U.S. EPA's Responses to Pennsylvania's Documentation on Manure Management Plans' Use of Book Values

March 10, 2017

BACKGROUND

During its November 28, 2016 conference call, the Chesapeake Bay Program Partnership's Water Quality Goal Implementation Team (WQGIT) approved the Phase 6 Nutrient Management BMP Expert Panel's un-amended Final Report and recommendations dated October 18, 2016, along with the inclusion of the following language to be inserted into a separate Appendix G to the final Panel report:

> *Where book values are used in lieu of site-specific manure or soil analyses, the jurisdiction's program must be sufficiently conservative to ensure that implementation of the standard process is sufficiently restrictive to be protective of water quality.*
>
> *Jurisdictions reporting book value based nutrient management for credit in the Chesapeake Bay Program's modeling system must provide a description and justification documenting how their program, including the methods for calculating the book values, meets this standard as part of their EPA approved BMP verification program plan.*

The EPA Chesapeake Bay Program Office was charged by the WQGIT with the responsibility for developing, in direct consultation with members of the Phase 6 Nutrient Management BMP Expert Panel and other recognized experts, a clear set of guidance on the level, type and scope of data and documentation that a jurisdiction needs to submit to fully address the above adopted language.

Working with and seeking input from two Phase 6 Nutrient Management BMP Expert Panel members[1], the six jurisdictional representatives on the Agriculture Workgroup, the CBP Agriculture Workgroup Coordinator, and the CBP Watershed Technical Workgroup Coordinator, EPA published its final guidance on February 7, 2017 (Attachment A).

In parallel, EPA worked directly with the Pennsylvania Department of Environmental Protection and the Pennsylvania State Conservation Commission to reach agreement on the process and schedule for submission of documentation on manure management plans' use of book values (Attachment B).

REQUESTED EVALUATIONS AND DOCUMENTATION

In its guidance, EPA asked jurisdictions to provide three sets of documentation to demonstrate their program is "sufficiently conservative to ensure that implementation of the standard process is sufficiently restrictive to be protective of water quality":

- Use of manure nutrient book values for manure management plans;
- Use of default soil-test phosphorus values and book values for manure nutrient analysis; and
- Use of soil-test P default values and manure nutrient book values in manure management plans.

[1] Dr. Frank Coale, Panel Chair, University of Maryland, and Dr. Doug Beegle, Pennsylvania State University.

Pennsylvania provided EPA with documentation addressing each of the above three elements on March 2, 2017 (Attachment C).

EPA RESPONSES TO PENNSYLVANIA'S DOCUMENTATION

Upfront in its submitted documentation, Pennsylvania provided an excellent analysis of the various livestock and poultry animal types classified as Concentrated Animal Operations and Concentrated Animal Feeding Operations and, therefore, required to implement Nutrient Management Plans under Act 38 versus the percent covered by Manure Management Plans. The documentation provided clear evidence that almost all swine and poultry operations are covered by Act 38 Nutrient Management Plans and were not addressed in this subject documentation. Therefore, Pennsylvania focused its documentation on turkey, dairy cattle, beef cattle, sheep, goat and equine operations not already covered under Act 38.

Use of Manure Nutrient Book Values for Manure Management Plans

To address the question as to whether the use of Pennsylvania State University's manure nutrient concentration book values, published in the Penn State Agronomy Guide, are sufficiently conservative, Pennsylvania provided EPA with Penn State's documentation on:

- the basis for how the published manure nutrient values were derived;
- the numeric and statistical range of analytical manure nutrient values for nitrogen and phosphorus by agricultural animal species;
- the statistical methods utilized to derive the manure nutrient values published by Pennsylvania State University; and
- the sources and relative age of the analytical manure nutrient data.

With noted exceptions, "the book values are very similar to or higher than the observed values, and are therefore more protective of the environment because the higher book values would result in lower allowable manure application rates."

EPA accepts and acknowledges that Pennsylvania provided sufficient documentation demonstrating that the Penn State Agronomy Guide published manure nutrient book values are sufficiently conservative for the majority of farms when compared with measured manure nutrient data across the livestock animal types of interest. EPA's review of the data also indicate that manure nutrient concentrations can vary widely as evidenced by the standard deviations presented in Table 2 and the subsequent figures.

Use of Default Soil-Test Phosphorus Values and Book Values for Manure Nutrient Analysis

To address the question of whether the use of default soil test phosphorus (P) values in development of manure management plans results in conservative decisions on manure applications, Pennsylvania provided documentation describing the process by which, in the absence of available phosphorus soil nutrient analysis, a default process can be implemented by assuming a "High Soil Phosphorus" soil residual and using crop specific annual phosphorus removal rates as part of the manure management planning process.

Specifically, Pennsylvania documented that:

> *If the farmer has not done a soil test for phosphorus in the past three years or if the soil test results show phosphorus levels (Mehlich 3-P levels) greater than or equal to 200 ppm, the farmer must use the phosphorus removal charts. If a soil test was completed within the past 3 years which included an assessment of phosphorus levels in the soil and the results show phosphorus levels (Mehlich 3-P levels) of less than 200 ppm, the nitrogen based charts may be used.*
>
> *Therefore, if soil tests are not available for the particular fields being planned, the program requires the planner to assume that the soil test levels are greater than 200 ppm P and the application rates cannot exceed the crop removal rate for phosphorus.*

EPA accepts and acknowledges that Pennsylvania provided sufficient documentation demonstrating that the use of default soil test phosphorus values in development of manure management plans results in conservative decisions for the majority of operations applying manure. EPA also acknowledges that Mehlich 3 levels can far exceed 200 ppm if manure is applied at inappropriate rates.

Use of Soil-Test P Default Values and Manure Nutrient Book Values in Manure Management Plans
To address the question as to whether Pennsylvania's program is sufficiently conservative considering their reliance upon soil-test P default values and manure nutrient book values, Pennsylvania provided documentation on how many of manure management plans (numerically and by acreage) segregated by the primary livestock species on the operation were developed and are being implemented by utilizing one of the following methods:

1) Use of default soil test P and default manure values;
2) Use of default soil test P and site-specific manure nutrient analysis;
3) Use of site-specific soil test P values and default manure values; or
4) Use of site-specific soil test P values and site-specific manure nutrient analysis.

Pennsylvania surveyed its 43 conservation districts within the Chesapeake Bay watershed to synthesize the above data. Pennsylvania provided documentation which clearly demonstrates that a significant number of producers' manure management plans which utilized manure nutrient book values also utilized the default soil-test P value option, which programmatically incorporates a presumption of high soil-test P status and restricts phosphorus applications to a crop-specific annual crop removal rate. This was the basis of the vast majority of plans and acreages reported via the conservation districts for beef cattle (83%), sheep (86%), goat (97%) and equine (90%). For turkeys, the vast majority of the reported acres (90%) had manure management plans based on manure and soil analyses. In the case of dairy cattle, 57 percent of the acres with plans written to the conservative crop phosphorus removal based application rates and an additional 17 percent of the acres with plans based on manure and soil analyses.

EPA accepts and acknowledges that Pennsylvania provided sufficient documentation demonstrating that Pennsylvania's manure management program is sufficiently conservative for a majority of farms considering their reliance upon soil-test P default values and manure nutrient book values. EPA acknowledges that most of the manure management plans reported by the conservation districts are written without site-specific manure and soil test analyses.

CREDITING NITROGEN AND PHOSPHORUS NUTRIENT MANAGEMENT

Based on these findings, Pennsylvania will receive core nitrogen (N) and P nutrient management credit for its past, present and future reported acres under manure nutrient management plans based on the language in Appendix G within the Chesapeake Bay Program's approved Phase 6 Nutrient Management Expert Panel Report.

Supplemental nutrient management BMPs for both N and P have been defined by the Phase 6 Nutrient Management Expert BMP Panel as representing advanced site-specific assessments and applications of N and P management tools that result in a verifiable implementation of a change in planned N and/or P application rates, N and/or P application timing, or N and/or P application placement which may result in a N and/or P Supplemental Nutrient Management BMP loss reduction credit(s). Like all watershed jurisdictions, Pennsylvania will need to provide separate documentation through their BMP verification programs demonstrating such changes in application rates, timing, and placement.

Attachment A
Guidance for Submission of Documentation Needed to Address the Phase 6 Nutrient Management BMP Language Agreed to by the Chesapeake Bay Program Partnership

February 7, 2017

BACKGROUND

During its November 28, 2016 conference call, the Chesapeake Bay Program Partnership's Water Quality Goal Implementation Team (WQGIT) approved the Phase 6 Nutrient Management BMP Expert Panel's un-amended Final Report and recommendations dated October 18, 2016, along with the inclusion of the following language to inserted into a separate Appendix G to the final Panel report:

> *Where book values are used in lieu of site-specific manure or soil analyses, the jurisdiction's program must be sufficiently conservative to ensure that implementation of the standard process is sufficiently restrictive to be protective of water quality.*
>
> *Jurisdictions reporting book value based nutrient management for credit in the Chesapeake Bay Program's modeling system must provide a description and justification documenting how their program, including the methods for calculating the book values, meets this standard as part of their EPA approved BMP verification program plan.*

The EPA Chesapeake Bay Program Office was charged by the WQGIT with the responsibility for developing, in direct consultation with members of the Phase 6 Nutrient Management BMP Expert Panel and other recognized experts, a clear set of guidance on the level, type and scope of data and documentation that a jurisdiction needs to submit to fully address the above adopted language. The below guidance directly reflects detailed input from several Panel members, jurisdictional representatives on the Agriculture Workgroup, the Agriculture Workgroup Coordinator, and the Watershed Technical Workgroup Coordinator.

REQUESTED EVALUATIONS AND DOCUMENTATION

Default Soil-Test Phosphorus Values and Book Values for Manure Nutrient Analysis

There are two distinct and fundamentally different components of the agricultural nutrient management process that are encompassed by this guidance. The first component is soil testing for assessment of phosphorus (P) availability from the soil to the growing crop. The second component is the nutrient analysis of manure to be applied to cropland. For a given farm operation or portion of a farm operation, site-specific data may be available for only the first component (soil-test P), only the second component (manure nutrient analysis), neither component or both components.

If soil samples are not collected from a field or management unit and analyzed for soil-test P, then an assumed, or default, soil-test P value must be utilized in the nutrient management planning and reporting process.

If a manure nutrient analysis is not conducted for the manure to be applied to the cropland at a specific site, then an assumed, or book value, manure nutrient analysis must be utilized in the nutrient management planning and reporting process.

Use of Soil-Test P Default Values and Manure Nutrient Book Values in Manure Management Plans
To address the question as to whether a jurisdiction's program is sufficiently conservative considering their reliance upon soil-test P default values and manure nutrient book values, the jurisdiction is asked to provide EPA with documentation on how many of manure management plans (numerically and by acreage) segregated by the primary livestock and poultry species on the operation, were developed and are being implemented by utilizing one of the following methods:

1) Use of default soil test P and default manure values;
2) Use of default soil test P and site-specific manure nutrient analysis;
3) Use of site-specific soil test P values and default manure values; or
4) Use of site-specific soil test P values and site-specific manure nutrient analysis.

EPA believes that in order to provide evidence of the conservative nature of its program, a jurisdiction needs to clearly demonstrate that a significant number of producers' manure management plans which utilized manure nutrient book values also utilized the default soil-test P value option, which programmatically incorporates a presumption of high soil-test P status and restricts phosphorus applications to a crop-specific annual crop removal rate.

The jurisdiction is asked to provide EPA with documentation of how the percentages of the population of manure management plans that were developed utilizing the input soil and manure nutrient data sources described above were derived.

The jurisdiction is also asked to provide documentation describing the process by which, in the absence of available Phosphorus soil nutrient analysis, what default process can be implemented by making what specific assumptions about Phosphorus soil residual and selection of crop specific annual Phosphorus removal rates as part of the Manure Management planning process.

Use of Manure Nutrient Book Values for Manure Management Plans
To address the question as to whether the use of the respective land grant university's manure nutrient concentration book values are sufficiently conservative, the jurisdiction is asked to provide EPA with documentation describing the basis for how the published manure nutrient values were derived. The documentation will describe the numeric and statistical range of analytical manure nutrient values for nitrogen and phosphorus by species, and the statistical methods utilized to derive the manure nutrient values published by the respective land grant university. The documentation should also describe the source(s) and relative age of the analytical manure nutrient data.

CREDITING N AND P NUTRIENT MANAGEMENT

This guidance is directed towards determining the use of book values to support crediting of core nitrogen (N) and P nutrient management based on the language in Appendix G. Supplemental nutrient management BMPs for both N and P have been defined by the Phase 6 Nutrient Management Expert BMP Panel as representing advanced site-specific assessments and applications of N and P management tools that result in a verifiable implementation of a change in planned N and/or P application rates, N and/or P application timing, or N and/or P application placement which may result in a N and/or P Supplemental Nutrient Management BMP loss reduction credit(s). Jurisdictions will need to provide separate documentation through their BMP verification programs demonstrating such changes in application rates, timing, and placement.

Attachment B
Process and Schedule for Submission of Documentation on Manure Management Plans' Use of Book Values Agreed to by Pennsylvania and EPA
February 7, 2017

BACKGROUND
On January 19, 2017, Jill Whitcomb, Pennsylvania Department of Environmental Protection, Doug Goodlander, Pennsylvania Department of Environmental Protection, and Frank Schneider, Pennsylvania State Conservation Commission met via conference call with Mark Dubin, University of Maryland Extension (in his role as the Chesapeake Bay Program Partnership's Agricultural Technical Coordinator), Matt Johnston, University of Maryland Department of Environmental Science and Technology (in his role as the Chesapeake Bay Program Partnership's Non-Point Source Data Analyst) and Rich Batiuk, U.S. EPA Chesapeake Bay Program Office (in his role at the Partnership's Basinwide BMP Verification Program Coordinator).

The objective of the meeting was to reach agreement on exactly how EPA's draft *Guidance for Submission of Documentation Needed to Address the Phase 6 Nutrient Management BMP Language Agreed to by the Chesapeake Bay Program Partnership* would be applied by Pennsylvania to meet the following language in Appendix G of the Partnership approved Phase 6 Nutrient Management BMP Expert Panel's Final Report:

> *Where book values are used in lieu of site-specific manure or soil analyses, the jurisdiction's program must be sufficiently conservative to ensure that implementation of the standard process is sufficiently restrictive to be protective of water quality.*
>
> *Jurisdictions reporting book value based nutrient management for credit in the Chesapeake Bay Program's modeling system must provide a description and justification documenting how their program, including the methods for calculating the book values, meets this standard as part of their EPA approved BMP verification program plan.*

AGREED TO DOCUMENTATION
EPA and Pennsylvania agreed to the development of the following three sets of documentation which were fully consistent with EPA's draft guidance developed at the request of the Partnership's Agriculture Workgroup and the Water Quality Goal Implementation Team.

Pennsylvania State University Manure Book Values
Pennsylvania Department of Environmental Protection and Pennsylvania State Conservation Commission will work directly with the lead authors of the Penn State University's Manure Management Plan Nutrient Balance Worksheet User Guide to secure additional documentation describing the basis for how the manure nutrient values published in Table 6 of the document were derived. The documentation will describe the numeric and statistical range of analytical manure nutrient values for nitrogen and phosphorus by population significant livestock species, and the statistical methods utilized to derive the manure nutrient values published by Penn State University. The documentation should also describe the source(s) and relative age of the analytical manure nutrient data, e.g. PSU Laboratory: 2001-2016.

Application of Default Soil-Test Phosphorus Values in Development of Manure Management Plans
Pennsylvania Department of Environmental Protection and Pennsylvania State Conservation Commission will provide more detailed documentation describing the process by which, in the absence of available Phosphorus soil nutrient analysis, a default process can be implemented by assuming a "High Soil Phosphorus" soil residual and using crop specific annual Phosphorus removal rates as part of the Manure Management planning process. This documentation, largely drawn from existing planning guidance documentation, will clarify the specific steps and sources of information utilized in the default process, as well additional clarification on the specific Phosphorus soil residual value represented by a "High Soil Phosphorus" classification used in default calculation process.

Use of Soil-Test P Default Values and Manure Nutrient Book Values in Manure Management Plans
To provide working documentation that Pennsylvania's holistic implementation of Manure Management Plan regulations is sufficiently conservative considering their greater reliance upon soil-test phosphorus default values and manure nutrient book values, Pennsylvania committed to surveying all 43 conservation districts within their portion of Chesapeake Bay watershed. Through a survey form developed cooperatively between the Pennsylvania Department of Environmental Protection, the Pennsylvania State Conservation Commission, and the Chesapeake Bay Program Office, the two Pennsylvania agencies will jointly contact the county conservation districts within the Commonwealth's portion of the Chesapeake Bay watershed and ask them to provide the following:

> For the Manure Management Plans written or reviewed by conservation district employees, segregated by the population significant livestock and poultry species identified in the survey form[1], how many of those manure management plans (numerically and by acreage) were developed and are being implemented by the producers utilizing one of the following methods:

5) Use of default soil test P and default manure values;
6) Use of default soil test P and site-specific manure nutrient analysis;
7) Use of site-specific soil test P values and default manure values;
8) Use of site-specific soil test P values and site-specific manure nutrient analysis

EPA and Pennsylvania both recognize responses may not be received from all 43 conservation districts—the objective here is to get a representative understanding of the basis for the manure management plans written to date across the array of population significant livestock and poultry species covered by these manure management plans.

In writing up this documentation, Pennsylvania Department of Environmental Protection and Pennsylvania State Conservation Commission will provide additional background information on relative size and types of agricultural operations to which these Manure Management Plan regulations apply. The emphasis of this entire set of agreed to documentation is to clearly communicate the conservative nature of the resultant recommended agricultural nutrient application rates through implementation of the entire program, not any single element in isolation.

[1] Only include species that have less than or equal to 70% coverage by Act 38 Nutrient Management Plans.

SCHEDULE FOR CREDITING

If Pennsylvania submits the above documentation in a timely manner, EPA has the time necessary to carry out its respective reviews, and EPA approves the document for incorporation into Pennsylvania's BMP verification program plan by March 30, 2017, Pennsylvania's submitted manure management plan acres will be incorporated into the calibration of the Partnership's Phase 6 Chesapeake Bay Watershed Model following the Partnership approved verification guidelines currently in place for Progress scenario reported acres and applicable to all jurisdictions. Pennsylvania's submitted manure management plan acres will also be credited in management watershed model scenarios used in the development of Pennsylvania's Phase III Watershed Implementation Plan, credited in future progress scenarios using the Phase 6 Watershed Model, and incorporated into Pennsylvania's historical record of BMP implementation when next updated in advance of development the 2018-2019 milestones consistent with CBP partnership approved milestone protocols and procedures.

If EPA disapproves the submitted documentation, EPA will clearly spell out in writing those specific areas of Pennsylvania's program that fall short of achieving the test of being "sufficiently conservative to ensure that implementation of the standard process is sufficiently restrictive to be protective of water quality."

EVALUATION AND AMENDMENT OF VERIFICATION DOCUMENTATION

Upon EPA review and agreement that the submitted documentation provided clear evidence of the conservative nature of the resultant recommended agricultural nutrient application rates through implementation of the entire program consistent with EPA's published guidance, EPA will ask Pennsylvania Department of Environmental Protection to amend their existing EPA approved BMP Verification Program Quality Assurance Plan to include the submitted documentation. EPA will then accept Pennsylvania's submitted manure management plan acreages starting with the Penn State University's Farmer Survey for crediting through the Partnership's suite of decision support tools, fully consistent with the Partnership approved Phase 6 Nutrient Management Practices BMP recommendations.

EPA and Pennsylvania agreed to target the mid-March 2017 timeframe for Pennsylvania's submission of documentation followed by EPA's timely review and approval.

Attachment C

Documentation on Manure Management Plans' Use of Book Values
Agreed to by Pennsylvania and EPA
March 2, 2017

Background: Pennsylvania Department of Environmental Protection and Pennsylvania State Conservation Commission staff reached an agreement with EPA on February 7, 2017 on exactly how the *Guidance for Submission of Documentation Needed to Address the Phase 6 Nutrient Management BMP Language Agreed to by the Chesapeake Bay Program Partnership* would be applied by Pennsylvania to meet the following language in Appendix G of the Partnership approved Phase 6 Nutrient Management BMP Expert Panel's Final Report:

> *Where book values are used in lieu of site-specific manure or soil analyses, the jurisdiction's program must be sufficiently conservative to ensure that implementation of the standard process is sufficiently restrictive to be protective of water quality.*
>
> *Jurisdictions reporting book value based nutrient management for credit in the Chesapeake Bay Program's modeling system must provide a description and justification documenting how their program, including the methods for calculating the book values, meets this standard as part of their EPA approved BMP verification program plan.*

EPA and Pennsylvania agreed to the development of three sets of documentation, which are fully consistent with EPA's draft guidance developed at the request of the Partnership's Agriculture Workgroup and Water Quality Goal Implementation Team.

A) ***Pennsylvania State University Manure Book Values***

B) ***Application of Default Soil-Test Phosphorus Values in Development of Manure Management Plans***

C) ***Use of Soil-Test P Default Values and Manure Nutrient Book Values in Manure Management Plans***

The primary focus of this documentation is to describe the process by which land application of manure occurs using the Manure Management Manual and the implementation of developed Manure Management Plans. Pennsylvania decided to focus on specific livestock and animal types in this documentation for reasons described below.

Livestock and Poultry Animal Types:

Concentrated Animal Operations (CAOs) and Concentrated Animal Feeding Operations (CAFOs) are required in Pennsylvania to have and implement Nutrient Management Plans (NMPs), a requirement under Chapter 83, Subchapter D. (also known as Act 38 NMPs). NMPs are developed, reviewed and approved by certified specialists and Pennsylvania maintains record of all NMPs in a central database. Using the database system, the animal types and numbers associated with current NMPs were compared to 2012 Ag Census Data. The following table provides the percentage of the livestock and poultry types that are covered by Act 38 NMPs versus the percent covered by Manure Management Plans (MMPs). This is important because the highly dense animal operations – the operations that are the most concerning regarding the lack of available acreage for the manure produced on that operation and susceptibility to high soil phosphorus – are covered by Act 38 NMPs. NMPs require the use of site-specific manure and soil testing due to the increased risk of soil phosphorus buildup on these high density or larger scale animal operations.

Table 1a. Comparison of Animal Equivalent Units (AEUs) in the primary animal types in Pennsylvania regulated under Act 38 Nutrient Management (CAFOs and CAOs)/Act 38 Volunteer Animal Operations (VAOs) and Chapter 91 Manure Management. The percentages come from the comparison of 2012 Ag Census Data to current information provided in Act 38 Nutrient Management Plans. The information used was state-wide data.

Animal Type	**Percent covered by Act 38 NMPs (CAFO/CAO/VAO)**	**Percent covered by MMPs**
All Swine (Hogs and Pigs used for breeding and other)	98.17	1.83
All Chicken (Layers, Pullets, Broilers)	99.51	0.49
Ducks*	147.32	-47.32
Turkeys	70.01	29.99
Dairy Related Cattle	20.04	79.96
Remaining Cattle (Beef)	9.88	90.12
Sheep and Lambs	3.13	96.87
Goats	5.18	94.82
Equine	7.22	92.78
*There has been a significant increase in duck population in Pennsylvania, which is why there is a higher population covered by NMPs than what was identified in the 2012 Ag Census		

As the data above shows, the primary animal types that are regulated under the Manure Management Plan requirements are Dairy, Beef, Sheep, Goats, and Equine by a vast majority

(between ~80-97%). Roughly only 30% of the Turkey population are regulated under the Manure Management Plan requirements as well, with 70% of these operations falling under the Act 38 planning requirements.

This data is important because the least concentrated animals are those that typically have lower nitrogen[1] and phosphorus[2] manure nutrient content. Manure nutrient analyses for smaller livestock operations, particularly those that haul manure on a daily or weekly basis, yield highly inconsistent results[3]. Additionally, many operations that grow beef [4], sheep, goats, and equine are typically not confined year-round and spend a significant portion of their time on pasture. As per the Phase 6 Nutrient Management BMP report, the N Core and P Core NM BMP multiplier values for "Other Hay and Pasture" were set at 1.00 because the CBP Partnership's modification of the LGU N (and P) Application recommendations created a uniform and much-reduced N application rate goal for these two agricultural land uses that included an assumed implementation rate of NM BMPs across the entire CBW. Therefore, the Panel could not apply a N (and P) application rate BMP multiplier other than 1.00 to these two land uses" (pg. 23-24).

A) ***Pennsylvania State University Manure Book Values***

Pennsylvania DEP and SCC requested a detailed description of the alignment of observed manure nutrient analysis to the Penn State Agronomy Guide book values from Douglas Beegle, PhD. and John Spargo, PhD. Dr. Beegle is a Distinguished Professor of Agronomy and served on the Phase 6 Nutrient Management BMP expert panel. Dr. Spargo is the Director of Penn State's Agricultural Analytical Services Lab (AASL). Their report can be found below:

This report is a summary of observed manure nutrient values based on samples submitted to the Penn State Agricultural Analytical Services Laboratory and a comparison to current Penn State Agronomy Guide manure nutrient content book values as requested by PA DEP. While it is recommended that Manure Management plans be developed using laboratory analysis, the additional time, effort and expense for routine manure testing may be overly burdensome for small, low density animal operations. For these operations, the use of book values should not compromise water quality protection. In general, our analysis shows that current book values compare relatively well with observed values. Also, because of the low animal density on these farms, manure rates rarely reach a maximum that would be limited by the manure nutrient content. Rates are typically lower than the maximum based on the manure nutrients and are determined by the amount of available manure and acres available for application. The rates in a Manure Management Plan are further restricted below maximum calculated rates to reduce the amount of excess P applied. The main motivation for using manure analysis on these farms would be agronomic, to ensure adequate nutrients are applied to meet crop nutrient needs.

Book values for Dairy, Beef, Turkey, Horse, Sheep, and Goats used in PA have been developed and modified over the years based on published references, manure analysis summaries, and professional judgement. Book values for Swine and Poultry have been developed from the same sources plus specific research to determine average nutrient contents for these species. The summaries for swine and poultry were not requested as part of this analysis and have not been included.

Analyses used here are from samples submitted to the Penn State Agricultural Analytical Services Laboratory from 1998 to 2016. Samples are identified by the farmer based on "Animal Type" and "Material Type". For the summaries presented here, the results were sorted by "Animal Type" and within the Animal Type, only samples identified with a "Material Type" as "Manure" were included. Other "Material Types" such as compost, treatment lagoon, separated solids and liquids, other treated manures, etc. were excluded. Note that the number of samples submitted for Dairy Calf and Heifer (77), Goats (27), and Sheep (34), are very low, consequently, these results may not be representative and should be viewed with caution. The numbers of samples represented in this summary for each animal type are shown in Tables 3-10. While N, P, and K analyses are available, this report only focuses on N and P.

Table 1b below summarizes the median manure analysis values compared to the current book values published in the Penn State Agronomy Guide. Note that there is not always a direct correspondence between the categories in the book values and the manure analysis summaries. The manure analysis summaries do not include all of the categories that are in the book values. The median is reported, rather than the mean, because the data are generally not normally distributed. This minimizes the impact of a few very high or low values on the summarized results. The means are also included below in the more detailed tables and graphs for reference only. There is general agreement between the book values and the median of observed values with some notable exceptions. The largest discrepancy is with the liquid dairy manure. For this summary an arbitrary division between "Liquid Dairy" and "Solid Dairy" was set at 5% dry matter in the Agronomy Guide. Adjusting that division, significantly changes the summary. If the division is set at 7.5 to 10% dry matter the agreement between book values and observed values is much better. This dry matter level should probably be adjusted in the book values. There is also disagreement with the Turkey, Sheep, and Goat phosphorus values.

With the exception of the P in the Sheep and Goat manure and to a lesser extent the calf and heifer and horse manure, the book values are very similar to or higher than the observed values, and are therefore more protective of the environment because the higher book values would result in lower allowable manure application rates.

Table 1b. Agronomy Guide versus Manure Analysis Medians for Dairy, Beef, Turkey, Horse, Sheep, and Goats.

		Agronomy Guide				AASL Median		
			Lb./ton*			Lb./ton*		
Animal Type	Subcategory	Moisture %	Total N	P_2O_5	K_2O	Total N	P_2O5	K_2O
Beef Cattle	Cow/Calf	88	11	7	10	12	6	12
	Steer	92	14	5	8			
Dairy Calf and Heifer**	Heifer	-	10	3	7	9	5	7
	Calf	-	10	3	4			
Dairy Cattle (Solid)	Dairy Cow	88	10	4	8	9	4	7
*Dairy Cow (Liquid lb./1000 gal))	Dairy Cow	95	28	13	25	17	5	15
Horse	Horse	80	12	5	9	11	7	12
Turkeys	Tom	40	52	76	42	54	45	35
	Hen		73	88	46			
Sheep**	Sheep	75	23	8	20	19	1	23
Goat**	Goat	75	23	8	20	20	13	23

* Units are lb./ton except for the Liquid Dairy which is lb./1000 gal ** Limited samples

In Table 2, the standard deviations of the means are reported as requested and a comparison of the values with the book values shows that the book values do fall within 1 standard deviation of the mean and median. Tables 3 to 10 and Figures 1 to 8 show more detail on the manure analysis summary. In these tables “Book Percentile” indicates where the “Book” values would fall within the observed data. Note in the figures that the values typically are not normally distributed, therefore the standard deviation in Table 2 maybe of questionable value.

Table 2. Mean, Median, and Standard Deviation of observed manure moisture content and nutrient concentration.

AASL		lb./ton*					
Subcategory	Moisture %*	Total N*	Total N SD	P_2O_5 *	P SD	K_2O*	K SD
Beef	72.2/74.8	13.3/11.6	7.5	7.4/6.2	5.0	14.6/11.8	11.3
Calf/Heifer	80.0/82.8	10.2/9.0	5.4	5.1/4.5	3.9	10.4/7.1	10.5
Dairy Cow - Solid	82.9/85.8	9.5/8.6	4.9	4.5/3.6	5.6	8.6/6.8	12.6
Dairy Cow - Liquid	97.5/96.9	16.7/17.2	9.6	5.5/5.3	3.9	14.0/14.7	6.6
Goat	58.4/60.6	23.2/20.2	8.7	15.9/12.9	9.6	26.2/22.5	22.5
Horse	63.1/66.9	11.7/11.3	4.4	8.7/7.5	5.7	14.0/11.6	9.2
Sheep	50.5/63.2	21.1/18.6	9.6	14.8/13.2	7.9	28.0/23.4	21.8
Turkey	34.0/35.6	53.2/54.0	15.3	48.0/44.6	20.1	36.0/34.5	12.4

*Mean/Median

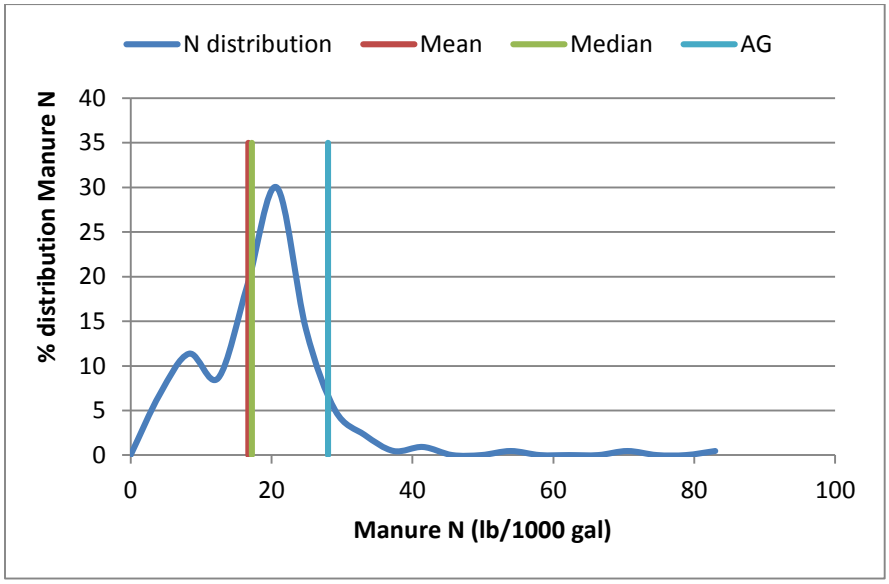
In conclusion, while it is recommended that Manure Management plans be developed using manure analysis, our evaluation of the analysis data shows that current book values compare relatively well with observed analysis values. Based on this evaluation and the typical management characteristics of these low density farms, it is unlikely that using these book values rather than an analysis would compromise environmental protection. Using manure analysis is, and should be, encouraged on these farms, more for the agronomic value to the farmer.

Table 3. Liquid Dairy Manure Summary

Dairy Liquid Manure (<5% dm) lb/1000 gal n=242

	N	NH_4	P_2O_5	K_2O
Book	28		13	25
Book Percentile	94		99	96
Mean	16.66	7.69	5.45	13.98
std Dev	9.55	4.24	3.94	6.55
Median	17.18	7.95	5.28	14.65

Figure 1 Liquid Dairy Manure N and P Distributions



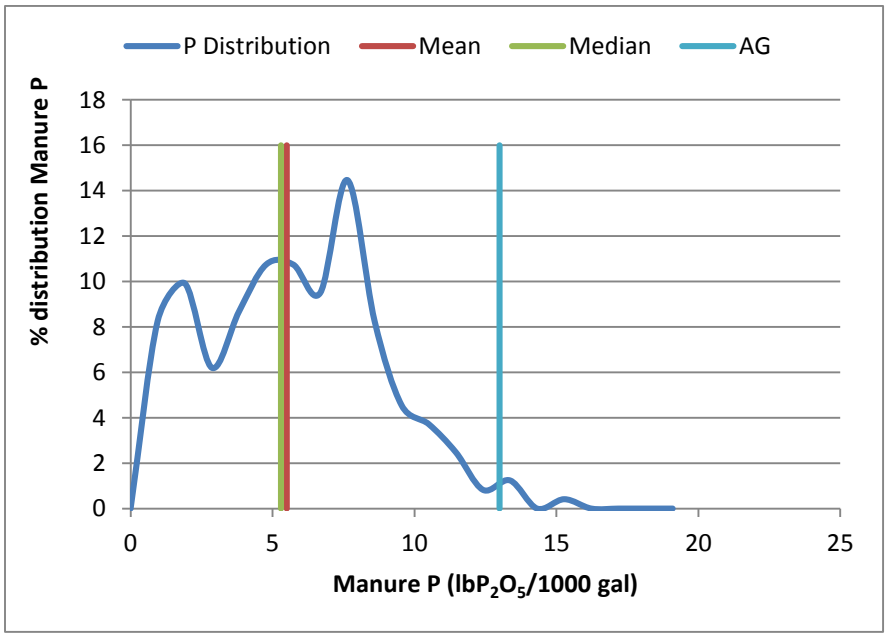
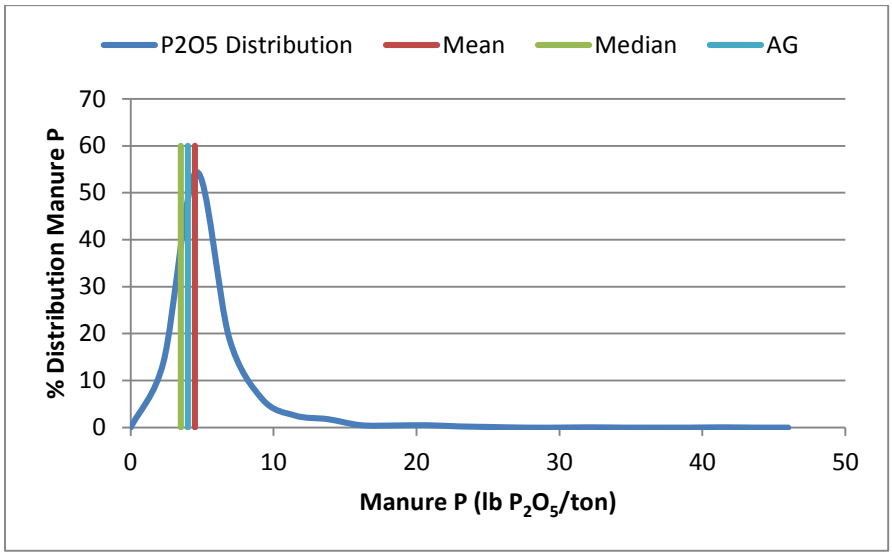


Table 4. Solid Dairy Manure Summary

Dairy Solid Manure (>5% dm)
lb/ton n=1842

	N	NH_4	P_2O_5	K_2O
Book	10		4	8
Book Percentile	59		69	64
Mean	9.53	2.68	4.50	8.60
Std Dev	4.91	1.88	5.63	12.54
Median	8.56	2.67	3.56	6.75

Figure 2 Solid Dairy Manure N and P Distributions



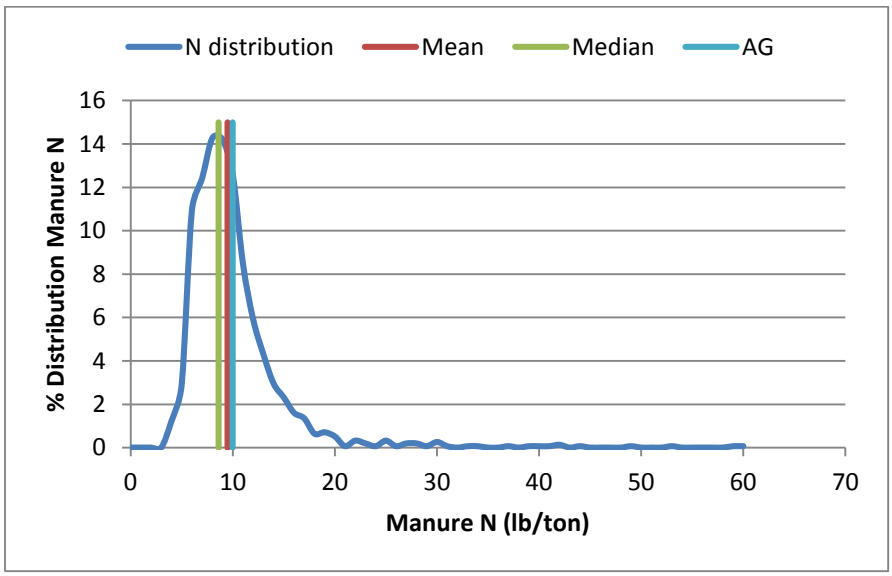
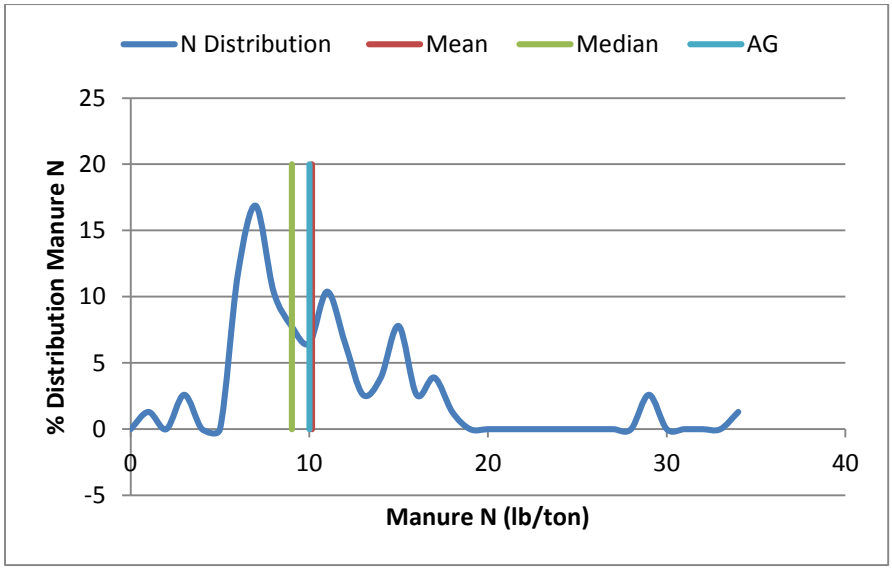


Table 5. Dairy Calf and Heifer Manure Summary

Dairy Calf/Heifer Manure lb/ton n=77

	N	NH_4	P_2O_5	K_2O
Book	10		3	7
Book Percentile	51		33	49
Mean	10.15	1.91	5.14	10.35
Std Dev	5.43	1.59	3.87	10.49
Median	9.03	1.76	4.50	7.06

Figure 3 Dairy Calf and Heifer Manure N and P Distributions



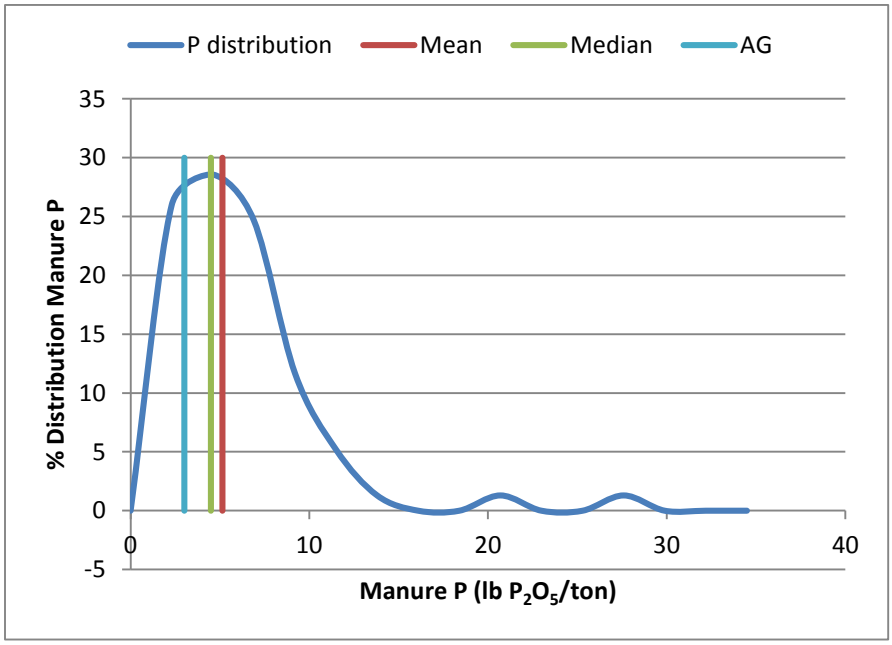
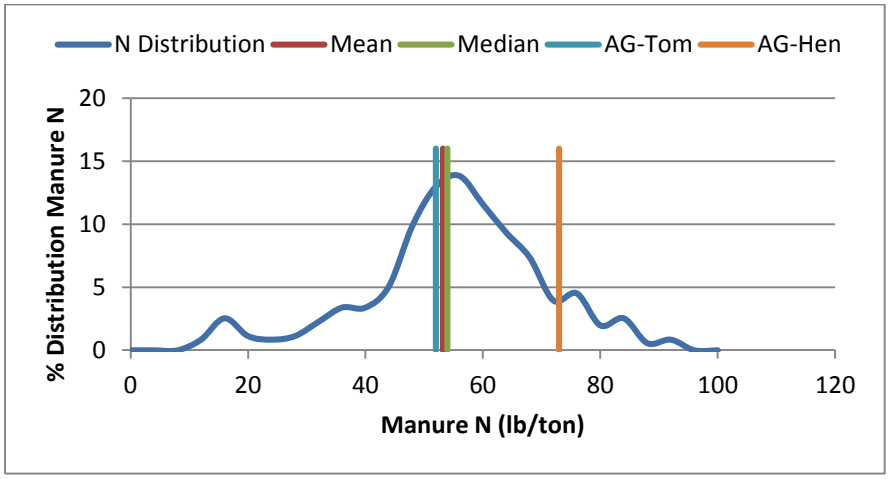


Table 6. Turkey Manure Summary

Turkey Manure				n=354
	N	NH_4	P_2O_5	K_2O
Book Tom	52		76	42
Book Percentile	43		90	75
Book Hen	73		88	46
Book Percentile	91		96	84
Mean	53.24	11.48	47.98	35.99
Std Dev	15.30	6.87	20.06	12.42
Median	53.95	11.54	44.64	34.53

Figure 4 Turkey Manure N and P Distributions



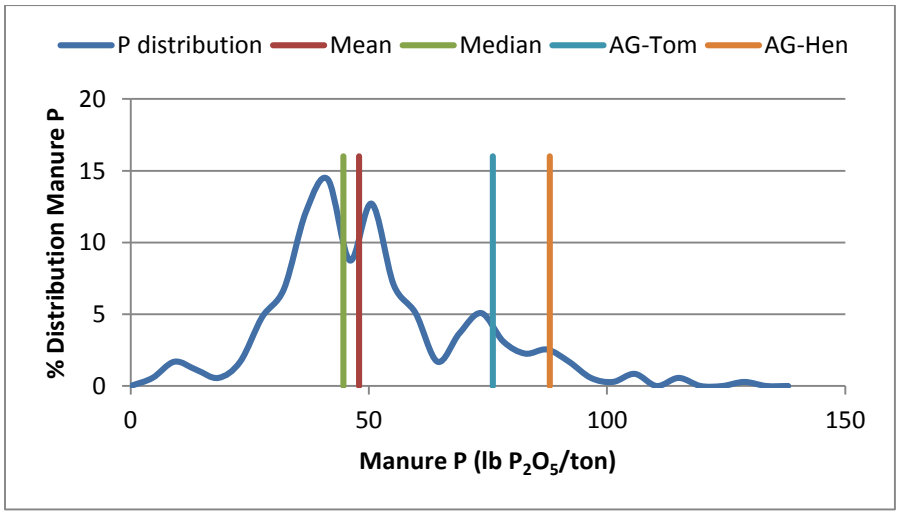
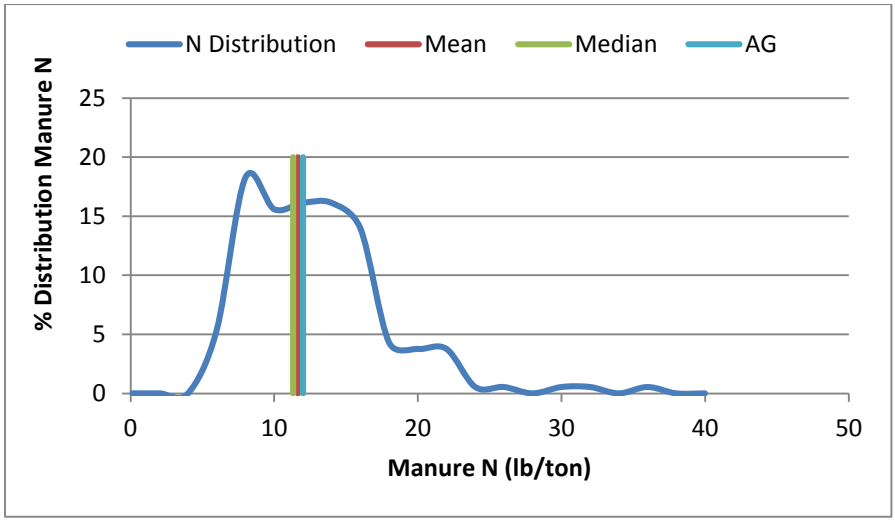


Table 7. Horse Manure Summary

Horse Manure				n=186
	N	NH_4	P_2O_5	K_2O
Book	12		5	9
Book Percentile	56		25	32
Mean	11.65	1.15	8.71	13.98
Std Dev	4.44	1.47	5.70	9.18
Median	11.31	0.64	7.48	11.58

Figure 5 Horse Manure N and P Distributions



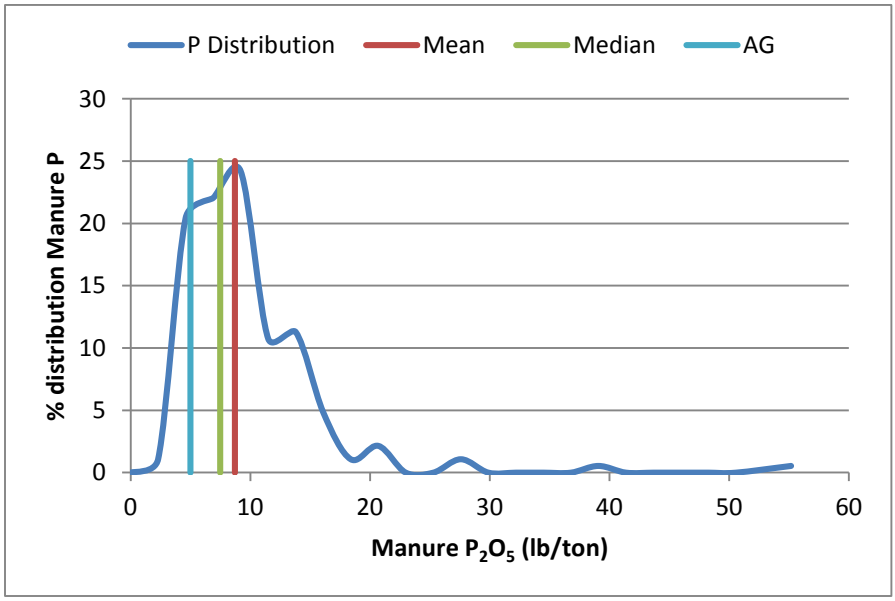
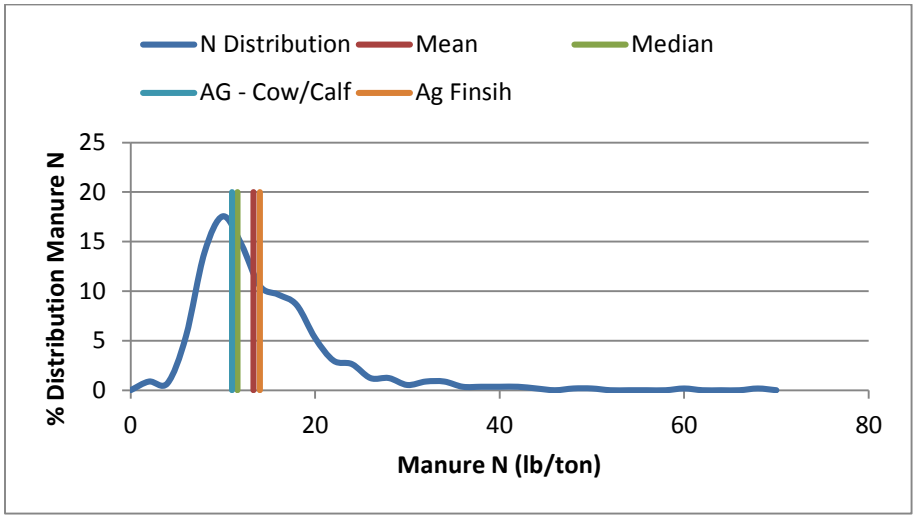


Table 8. Beef Manure Summary

Beef Manure n=569

	N	NH_4	P_2O_5	K_2O
Book - Cow Calf	11		7	10
Book Percentile Cow Calf	46		60	41
Book - Finish	14		5	8
Book Percentile Finish	64		35	32
Mean	13.30	1.10	7.36	14.57
Std Dev	7.52	1.22	5.02	11.34
Median	11.59	0.66	6.17	11.79

Figure 6 Beef Manure N and P Distributions



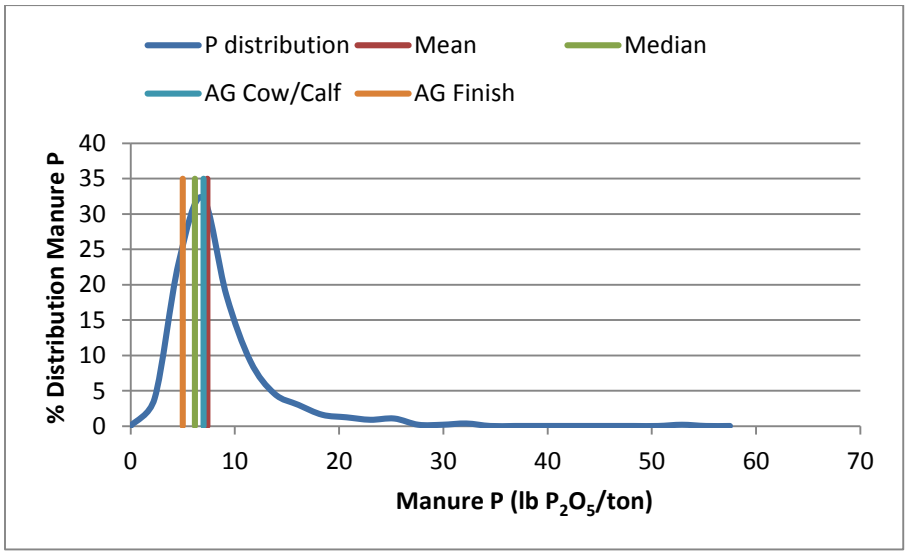
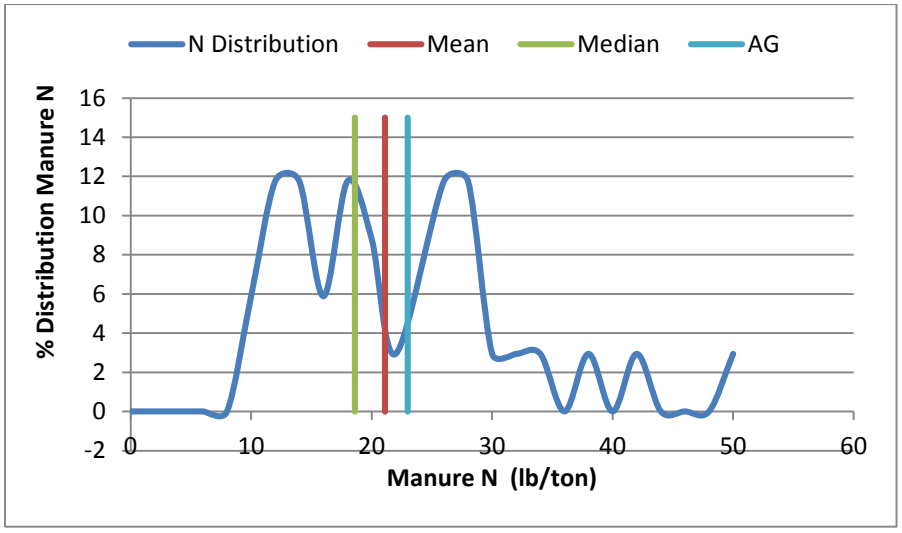


Table 9. Sheep Manure Summary

Sheep Manure				n=34
	N	NH_4	P_2O_5	K_2O
Book	23		8	20
Book Percentile	60		12	33
Mean	21.0934	2.299623	14.77029	27.99694
Std Dev	9.593852	2.65651	7.929091	21.78679
Median	18.60915	1.331997	13.17903	23.44924

Figure 7 Sheep Manure N and P Distributions



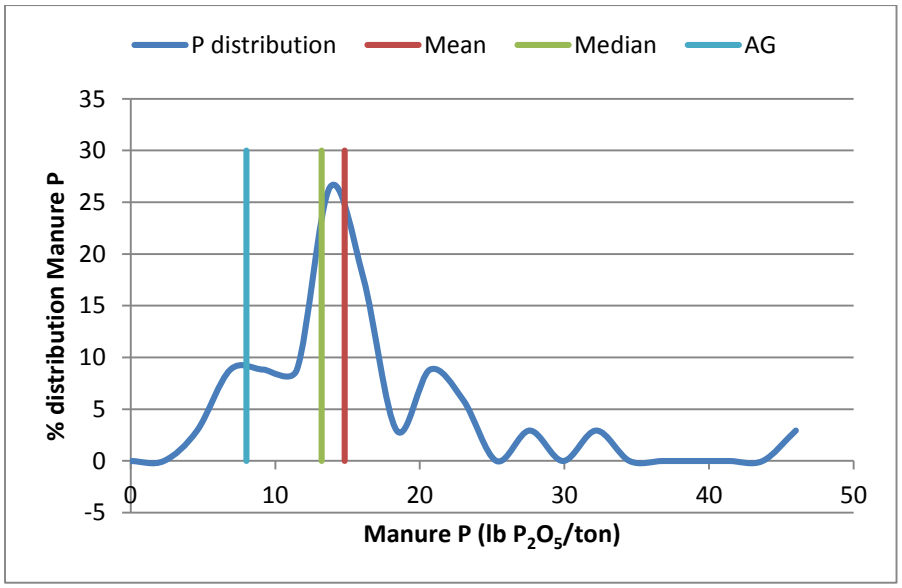
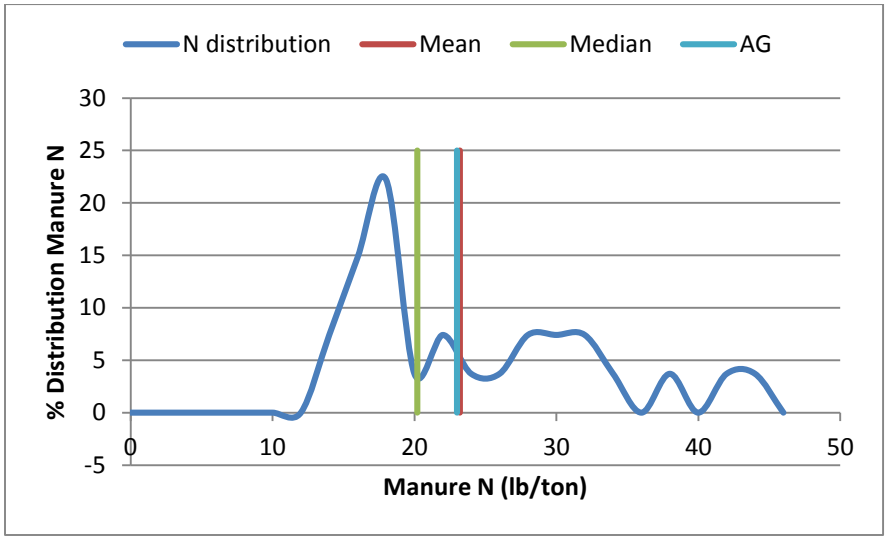
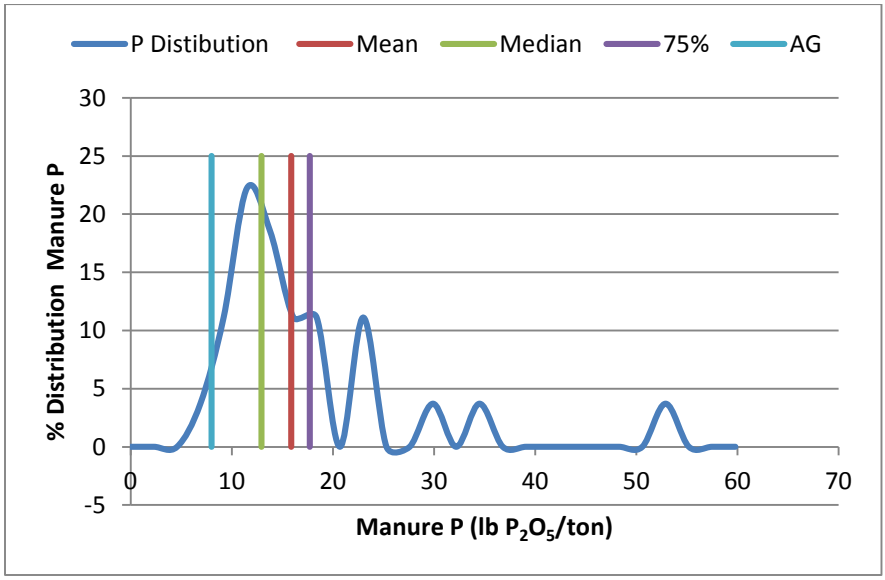


Table 10. Goat Manure Summary

Goat Manure				n=27
	N	NH_4	P_2O_5	K_2O
Book	23		8	20
Book Percentile	58		5	47
Mean	23.20	3.05	15.88	26.23
Std Dev	8.73	4.21	9.62	22.46
Median	20.21	1.08	12.93	22.51

Figure 8 Goat Manure N and P Distributions





B) ***Application of Default Soil-Test Phosphorus Values in Development of Manure Management Plans***

Pennsylvania regulates all land application of manure under Pennsylvania Code Title 25, Chapter 91.36. The use of the most current Manure Management Plan Guidance, 361-0300-002, (Manure Management Manual) is acceptable to meet these requirements, unless the agricultural operation is regulated as a Concentrated Animal Operation (CAO) under Chapter 83, Subchapter D or is regulated as a Concentrated Animal Feeding Operation (CAFO) under a CAFO permit as described in Chapter 92.5a.

The Manure Management Manual contains a workbook-type plan document that can be written by anyone, including Certified Nutrient Management Planners, Certified Crop Advisors, Conservation District Technicians, farmers and producers. Pennsylvania regulations do not require a certified planner develop Manure Management Plans. However, the plans must be developed using the Manure Management Manual or another approved method (such as Nutrient Balance Worksheets, Act 38 Nutrient Management Plan, or NRCS 590). The plans must contain the following, as applicable:

1. Operation Information
2. Farm Map outlining farm fields, waterbodies, wells, manure storages, pastures, animal concentration areas, and manure application setbacks
3. Animals on the Operation – types, numbers, days on the farm per year
4. Crop rotation(s)
5. Environmentally Sensitive Areas requiring manure application setbacks – identify the location and application setbacks for private or public drinking water wells; streams, lakes or ponds; sinkholes; areas of concentrated flow including swales, ditches, gullies; above ground inlets to agricultural drainage systems requiring winter manure application setbacks
6. Manure Management Plan Summary for Land Application of Manure and Fertilizer describing the crop to be grown, type of manure to be applied, rate to be applied, timing of the application, and application method for manure and fertilizer applied on the site
7. Winter application worksheet–required if manure is applied in the winter
8. Manure Storage Facilities description – identify the type of storage; when it was installed, approximate size and volume; additional materials added (such as bedding); related practices that need to be installed to address any problems
9. Solid Manure Stockpiling or Stacking locations
10. Pasture Areas and an indication of how nutrient loading is addressed on these lands
11. Animal Concentration Area (ACA) location and what practices are required to address runoff from these areas

Manure Management Plan Summary for Land Application of Manure and Fertilizer: The primary focus of this documentation is to describe the process by which land application of manure occurs using the Manure Management Manual and implementing the developed Manure Management Plan. This section of the plan must describe the manure application rate(s) as well as any fertilizer or other organic nutrient applications by crop group in a given season. It also includes manure imported to the operation.

In determining manure application rates, farmers have three options:

1. Use the values from the Manure Application Rate Charts in Appendix 1 (of the Manure Management Manual) based on the crop group, expected yield, manure type, application timing and method of application; **or**
2. Establish application rates based on the applicable Nitrogen or Phosphorus Balance Worksheets (NBS) (not including PA Phosphorus Index option); **or**
3. Have an individual trained to implement the PA Phosphorus-Index (such as a Certified Nutrient Management Specialist, Certified Manure Hauler or Broker, or other individual who has received PA Phosphorus Index training) develop this section of the plan using the PA Phosphorus Index.

The planning process and recordkeeping requirements are more detailed as one moves down the list. However, these more detailed processes may provide additional flexibility to the farmer in the maximum land application rates for the manure applied on the operation.

Note that the documentation that Pennsylvania is providing to EPA focuses on the development of manure management plans in the absence of site-specific manure and soil analyses.

The Manure Application Tables include the manure type, crop type, manure application method/timing, and expected crop yield to determine an appropriate amount of manure and fertilizer that may be applied. These tables are established based on nutrient utilization, nitrogen mineralization, and manure nutrient content values from the Land Grant University for the most common manure and crop types in Pennsylvania. If the manure type or crop is not included in the tables in the manual (or tables have not been developed as supplements to the manual), the Nitrogen or Phosphorus Nutrient Balance Sheet (Option 2) or the P-Index (Option 3) must be used.

If the farmer has not done a soil test for phosphorus in the past three years or if the soil test results show phosphorus levels (Mehlich 3-P levels) greater than or equal to 200 ppm, the farmer must use the phosphorus removal charts. If a soil test was completed within the past 3 years which included an assessment of phosphorus levels in the soil and the results show phosphorus levels (Mehlich 3-P levels) of less than 200 ppm, the nitrogen based charts may be used.

Therefore, if soil tests are not available for the particular fields being planned, the program requires the planner to assume that the soil test levels are greater than 200 ppm P and the application rates cannot exceed the crop removal rate for phosphorus. The farms that fall under Pennsylvania's Manure Management Manual requirements are those smaller, low animal density operations, where soil phosphorus buildup is unlikely to occur for reasons described in Section A of this document. Essentially all of the hog and chicken operations in the state fall under the CAO or CAFO definitions (see Table 1) and are therefore not authorized to use the MMM planning options and must following the state's Act 38 planning standards.

No single manure application can exceed 9,000 gallons. For application rates greater than 9,000 gallons, the application must be split into multiple applications. The maximum application rate for winter spreading is 5,000 gallons per acre of liquid manure or 20 tons per acre of dry non-poultry manure per acre or 3 tons of dry poultry manure per acre.

One element of the Manure Management Plan (MMP) focuses on Environmentally Sensitive Areas (ESAs). ESAs require a 100-foot mechanical manure application setback from a perennial and intermittent streams, lakes and ponds. Setbacks can be reduced to 50 feet where a soil test was done within the last 3 years and shows a soil phosphorus level (Mehlich 3-P levels) of less than 200 ppm and the farmer uses no-till practices and if residue is removed, a cover crop is planted. A stream, lake or pond setback can be further reduced to 35 feet where there is a permanent vegetated buffer along the water body. As per the P6 Nutrient Management BMP report, P placement adjustment practices -- a P supplemental credit -- includes phosphorus application setbacks from water consistent with this element of MMPs. The report provides the criteria for these setbacks in that it states: "Setbacks must meet the minimum standards required under applicable local, state, or federal programs and laws."

Farmers are also required to maintain two types of records on site. Records are not required to be submitted to the regulatory agency or conservation district but must be made available to agency staff upon request. The farmer must maintain records to demonstrate the actual manure application rates and locations of manure application as well as actual crop yields obtained for the farm. Again, these records must be made available to DEP or the county conservation district upon request. Farmers are also required to keep records documenting inspection of their manure storage facilities and stacking areas. Manure transfer records must be kept, where applicable.

Pastures, as mentioned earlier in this document, are planned somewhat differently when manure is not mechanically applied (i.e. the manure is deposited by grazing animal). All pastures on the farm must be listed in the Manure Management Plan and identified on the farm map. Farms have several choices for managing pastures:

1. The farm can develop a grazing plan meeting the requirements of the NRCS Pennsylvania Technical Guide Practice Standard 528 for Prescribed Grazing; **or**

2. Farmers can manage pastures by assuring that there is dense vegetation in the pasture throughout the growing season. Dense vegetation means that the pasture is managed to minimize bare spots and to maintain an average vegetation height across the pasture during the growing season at least 3 inches high.

Grazed fields that do not have an NRCS grazing plan which are overgrazed (as defined as not meeting the management requirements described above in the second bullet) need either to be managed to restore dense vegetation or these areas will be defined as Animal Concentration Areas (ACAs) and will need to meet the requirements of an ACA in the manual.

C) *Use of Soil-Test P Default Values and Manure Nutrient Book Values in Manure Management Plans*

The Department of Environmental Protection maintains the statutory authority for Chapter 91 (Manure Management) and the State Conservation Commission maintains the statutory authority for Chapter 83 (Nutrient Management). All 43 Conservation Districts in Pennsylvania's Chesapeake Bay Watershed are delegated authority from DEP and SCC for Manure Management and Nutrient Management. As part of this delegated authority, conservation districts assist in the development and review of Manure Management Plans.

Pennsylvania DEP and SCC disseminated an EPA-approved survey to the 43 districts in the Chesapeake Bay Watershed to determine the approximations of manure management plans (numerically and by acreage) which were developed and are being implemented by the producers utilizing one of the following methods:

1) Use of default soil test P and default manure values;
2) Use of default soil test P and site-specific manure nutrient analysis;
3) Use of site-specific soil test P values and default manure values;
4) Use of site-specific soil test P values and site-specific manure nutrient analysis

For reasons described in the beginning of this documentation, the district survey included Dairy, Beef, Turkey, Sheep, Goat, Equine, and Other animal groups. The "Other" animal group included crop only farms importing manure; mixed animal operations; bison; alpacas; llamas; small poultry flock (under the Act 38 and/or CAFO thresholds); and small hog operations (under the Act 38 and/or CAFO thresholds).

Conservation District Survey Data:
The completed conservation district surveys were submitted to and aggregated by the State Conservation Commission. The conservation districts were provided a two-week time frame to complete the survey. The districts were directed to provide data based on the most recent 18-month period (July 1, 2015 through December 31, 2016) of reported numbers of plans as well as plan acres for the livestock and poultry types identified above. The information provided by the districts incorporate actual records as well as best professional judgment based on district technician involvement in the development and/or review of Manure Management Plans during the 18-month time frame identified above.

Of the 43 conservation districts surveyed, completed data sets were submitted by 28 districts. To put that in perspective, 10 of the districts who responded are in the top 13 (top 30%) of total delivered agricultural nitrogen and phosphorus load to the Chesapeake Bay (according to 2015

county loading data). More than half that responded are located in Pennsylvania's Southcentral Region.

As shown in Table 10 (Appendix A), the majority of the Manure Management Plans that were developed with conservation district technician assistance or reviewed by conservation district technicians were written to the **Crop Phosphorus Removal Based Application Rates**. A summary breakdown of the percentage covered by MMPs written to Crop P Removal Rates for each livestock and poultry type identified in the survey is provided below.

Dairy – 57.4% (29,703 acres) of the estimated total acres were written to Crop P Removal Rates;
-50.4% (26,289 acres) of the estimated total acres had soil analyses
Beef – 82.5% (26,155 acres) of the estimated total acres were written to Crop P Removal Rates;
Turkey – 100% (830 acres) of the estimated total acres were written to N-based Rates,
-3 total plans reported
-90% (745) acres had manure and soil analyses
Sheep – 86% (1,367 acres) of the estimated total acres were written to Crop P Removal Rates;
Goat – 97% (277 acres) of the estimated total acres were written to Crop P Removal Rates;
Equine – 90% (4,030 acres) of the estimated total acres were written to Crop P Removal Rates;
Other – 59% (6,012 acres) of the estimated total acres were written to Crop P Removal Rates

Conclusion:

In summary, the planning process in Pennsylvania requires that the nutrient content of the manure and the residual nutrients in the soil are taken into account. For Manure Management Planning and implementation, the nutrient content of the manure can be determined from standardized book values established by the Land Grant University or from on-farm sampling. The nutrient content of soil can be determined from on-farm sampling or, if no sampling is conducted, it is assumed to be at 200 ppm phosphorus or higher. As shown in this documentation, the majority of the Manure Management Plans that were developed with conservation district assistance or reviewed by the conservation district staff were written to Crop Phosphorus Removal Based Application Rates. Those that are not developed to the phosphorus removal rates must have soil tests; the soil test results must show that the phosphorus level is below 200 ppm. While there are Manure Management Plans that are written to Nitrogen Based Application Rates without site-specific manure analysis, as stated earlier in the report provided by Dr. Beegle and Dr. Spargo, the manure nutrient book values compare with observed analysis values and are protective of water quality. Therefore, this documentation meets the criteria as stated in the language developed in Appendix G of the Partnership approved Phase 6 Nutrient Management BMP Expert Panel's Final Report.

Acknowledgments:
We would like to thank Dr. Douglas Beegle and Dr. John Spargo from Penn State University as well as Pennsylvania's Conservation Districts for enabling us to develop this documentation. We greatly appreciate their time and efforts.

Citations

1. Pennsylvania Act 38 Nutrient Management Program Technical Manual. Supplement 1, Agronomy Guide Tables. 2015.
2. Agronomy Facts 13: Managing Phosphorus for Crop Production, authored by Douglas Beegle and John T Durst. Penn State University. Penn State Extension Publications. 2002.
3 LPES Small Farms Fact Sheets, authored by Randall James, Ohio State University Extension, courtesy of MidWest Plan Service, Iowa State University, Ames, Iowa 50011-3080. Copyright 2006.
4 Animal Waste Management Systems BMP expert panel report. EPA CBPO. 2016.

APPENDIX A

Table 10. Tabulated Data from Conservation Districts (28) in Pennsylvania's Chesapeake Bay Watershed for the previous 18-month period (July 1, 2015 through December 31, 2016)

NAME OF COUNTY CONSERVATION DISTRICT: ENTIRE BAY WATERSHED

NAME OF POINT OF CONTACT: FRANK SCHNEIDER

CHESAPEAKE BAY MMP SURVEY

		PRIMARY ANIMAL TYPE																				
		Dairy			Beef			Turkey			Sheep			Goat			Equine			Other		
	Questions on MMPs Either Developed or Reviewed by County Conservation District Staff	Estimated Total Number of Dairy Plans	Estimated Total Number of Dairy MMP Acres	Percentage of Total MMP for Dairy	Estimated Total Number of Beef Plans	Estimated Total Number of Beef MMP Acres	Percentage of Total MMP for Beef	Estimated Total Number of Turkey Plans	Estimated Total Number of Turkey MMP Acres	Percentage of Total MMP for Turkey	Estimated Total Number of Sheep Plans	Estimated Total Number of Sheep MMP Acres	Percentage of Total MMP for Sheep	Estimated Total Number of Goat Plans	Estimated Total Number of Goat MMP Acres	Percentage of Total MMP for Goats	Estimated Total Number of Equine Plans	Estimated Total Number of Equine MMP Acres	Percentage of Total MMP for Equine	Estimated Total Number of Other Plans	Estimated Total Number of Other MMP Acres	Percentage of Total MMP for Other
	PHOSPHORUS REMOVAL APPLICATION RATES																					
1	Manure Management Plans that were written using **Crop Phosphorus Removal Based Application Rates** (manure analysis **not** available, soil analysis **not** available)	157	26080	50%	229	25997	82%		0	0%	18	967	61%	18	277	97%	235	3998	89%	61	5565	54%
2	Manure Management Plans that were written using **Crop Phosphorus Removal Based Application Rates** (manure analysis available, soil analysis **not** available)		0	0%		0	0%		0	0%		0	0%		0	0%		0	0%		0	0%
3	Manure Management Plans that were written using **Crop Phosphorus Removal Based Application Rates** (manure analysis **not** available, soil analysis available)	25	3411	7%		0	0%		0	0%	1	400	25%		0	0%	1	32	1%	3	261	3%
4	Manure Management Plans that were written using **Crop Phosphorus Removal Based Application Rates** (manure analysis available, soil analysis available)	1	212	0.4%	1	158	0.5%		0	0%		0	0%		0	0%		0	0%	1	186	2%
	NITROGEN BASED APPLICATION RATES																					
5	Manure Management Planss that were written using **Nitrogen Based Application Rates** (manure analysis **not** available, soil analysis available)	73	13623	26%	61	5478	17%	1	85	10%	2	224	14%	1	10	3%	14	481	11%	31	2982	29%
6	Manure Management Plans that were written using **Nitrogen Based Application Rates** (manure analysis available, soil analysis available)	24	9043	17%	2	215	1%	2	745	90%		0	0%		0	0%		0	0%	9	1351	13%
	TOTAL:	**280**	**52369**	**100%**	**293**	**31848**	**100%**	**3**	**830**	**100%**	**21**	**1591**	**100%**	**19**	**287**	**100%**	**250**	**4511**	**100%**	**105**	**10345**	**100%**

March 2, 2017

Pennsylvania State Conservation Commission and Department of Environmental Protection
Manure Management Plan Survey

In order for Pennsylvania's Chapter 91 Manure Management Plans to qualify for full efficiency credit in the Phase 6.0 Chesapeake Bay Watershed Model, Pennsylvania must demonstrate to EPA that these plans are sufficiently conservative to be protective of water quality.

As part of this demonstration, the State Conservation Commission (SCC) and the Department of Environmental Protection (DEP) have been directed to provide a representation of Manure Management Plans across the Commonwealth's portion of the Chesapeake Bay watershed. The representation is to be based on the findings of a survey provided to each of the county conservation districts with service areas within the Bay watershed boundaries (attached). The county survey is intended to obtain composite Manure Management Plan information on significant livestock species and the baseline nutrient information that was used to develop those Plans.

Together, the SCC and DEP are requesting all conservation districts in the Chesapeake Bay Watershed to provide Manure Management Plan composite information. This survey information may be an estimate based on your staff's best professional judgment. While there are plans that contain multiple animal types, focus the plan acres on the primary animal type on that operation (i.e. a dairy with mules would be categorized under dairy). Districts' experiences with assisting farmers to develop Manure Management Plans; providing Manure Management Planning workshops for farmers and consultants; and complaint follow-ups and inspections provide the assurance that the Chesapeake Program Partnership requires to make this determination. Additionally, EPA views conservation districts as a trusted independent entity to fulfill this request.

Enclosed you will find a table pre-populated with specific livestock types; the table does not include chickens, ducks, or swine since over 98% of those animal types are covered by Act 38 Nutrient Management Plans. There are specific questions regarding an estimated acreage associated with the plans and percentage of plans that have been developed or seen by your office that would fall into either the Nitrogen or Crop Phosphorus Removal Based Application Rate, depending upon the availability of site-specific manure and/or soil analyses. We are only requesting your **estimate of acres of Manure Management Plans developed using the Manure Management Land Application of Manure Guidance (Manure Management Plan Guidance) for the time period of July 1, 2015 through December 31, 2016**. These Manure Management Plans that we are seeking information on could have been written using any of the 3 planning techniques described Manure Management Manual including: lookup tables, the Manure Management Manual Nutrient Balance Sheets, or the Manure Management Manual P-Index Nutrient Balance Sheets.

Start with the Manure Management Plan information, both written and reviewed, that you provided as part of our Bay Technician invoicing paperwork in Section 2 of the CBP-23 forms. Include number of plans and plan acres for plans developed via manure management workshops, if recorded. Then, use best professional judgment on the numbers of total acres that were developed or reviewed under each livestock type and how the plans were written. The relative percent will be then calculated by the spreadsheet and the total number of plans and plan acres will be summed automatically at the bottom of the table. Act 38 NMPs and NRCS 590 Plans are already accounted for in the Chesapeake Bay modeling tools; therefore, we are not seeking an estimate on those types of plans.

Please submit your completed survey to Frank Schneider at fschneider@pa.gov by Friday, February 24.

We appreciate your efforts in this short time frame. Without you, we would not be able to provide sufficient information to EPA for their approval of crediting our Manure Management Plans in the Chesapeake Bay Program modeling tools.

Please contact Frank Schneider at fschneider@pa.gov or (717) 705-3895 or Jill Whitcomb at jiwhitcomb@pa.gov or (717) 783-5205 for more information.