop a report that includes information as described in the Water Quality Goal Implementation Team's *Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in the Chesapeake Bay Watershed Model*<sup>1</sup> (see Attachment 1 for an outline of the final report).

## Timeline/Deliverables

May 2015 – Panel stakeholder kickoff meeting

January 2016 – Based on their written EPEG charge, the panel will develop a proposed scope of work including BMP structure and type, draft BMP definition(s), and initial elements of the BMP such as associated components and conservation practices, and USDA-NRCS associated CP codes. Initially identified literature citations will be included to provide a range of potential effectiveness values that the panel will consider and supplement with further evaluation. The panel will present their provisional BMP paper to the AgWG, WTWG, and WQGIT for informational purposes, and for initial partnership comments on the proposed direction of the panel's evaluation. The paper will not represent a full recommendation report, and the partnership will not be asked for formal approval at this time.

May 2016 – **Target date** for panel to release full recommendations and final report for approval by the AgWG, WTWG, and WQGIT.

August 2016 – If approved by the partnership, panel recommendations are final and will be represented in the final Phase 6 modeling tools.

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<sup>1</sup> [http://www.chesapeakebay.net/documents/Nutrient-Sediment\\_Control\\_Review\\_Protocol\\_v7.14.2014.pdf](http://www.chesapeakebay.net/documents/Nutrient-Sediment_Control_Review_Protocol_v7.14.2014.pdf)

## **Phase 6.0 BMP Verification Recommendations**

The panel will utilize the Partnership approved *Agricultural BMP Verification Guidance*<sup>2</sup>, as the basis for developing BMP verification guidance recommendations that are specific to the BMP(s) being evaluated. The panel's verification guidance will provide relevant supplemental details and specific examples to provide the Partnership with the recommended potential options for how jurisdictions and partners can verify recommended manure injection and incorporation practices in accordance with the Partnership's approved guidance.

## **References**

AgWG. 2014. Agriculture Workgroup expert panel organization – DRAFT January 8, 2014. Agriculture Workgroup, Chesapeake Bay Program.

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<sup>2</sup> <http://www.chesapeakebay.net/documents/Appendix%20B%20-Ag%20BMP%20Verification%20Guidance%20Final.pdf>

## **Attachment 1: Outline for Final Expert Panel Reports**

- Identity and expertise of Panel members
- Practice name/title
- Detailed definition of the practice. For example, the Expert Panel should clarify when a practice is compatible with no-till where the definition of no-till is compatible with both state and NRCS definitions.
- Recommended nitrogen, phosphorus, and sediment loading or effectiveness estimates
  - Discussion may include alternative modeling approaches if appropriate
- Justification for the selected effectiveness estimates, including
  - List of references used (peer-reviewed, unpublished, etc.)
  - Detailed discussion of how each reference was considered, or if another source was investigated, but not considered.
- Description of how best professional judgment was used, if applicable
- Land uses to which the BMP is applied
- Load sources that the BMP will address and potential interactions with other practices
- Description of pre-BMP and post-BMP circumstances, including the baseline conditions for individual practices
- Conditions under which the BMP works:
  - Should include conditions where the BMP will not work, or will be less effective. An example is large storms that overwhelm the design.
  - Any variations in BMP effectiveness across the watershed due to climate, hydrogeomorphic region, or other measureable factors.
- Temporal performance of the BMP including lag times between establishment and full functioning (if applicable)
- Unit of measure (e.g., feet, acres)
- Locations within the Chesapeake Bay watershed where this practice is applicable
- Useful life; effectiveness of practice over time
- Cumulative or annual practice
- Description of how the BMP will be tracked, reported, and verified:
  - Include a clear indication that this BMP will be used and reported by jurisdictions
- Suggestion for a review timeline; when will additional information be available that may warrant a re-evaluation of the estimate
- Outstanding issues that need to be resolved in the future and a list of ongoing studies, if any
- Documentation of any dissenting opinion(s) if consensus cannot be reached
- Operation and Maintenance requirements and how neglect alters performance

### **Additional Guidelines**

- Identify ancillary benefits and unintended consequences
- Include negative results
  - Where studies with negative pollution reduction data are found (i.e. the BMP acted as a source of pollutants), they should be considered the same as all other data.

- Include results where the practice relocated pollutants to a different location. An example is where a practice eliminates a pollutant from surface transport but moves the pollutant into groundwater.

In addition, the Expert Panel will follow the “data applicability” guidelines outlined Table 1 of the Water Quality Goal Implementation Team’s [\*Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in the Chesapeake Bay Watershed Model\*](#).