

Title:

Appendix A- Chesapeake Bay Trading

Purpose:

The purpose of this appendix is to provide additional program specific information regarding the use and incorporation of nutrient trading in the Chesapeake Bay region.

Where Trading May Occur:

Trading within the Pennsylvania portion of the Chesapeake Bay Watershed may occur within the Susquehanna or Potomac watersheds. Trading between the Susquehanna and Potomac watersheds however is not supported.

Application

Any combination of point sources, nonpoint sources or third parties can participate in trading. Any entity may create, purchase, retire or otherwise use credits for the purpose of securing long-term improvements in water quality, subject to any applicable state, federal and local laws.

For sources to participate in trading they must meet certain thresholds of eligibility which have been described in the interim policy. If the threshold of eligibility is met then they may begin the trading process.

Although credit and trade proposals involving nonpoint sources will not be limited to the following, DEP is particularly interested in initial nonpoint source trades involving:

- Forested Riparian buffers;
- Cover crops; and
- Advanced Nutrient Management.

Additional BMPs will be accepted where efficiencies in the Chesapeake Bay Model or other reports are identified and defined.

Trading Process

The trading process involves a number of steps that will need to be completed before a trade can be finalized. The Department has established a website (http://www.dep.state.pa.us/river/river_trading.htm) which also reviews the steps of a trade, provides example calculations, contract examples and will act as a collector for credit need and generation information.

Steps for Conducting a Trade

1. Determine if the threshold of eligibility has been reached.
2. Determine if there is a need/generation of credits.
 - a. Point Source
 - i. Should compare their projected loads with loads assigned in their permit, or anticipated loads.
 - ii. Should calculate the number of credits they need or have generated.

$$1. \text{ Number of credits} = \text{Permit limit (lbs)} - \text{Discharge (lbs)}$$

b. Nonpoint Source

- i. Should review their nutrient management budget and determine if they wish to explore options that would put them above and beyond compliance.
- ii. If the source wishes to go beyond compliance, BMPs incorporated in the Chesapeake Bay Model can be utilized; however DEP is particularly interested in initial nonpoint source trades involving:
 - Forested Riparian buffers;
 - Cover crops; and
 - Advanced Nutrient Management.

Additional BMPs may be accepted that are incorporated in the Chesapeake Bay Model and as additional efficiencies are identified and defined by the Chesapeake Bay Model.

- iii. Other BMPs may be accepted but a discussion will need to be held with the Department.

1. The calculation of credits generated is the total amount of pounds reduced from the land when a BMP is installed. In order to determine this the source must know: the acreage that they will be installing the BMP on, their initial nitrogen loading rate for that acreage, the estimated nitrogen reduction efficiency related to the BMP installed, delivery ratio, retirement ratio, and their current nutrient management reduction.

- a. Number of Credits = Estimated Nitrogen Loading Reduction – Current Nutrient Management Reduction. The Chesapeake Bay Model will be used as the source of loading reduction efficiencies.

- i. Total Available Nitrogen Load = acres(initial nitrogen loading rate)
- ii. BMP Implementation Reduction = BMP Nutrient Reduction Efficiency (total available nitrogen load).
- iii. New Estimated Nitrogen Loading Reduction = BMP Implementation Reduction (Delivery Ratio) – (BMP Implementation Reduction (Delivery Ratio) – ((BMP Implementation Reduction (Delivery Ratio) (Retirement Ratio)))

- iv. Current Nutrient Management Reduction = BMP percent efficiency (total available nitrogen load).
 - b. An example of nonpoint source credit generation is also provide on DEP's website (http://www.dep.state.pa.us/river/river_trading.htm).
 - 3. Find a trading partner.
 - a. Point Source
 - i. Four options:
 - 1. Independently identify a trading partner and agree upon a deal. Until the program is self-executing, trading participants will need to submit trade proposals to DEP Regional Office for tracking and monitoring.
 - 2. Contact the permit writer in the appropriate DEP Regional Office who issued the NPDES permit. This individual will be able to help set up a trade or will be able to point in the direction of who can (i.e another point source who has generated credits, a Department approved entity that knows of generated credits, or a nonpoint source interested in generating credits).
 - 3. May contact the Department approved entity, such as the Conservation District, that is in proximity to see if they maintain a list of nonpoint sources who have expressed a willingness to implement BMPs if funding was provided. This entity may also maintain a list of nonpoint sources who have entered into state funded BMPs that put them above their threshold of eligibility and are generating credits.
 - 4. Visit the Department's trading website (http://www.dep.state.pa.us/river/river_trading.htm) to view what sources (point and nonpoint) have posted their interest in purchasing credits or selling generated credits.
 - b. Nonpoint Source
 - i. Three options:
 - 1. Independently identify a trading partner and agree upon a deal. Until the program is self-executing, trading participants will need to submit trade proposals to DEP Regional Office for tracking and monitoring.
 - 2. May contact the Department approved entity, such as the Conservation District, to inquire if there are

- point sources interested in funding the implementation of BMPs for credits. This entity could also make note of the interest in implementing additional BMPs if funding is provided.
3. Visit the Department's trading website (http://www.dep.state.pa.us/river/river_trading.htm) to view what sources have posted interest in purchasing credits and/or to post interest in generating credits.
 4. Enter into a trade for credits.
 - a. This trade can be:
 - i. one that the source has established as a one to one trade; or
 - ii. one that the Department or other entity has helped establish.
 - b. Trades will employ delivery ratios to ensure proper calculations are reached. The website provides an example of how to incorporate this ratio.
 - c. The trades that are established as a one to one trade will be based on the cost that the sources work out for the credits based on the cost of BMP implementation or technology invested in. All trades will maintain a 5% administration ratio and a 5% retirement ratio. (Note: the ratio amount for both may increase over the life of the trading program.) Both ratios will provide the trading program with money that can be reinvested into future BMP implementation or to account for wet weather events, or of the interest in implementing additional BMPs if funding is provided.
 5. Establish a contract for the trade of credits.
 - a. Each trade that is created should have a contract. The two parties entering into a trade may have their own legally binding agreement, work off of a contract similar to an EQIP contract or work off of the example contract that is provided on DEP's trading website.
 - b. The contract should also explain the ownership of credits. Generally, the party that is investing the money into the generation of credits would own the credits (i.e. a point source investing money into a nonpoint BMP establishment would own the credits generated from that BMP for the length of money invested). If state or federal funds are used to establish cost-share nutrient controls that generate credits, the ownership of the credits would depend upon any restrictions the grantor placed on the funds.
 - c. The contract should also contain any monitoring and evaluation activities and banking requirements that the parties agree to.
 6. Register credits on DEP website.
 - a. The registration of credits on the website (http://www.dep.state.pa.us/river/river_trading.htm) will allow the

Department to maintain adequate monitoring and record-keeping for the trades that have occurred.

- b. Registering the credits trading also allow the Department to maintain proper reporting, inspection and audit provisions to ensure that the program is aiding in the reduction of nutrients and sediment pollution.

Monitoring and Evaluation / Risk Allocation

Risk will be allocated in the following manner for the initial start-up phase of the trading program. Risk allocation may change in future versions of this policy.

General

Trades will be documented through contracts, with DEP as a third party signatory. As stated above, DEP will make sample contracts available on its website.

Trades involving sources with NPDES permits (point sources)

DEP will enforce permit limits through established Departmental compliance procedures prior to and once watershed permits are developed. Once developed, watershed permits will be updated annually to reflect trades.

Trades involving entities without NPDES permits (nonpoint sources and third parties)

Willful failure by nonpoint sources or third parties to meet trade contract obligations will result in action by DEP. Other signatories to the contract may also take action.

DEP will pursue the following actions, as appropriate:

- Suspend future payments of any unpaid funds;
- Pursue reimbursement of expended funds intended to create credits; and/or
- Place the noncompliant source on lists that will negatively impact their ability to receive future funding.

If DEP determines that BMP failure is due to reasons beyond the control of the credit generator, the Department will not take action against the credit generator.

Algorithm/ Example of Credit Generation and a Trade (HYPOTHETICAL)

Example Credit Generation

A farmer located in Chesapeake Bay Watershed Model Segment 80 currently implements conventional till and decides to plant 100 acres of early cover crops and wishes to trade for nitrogen. From this BMP implementation the farmer would generate 700 credits of nitrogen that would be available for trading. There would also be credits for phosphorous available, and could be calculated using this process.

Nitrogen Credit Calculation:

Givens:

Acres: 100
Transport Factor (Delivery Ratio)¹: 0.9867
Retirement Ratio²: 5 %
Initial Nitrogen Loading Rate³: 29.0 lbs/yr
Current Nutrient Reduction Efficiency⁴: 18%
Cover Crop Nutrient Reduction Efficiency⁵: 45 %

Must Finds:

Total Available Nitrogen Load: 2,900 lbs/yr
BMP Implementation Reduction: 1,305 lbs/yr
New Estimated Nitrogen Loading Reduction: 1,222 lbs/yr
Current Nutrient Management Reduction: 522 lbs/yr

1. Total Available Nitrogen Load = 2,900 lbs/yr
acres(initial nitrogen loading rate)
 $100(29\text{lbs/yr}) = 2,900 \text{ lbs/yr}$
2. BMP Implementation Reduction = 1,305 lbs/yr
Cover Crops BMP Nutrient Reduction Efficiency (total available nitrogen load).
 $45\% (100(29.0 \text{ lbs/yr})) = 1,305 \text{ lbs/yr}$
3. New Estimated Nitrogen Loading Reduction = 1,222 lbs/yr
BMP Implementation Reduction (Delivery Ratio) – (BMP Implementation Reduction (Delivery Ratio) – ((BMP Implementation Reduction (Delivery Ratio) (Retirement Ratio)))
 $1,305 \text{ lbs/yr}(0.9867) - (1,305 \text{ lbs/yr}(5 \%)) = 1,222 \text{ lbs/yr}$
4. Current Nutrient Management Reduction = 2610 lbs/yr
BMP percent efficiency (total available nitrogen load).
 $18\% (100(29\text{lbs/yr})) = 522 \text{ lbs /yr}$
5. Number of Credits = Estimated Nitrogen Loading Reduction – Current Nutrient Management Reduction.
 $1,222 \text{ lbs/yr} - 522 \text{ lbs/yr} = 700 \text{ lbs/yr}$
CREDITS GENERATED= 700

Point-to-Point Trading Example

Note – This is intended to be separate from the first example.

Two Point Sources in the Susquehanna Watershed would like to possibly trade for nitrogen. What credits would be needed, and what would be available for trade?

Givens:

¹ Source: Ches Bay BMPs (7-27-2004)

² Source: Policy

³ Source: Conventional Till Nitrogen Loading Rate

⁴ Source: Ches Bay BMP Efficiency

⁵ Source: Ches Bay BMP Efficiency

Source A

Bay Watershed Model Segment Location: 720
Transport Factor (Delivery Ratio): 0.8082
Current TN loading (lb/yr): 100,000
Permitted Loading (8 mg/l @ 2010 projected flows): 50,000

Source B

Bay Watershed Model Segment Location: 110
Transport Factor (Delivery Ratio): 0.9637
Current TN loading (lb/yr): 120,000
Permitted Loading (8 mg/l @ 2010 projected flows): 200,000

Common

Retirement Ratio: 5 %

Calculations:

Source A

Assuming no additional control.

Difference between actual loading and permitted loading = $100,000 - 50,000 = 50,000$ lbs
Application of delivery ratio = $50,000 \text{ lbs} \times 0.8082 = 40,410$ lbs (credits needed)

Source B

Difference between permitted and actual loading = $200,000 - 120,000 = 80,000$ lbs
Application of delivery ratio = $80,000 \text{ lbs} \times 0.9637 = 77,096$ lbs
Application of retirement ratio = $77,096 - (77,096 \times 0.05) = 73,241$ credits available

Source A could work directly with Source B on a trade agreement, then register trade on the website.

Point- to- Nonpoint Trading Example

Note – This is intended to be separate from the first two examples.

A point source and a nonpoint source in the Susquehanna Watershed would like to possibly trade for nitrogen. What credits would be needed, and what would be available for trade?

Givens:

Source A

Acres: 100
Transport Factor (Delivery Ratio)⁶: 0.9867
Retirement Ratio⁷: 5 %
Initial Nitrogen Loading Rate⁸: 29.0 lbs/yr

⁶ Source: Ches Bay BMPs (7-27-2004)

⁷ Source: Policy

Current Nutrient Reduction Efficiency⁹: 18%
Cover Crop Nutrient Reduction Efficiency¹⁰: 45 %

Source B

Bay Watershed Model Segment Location: 720
Transport Factor (Delivery Ratio): 0.8082
Current TN loading (lb/yr): 100,000
Permitted Loading (8 mg/l @ 2010 projected flows): 50,000
Retirement Ratio: 5 %

Calculation:

Source A

1. Total Available Nitrogen Load= 2,900 lbs/yr
acres(initial nitrogen loading rate)
 $100(29\text{lbs/yr})= 2,900 \text{ lbs/yr}$
2. BMP Implementation Reduction = 1,305 lbs/yr
Cover Crops BMP Nutrient Reduction Efficiency (total available nitrogen load).
 $45\% (100(29.0 \text{ lbs/yr}))= 1,305 \text{ lbs/yr}$
3. New Estimated Nitrogen Loading Reduction = 1,222 lbs/yr
BMP Implementation Reduction (Delivery Ratio) – (BMP Implementation Reduction (Delivery Ratio) – ((BMP Implementation Reduction (Delivery Ratio) (Retirement Ratio)))
 $1,305 \text{ lbs/yr}(0.9867) - (1,305 \text{ lbs/yr}(5 \%))= 1,222 \text{ lbs/yr}$
4. Current Nutrient Management Reduction = 2610 lbs/yr
BMP percent efficiency (total available nitrogen load).
 $18\% (100(29\text{lbs/yr}))= 522 \text{ lbs /yr}$
5. Number of Credits = Estimated Nitrogen Loading Reduction – Current Nutrient Management Reduction.
 $1,222 \text{ lbs/yr} - 522 \text{ lbs/yr} = 700 \text{ lbs/yr}$

Source B

Assuming no additional control.

Difference between actual loading and permitted loading = $100,000 - 50,000 = 50,000 \text{ lbs}$
Application of delivery ratio = $50,000 \text{ lbs} \times 0.8082 = 40,410 \text{ lbs}$ (credits needed)

Source A could work directly with Source B on a trade agreement, then register trade on the website. Given the numbers generated above the point source could buy the 700 credits but would still need to generate or find 39,710 credits.

⁸ Source: Conventional Till Nitrogen Loading Rate

⁹ Source: Ches Bay BMP Efficiency

¹⁰ Source: Ches Bay BMP Efficiency