APPENDIX F:

TECHNICAL REQUIREMENTS FOR TIER 1AND TIER 2 NUTRIENT APPLICATION MANAGEMENT BMPs – TRACKING, REPORTING, DATA QUALITY, NEIEN, SCENARIO BUILDER, AND THE WATERSHED MODEL

Background: In June 2013 the Water Quality Goal Implementation Team (WQGIT) agreed that each BMP expert panel would work with CBPO staff and the Watershed Technical Workgroup (WTWG) to develop a technical appendix for each expert report. The purpose of the technical appendix is to describe how the expert panel's recommendations will be integrated into the modeling tools including NEIEN, Scenario Builder and the Watershed Model.

Practice Definitions: The new practices are organized into three tiers, each building on the previous tier in succession.

Tier 1 - Crop Group Nutrient Application Management (CGNAM):

Documentation exists for manure and/or fertilizer application management activities in accordance with basic land grant university (LGU) recommendations. This documentation supports farm-specific efforts to maximize growth by application of nitrogen (N) and phosphorus (P) with respect to proper nutrient source, rate, timing and placement for optimum crop growth consistent with LGU recommendations. Particular attention is paid to: (1) standard, realistic farm-wide yield goals; (2) credit for N sources (soil, sod, past manure and current- year applications); (3) P application rates consistent with LGU recommendations based on soil tests for fields without manure; and (4) N based application rates consistent with LGU recommendations for fields receiving manure.

Tier 2 – Field Level Nutrient Application Management (FLNAM):

Implementation of formal NM planning is documented and supported with records demonstrating efficient use of nutrients for both crop production and environmental management. Nutrient applications are based on: (1) standard yield goals per soil type, or historic yields within field management units; (2) credit for N sources (soil, sod, past manure, and current-year applications); (3) P application rates consistent with LGU recommendations based on soil tests and LGU guidelines; (4) fields assessed for P loss risk with a LGU P risk assessment tool; and (5) other conservation tools necessary for proper nutrient source, rate, timing and placement to improve nutrient use efficiency.

Tier 3 – Adaptive Nutrient Management (ANM):

Implementation of Tier 2 nutrient application management, plus multiyear monitoring of nutrient use efficiency with the results of this monitoring being integrated into future NM planning. This process evaluates and refines the standard LGU nutrient recommendations using field- and subfield-specific multiple-season records. It further promotes the coordination of amount (rate), source, timing, and placement (application method) of plant nutrients to further reduce nutrient losses while maintaining economic returns. In addition to the field assessments in FLNAM, ANM must include some or all of the following elements:

- Multiyear, ongoing records from tests or trials including field- and subfield-level soil test P (STP).
- An N assessment including but not limited to Illinois Soil Nitrogen Test (ISNT), Corn Stalk Nitrate Test (CSNT), Pre-sidedress Nitrate Test (PSNT) and in-field monitoring/strip trials with yield determination to improve upon the standard LGU recommendations for application.
- Precision application technologies to more accurately deliver and record recommendations.

Q1: What are the efficiency reductions a jurisdiction can claim for implementing Tier 1, Crop Group Nutrient Application Management?

A1: The panel recommended that Tier 1, Crop Group Nutrient Application Management, should have different reductions to loads for different land uses simulated in the Chesapeake Bay Watershed Model. A jurisdiction can expect loads from agricultural land uses to be reduced by percentages in the table below.

Table 1. Tier 1, Crop Group Nutrient Application Management Percent Nutrient Reductions

Land Use	TN Reduction	TP Reduction
High-Till with Manure	9.25	10
Low-Till with Manure	9.25	10
High-Till without Manure	5	8
Pasture	5	8
Alfalfa	5	8
Hay with Nutrients	5	8
Nursery	5	8

Q2: What are the efficiency reductions a jurisdiction can claim for implementing Tier 2, Field Level Nutrient Application Management?

A2: The panel recommended that Tier 2, Field Level Nutrient Application Management, should have a TN reduction of 6.5% and a TP reduction of 10% for all land uses, which would be added to the Tier 1 efficiency values in Table 1. A jurisdiction can expect loads from agricultural land uses to be reduced by percentages in the table below.

Table 2. Tier 2 Nutrient Application Management Percent Nutrient Reductions

Land Use	TN Reduction	TP Reduction
High-Till with Manure	15.75	20
Low-Till with Manure	15.75	20
High-Till without Manure	11.5	18
Pasture	11.5	18
Alfalfa	11.5	18
Hay with Nutrients	11.5	18
Nursery	11.5	18

Q3: Why is there no credit given for Tier 3 Nutrient Application Management?

A3: At the time of publication of this document, the expert panel has not defined reduction efficiencies for Tier 3. Credit will be given in Scenario Builder and the Watershed Model for Tier 3 following approval of the panel's future recommendations.

Q4: Can jurisdictions still receive credit for the Enhanced Nutrient Application Management and Decision Agriculture BMPs?

A4: No. The panel recommended the immediate replacement of both Enhanced Nutrient Application Management and Decision Agriculture BMPs with Tier 2 Field Level Nutrient Application Management.

Q5: Can a jurisdiction report Tier 1 Nutrient Application Management AND Tier 2 Nutrient Application Management on the same acre?

A5: No. Each BMP must be reported separately. For example, a state has 150 acres under some type of nutrient management in a county, with 100 acres of Tier 1 Nutrient Management, 50 acres of Tier 2 Nutrient Management. States should report 100 and 50 acres accordingly. The 50 acres under Tier 2 assumes the management requirements of Tier 1 are being met and the additional management needed to meet Tier 2 requirements.

Q6: How are the reductions actually calculated in Scenario Builder and the Watershed Model?

A6: Reductions for all types of nutrient application management BMPs are applied as percent reductions to loads exiting agricultural land uses. Therefore, the impact of these reductions in the Watershed Model will vary across the watershed as a result of hydrologic conditions, application rates to land uses and nutrient export from land uses.

Q7: What data fields does a jurisdiction need to report to successfully process nutrient application management BMPs in Progress?

A7: Jurisdictions should report the following information:

- Nutrient Application Practice Type: Crop Group Nutrient Application Management (Tier 1); Field level Nutrient Application Management (Tier 2)
- Acres: Number of acres under a nutrient application management plan in the geographic reporting unit
- Land use: Approved NEIEN land uses
- Location: Approved NEIEN geographies: County; County (CBWS Only); Hydrologic Unit Code (HUC12, HUC10, HUC8, HUC6, HUC4), State (CBWS Only)
- Date of Implementation: Year of plan implementation (not necessarily the year the plan was written)

Q8: What data fields does a jurisdiction need to report to successfully process nutrient application management BMPs in a planning scenario?

A8: Jurisdictions should report the following information:

- Short Name: EffNutMan (Tier 1); EffNutMan2 (Tier 2)
- Acres: Number of planned acres under a nutrient application management plan in the geographic reporting unit
- Land use: Approved SB land uses listed in Tables 1 and 2 above
- Location: Approved SB geographies: County; County (CBWS Only); Hydrologic Unit Code (HUC12, HUC10, HUC8, HUC6, HUC4), State (CBWS Only)

Q9: Do states need to report all acres under nutrient management BMPs annually?

A9: Yes. Beginning in 2013, states submit the total number of acres concurrently complying with the requirements under Nutrient Application Management for a given year.

Q10: What is the order of credit for nutrient management BMPs in Scenario Builder?

A10: Jurisdictions may submit acres of Tier 1 Nutrient Management, and Tier 2 Nutrient Management in the same geographic reporting unit. However, these BMPs may not be reported on the same acre. To avoid double-counting on the same acres, the panel recommends that Scenario Builder will process the BMPs in the following order:

Tier 2 Nutrient Management
Tier 1 Nutrient Management

If there are no agricultural acres available in the geographic reporting unit after a BMP is processed, the next BMP in the processing order will not receive credit.

Q11: The Tier 2 report identifies manure incorporation as a component of Tier 2 management. If this is the case, will additional model reductions be given once this particular practice is investigated and approved through the WQGUT?

A11: Proposed answer: No. The panel clearly identified manure incorporation as a component of Tier 2 so crediting again separately would be double-counting of benefits. However, 6/5/14 NutMan panel minutes say the panel thought this practice should be incorporated as a separate BMP.

Q12: If Tier 1 is N-based manure rates and Tier 2 is P-based manure rates, will Scenario Builder be run under N-based conditions for calculating rates for Tier 1 acres and P-based conditions for calculating rates for Tier 2 acres – and if not, why not? What if there's both Tier 1 (N-based) and Tier 2 (P-based) in the same county or Watershed Model segment (Scenario Builder doesn't operate at finer scales since so much of the data isn't sub-county)?

A12: Answer is unknown. Scenario Builder has the ability to apply nutrients to fulfill an N-based plan or apply nutrients to fulfill a P-based plan. Alternatively, Scenario Builder could have been used as a single line of evidence to estimate reductions in loads that occur if nutrients were applied to fulfill a P-based plan (a substantial component of Tier 2 Nutrient Management). This

analysis was never requested.

Q13: If the basis of the panel's recommended reductions are a switch from N-based nutrient applications to P-based for crops that have historically seen high application rates of manure P, why are crops that don't see manure nutrients (have never seen or see very little) eligible for Tier 2 credit? Such crops include: 1) crops on fertilizer-only farms (about 87% of cropland for the CB watershed as a whole, up to 65% of cropland in counties with high animal densities); 2) legumes such as soybeans and alfalfa, 3) vegetables and specialty crops.

A13:

Q14: What specific data and documentation does a jurisdiction need to provide to CBPO to ensure acres reported for the annual model progress assessment under Tier 2 Nutrient Application Management meet the definition of the BMP? Specifically, what is the documentation that's supported with records referred to in the following excerpt from the Tier 2 definition? " . . . Implementation of formal NM planning is documented and supported with records demonstrating efficient use of nutrients for both crop production and environmental management . . ."

A14:

Q15: According to the Tier 2 report, "implementing a nutrient management plan consistent with the approved Tier 2 definition, acres having a very high phosphorus test, which are most often manured acres, are applying only about 10-20% of the P that was previously allowed under Tier 1. This 80% or more reduction in P-application rates from manure, combined with those acres that are not phosphorus limited (receiving a Tier 1 P rate), would yield at least an estimated 10% reduction in P loss."

So according to these criteria, acres reported as managed under Tier 2 would need to show at least an 80% TP application reduction to get a 10% TP load reduction in the model?

A15: Proposed answer: It seems, according to the panel's report, yes. There are several questions not addressed by the panel about the need for specific criteria or guidance that would qualify an acre managed under Tier 2 to be reported as Tier2 (among specific criteria for application rate reductions and optimizations of application timing, methods, and form). More specific criteria were considered by the panel as part of compliance questions so were not addressed in the report or response to comments.

Q16: Can acres be reported for Tier 1 or Tier 2 model credit that are part of an operation that simply has a written Nutrient Management plan?

A16: Proposed answer: No. There needs to be demonstrated elevated change in nutrient management action from Tier 1 actions. Those changes don't include solely upgrading written plans. The actions that are to be documented as data that's reported to CBPO are, in part: 1) manure incorporation, 2) manure application timing, 3) N split applications, 4) N fertilizer banding, 5) P site indices, and 6) nutrient application setbacks.

Q17: According to USDA, soil testing on manured acres prior to applying more manure occurred on only 37 percent of cropped acres in 2011 for the CB watershed as a whole. Are similar types of data needed for determining Nutrient Application Management compliance for CBP reporting?

A17: Proposed Answer: Yes. Methods and data for calculating compliance rates and the degree of eligibility for tiers of Nutrient Application Management are part of each state's QAPP.

Q18: What other types of data are needed for CBP reporting for determining Nutrient Application Management compliance levels, rates of compliance, and degrees of eligibility for tiers.

A18: Proposed Answer: In part, annual TN and TP application rate changes and appropriateness of rates, timing, and methods – for both manure nutrients and commercial fertilizer. Other data reporting requirements correlated to the Tier 2 (Field Level) Nutrient Application Management need to be determined by relevant WQGIT workgroups, committees, and EPA (as part of grant and cooperative agreement QAPP).

Q19: According to the panel's response to comments, "Verification programs must be documented in 2015 and fully implemented by 2018." Does this mean documentation and data no longer have to be provided to CBPO regarding the quality of environmental data reported to EPA and, specifically, data on compliance levels and changes in application rates over time?

A19: Proposed Answer: No. Please see answer to question 18.