

# **Nutrient Trading for the Chesapeake Bay**

by  
**ALLISON WIEDEMAN**  
**TECHNOLOGY COORDINATOR**  
**EPA CHESAPEAKE BAY PROGRAM**

**April 2001**

A five year period of intensive research in the early eighties by the U. S. Environmental Protection Agency together with the states surrounding the Chesapeake Bay, determined that the health of the Chesapeake Bay was in jeopardy and that it was necessary to initiate a collaborative effort to restore this largest estuary of the country. It was further determined that while toxic pollutants were in fact causing detrimental impacts in certain localized areas of the Bay, the principle ubiquitous problem facing this estuary was dangerously low dissolved oxygen due to nutrient over enrichment. An overabundance of nutrients, or nitrogen and phosphorus, can adversely impact underwater living resources by causing algae blooms which decrease light penetration, and upon their decomposition, consume ambient quantities of essential dissolved oxygen. In a determined effort to address the problem, the U.S. Environmental Protection Agency (EPA), the Governors of Maryland, Virginia, Pennsylvania, the Mayor of the District of Columbia, and the Chair of a tri-state legislative body known as the Chesapeake Bay Commission signed the *Chesapeake Bay Agreement* in 1987, which among other things, stated that a 40% reduction of nutrients entering the Bay would be necessary to restore its health. This goal targeted a 40% reduction by the year 2000 of controllable nutrient loads from point and nonpoint sources in the entire 64,000 square mile Bay watershed from levels being discharged in 1985 , and that once achieved, this level would be maintained thereafter.

And just recently, in June of 2000, a comprehensive assessment of the Bay's restoration needs culminated in a landmark multi-jurisdictional agreement which delineates new restoration commitments, and was entitled *Chesapeake 2000*, or generally referred to as "C2K". For nutrients, C2K specifies a goal to remove the Bay and its tidal waters from the list of impaired water bodies for nutrients by 2010. Early analyses indicate reductions far beyond the 1987 40%

goal will be necessary to achieve this delisting goal. Hence intensive efforts to achieve and maintain these reductions have been in effect for many years. As a result, the “low hanging fruit” in terms of nutrient reduction measures, has to a large degree, already been picked.

As part of an evaluation to uncover remaining reduction options, the Bay Program established a Task Force in 1999 of jurisdictional representatives to determine actions that could be taken to help in holding the line on nutrient pollution once the 40% reductions goal was achieved. The Task Force authored a report which emphasized that maintaining a capped nutrient load will require total offsets in any increase in nutrient load associated with expansion or development in any sector. Additionally, the report pointed out that growth in load may be expected from increases in sewage flows and polluted runoff from new development. Growth in load from agriculture will be primarily from expansion and further intensification of animal agriculture. The report listed specific actions new cap strategies should consider, one of which was the potentially significant role for trading in maintaining the cap. It was realized that new innovative and creative measures would have to be sought out in order to meet the challenges C2K presented.

Not only was it acknowledged by this Task Force, but some of the Bay jurisdictions began to actively explore trading on their own. In fact, Virginia’s state legislature enacted the Virginia Water Quality Improvement Act in 1998 which provided funds for many nutrient reduction actions called for by their state’s Potomac tributary strategy and also included a clause requiring the concept of trading be explored as a means of nutrient management.

The Maryland Department of the Environment (MDE) developed a trading concept paper in August of 1997 in an effort to address the issue of allowing for continued development of municipal wastewater treatment plants while still meeting the Chesapeake Bay nutrient reduction goals.<sup>1</sup> Additionally, the Water Environment Research Foundation sponsored a study to design a trading program for Maryland. This project is being performed in consultation with Maryland stakeholders including MDE, the Maryland Department of Agriculture, the Maryland Department of Natural Resources, and the Maryland Association of Municipal Wastewater Agencies. Trading scenarios will involve point to point, or point to nonpoint sources. This study is projected to be

completed in early to mid 2001.

Nutrient trading was also not at all new to the EPA. In fact, EPA was on the forefront of this concept as it composed a set of guidelines for development of trading programs in 1996.<sup>2</sup> As stated in the guideline's accompanying letter from Robert Perciasepe, former Assistant Administrator for EPA's Office of Water, "trading provides communities with sensible, innovative ways to meet water quality objectives more quickly and at less overall cost". Furthermore, EPA completed a study to simulate trading programs for several Bay basins in Pennsylvania for which Total Maximum Daily Loads (TMDLs) have been developed. A workgroup of PA stakeholders had been formed to assist in this project including the Pennsylvania Department of Environmental Protection, the Chesapeake Bay Foundation, the Pennsylvania Municipal Authority Association, and the Bay Program. An end product of this endeavor includes a guidance manual elaborating on issues regarding point/nonpoint source trading.<sup>3</sup> And just recently, the PA Joint Legislative Air and Water Pollution Control and Conservation Committee issued a document which recommends that a commission be created to develop "a watershed-based pollutant credit trading system with the goal of raising water quality above the minimum standards".<sup>4</sup> The Pennsylvania Department of Environmental Protection is moving forward to implement this recommendation by tasking the Pennsylvania Environmental Council to evaluate trading options and construct a demonstration trading project for nutrients on a small Pennsylvania watershed on the Susquehanna River.

As regulatory nutrient reduction programs such as TMDLs and nutrient water quality criteria development add to the mix of otherwise voluntary Bay Program nutrient reduction initiatives, it was a natural progression therefore, that the Chesapeake Bay Program move to explore trading as an innovative reduction option. After a public workshop in 1998 revealed abundant public interest in this concept, the Chesapeake Bay Program formed a team to explore trading as it would relate to the Chesapeake Bay watershed. This team, later called the Nutrient Trading Negotiation Team (NT), was charged with conducting an intensive and focused effort over an 18 month time period to examine the concept of nutrient trading, and if appropriate, develop recommendations for nutrient trading guidelines. The intent of such guidelines would be to provide a consistent approach for the Chesapeake Bay Agreement states to voluntarily develop, as they deem appropriate, state-specific nutrient trading programs.

The Negotiation Team was composed of 38 individuals that could speak for, or represent, the following stakeholder groups:

- ! U.S. EPA, Chesapeake Bay Program
- ! U.S. EPA, Region III
- ! District of Columbia
- ! State of Maryland
- ! State of Pennsylvania
- ! Commonwealth of Virginia
- ! Regional Environmental Interests
- ! Local Watershed Interests
- ! Public Interest
- ! Local Government Interests
- ! Municipal Point Source Interest
- ! Industrial Point Source Interest
- ! Rural Non-point Source Interest
- ! Urban Non-point Source Interest
- ! Chesapeake Bay Commission

As its name implies, the team performed its work using a professional facilitator as many of the issues cover controversial topics such the geographic scope of a trading program, or eligibility criteria potential traders must meet before they can trade.

Through its deliberations, the NT delineated 6 major elements of a trading framework that are described below:

- Nutrient Reduction Goals – The bay-wide goals established by the CBP for nutrient reduction or individual tributary specific goals. In the context of a trading program, these goals will correspond to and be congruent with appropriate allowances (or caps) associated with tributary strategies. The effects of moving caps (cap changes with new model analyses for example) would also be delineated for the trading program.
- Eligibility – Activities to determine the number and types of credits which may be traded. An entity may need to be established to apply guidelines and policies to

determine if candidate credits are eligible for trading. Various classes of credits and/or trades may be specified to address issues of equity, trading ratios, minimum qualifications of a trader, past performance of classes of credits, and other similar qualifications.

- Trade Administration – The “market” in which prospective, pre-qualified (eligible) buyers and sellers place offers within an agreed upon time frame for buying and selling credits under specific terms and conditions (price, type of credit, etc.). The type of trade would need to be specified, e.g., standard auction, Dutch auction, etc. Additional activities would include the recording of the transactions and similar brokerage services.
- Accountability – Post-trade monitoring and assessment of the effectiveness of the trade, including but not limited to enforcement of the terms and conditions of a trade, provisions for extraordinary agreements, and recording updates to the trade. Issues of default and/or expiration of credits would be monitored and managed based on the terms and conditions established prior to the trade. Monitoring of local water quality conditions also is addressed.
- Assessment/Indicators – Tributary and bay-wide assessment of the effectiveness of the trading program outcomes, especially in terms of the nutrient reduction goals.
- Stakeholder Involvement – A set of activities and opportunities for any interested party to observe the trading program, monitor non-proprietary information about the trading program operation and accomplishments, and offer comments for improvement. The development and implementation of trading programs must be transparent to the public.

The document contains guidelines that provide recommendations, based on negotiations and investigations by the team, on how to approach and structure a trading program regarding each of the above referenced elements. The core of the document, however, consists of eight fundamental principles which are deemed essential for a viable and environmentally protective trading program. These fundamental principles are listed below:

**Fundamental Principle #1**

Trades must not produce water quality effects locally, downstream, or Baywide that:

- violate water quality standards or criteria;
- do not protect designated uses; or
- adversely impact living resources and habitat.

**Fundamental Principle #2**

Trading will be allowed only within each major Bay tributary (i.e., Susquehanna, Potomac, Rappahannock, York, James, Patuxent, Maryland Western Shore, Virginia Western Shore, Maryland Eastern Shore, Virginia Eastern Shore) among all signatory states and non-signatory states if they adopt the appropriate allowance and are consistent with the Chesapeake Bay Program's nutrient trading guidelines and state tributary strategies.

**Fundamental Principle #3**

The nutrient trading program must be consistent with federal, state and local laws and regulations, be flexible enough to adapt to future changes in these laws and regulations, enable participation of all potential sources as determined by the market place.

**Fundamental Principle #4**

The nutrient trading program must be consistent with the Chesapeake Bay Program's nutrient reduction goals and state tributary strategies.

**Fundamental Principle #5**

Each trade must result in a net reduction in nutrient loadings or contribute to maintenance of a tributary nutrient cap. Net reduction in loadings or maintenance of a cap shall be calculated based upon the estimated tributary loadings at a point in time determined by the state.

**Fundamental Principle #6**

Sources should implement nutrient reduction actions to achieve the 40% reduction goal, as well as the goals adopted for the tributaries south of the Potomac River prior to pursuing a nutrient trading option.

**Fundamental Principle #7**


Traders must be in substantial compliance with all local, state, and federal environmental laws, regulations and programs.

**Fundamental Principle #8**

The involvement of a diverse group of stakeholders must be sought in the design and implementation of state trading programs and related public education initiatives.

A draft Nutrient Trading Guidelines Document covering the guidelines and fundamental principles described above was drafted in August 2000. This document was then distributed for public review during the fall of 2000 during which a total of 16 public meetings were held across the watershed, and 119 written comments were received. The public comments were assimilated and considered by the NT and then an interim final draft document was completed. The interim draft document then went through the Chesapeake Bay Program's committee and subcommittee

structures for review, after which a final document was completed in March of 2001.<sup>5</sup> The guidelines and fundamental principles set forth in this document were officially endorsed by the Bay Program's Principles Staff Committee which is composed of the Secretaries of the state environmental government organizations. The endorsement is included herein.



*Chesapeake Bay Program Principals' Staff Committee*


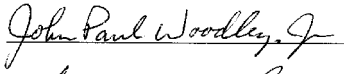

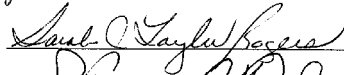

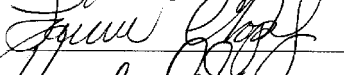

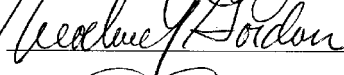




**ENDORSEMENT OF THE NUTRIENT TRADING  
FUNDAMENTAL PRINCIPLES AND GUIDELINES**

The Chesapeake Bay Program convened the Nutrient Trading Negotiation Team in June 1999 to explore the feasibility of nutrient trading for point and nonpoint sources in the watershed and, if appropriate, to develop nutrient trading guidelines. The outcome of the Team's deliberations is presented in a document entitled *Nutrient Trading Fundamental Principles and Guidelines*. The document is intended to be used as a guide for those Bay jurisdictions that choose to establish nutrient trading programs.

The Negotiation Team was composed of a wide array of interested stakeholders from across the Chesapeake Bay watershed—Federal, state and local governments, as well as municipal, industrial, agricultural, environmental and public interests were among those represented. Using a facilitated consensus-based approach, the Negotiation Team derived the nutrient trading fundamental principles and guidelines contained in the document. Fundamental principles represent those elements of a nutrient trading program that the Negotiation Team deemed essential. The guidelines are those elements of a program that the Negotiation Team deemed important for the jurisdictions to consider when developing and implementing a trading program.

The document is based on the Negotiation Team's comprehensive consideration of numerous other trading programs and approaches, substantial research, and corresponding lengthy negotiations. While the document provides parameters of a general framework, individual Bay jurisdictions implementing a trading program will need to determine additional program elements. The document reflects changes made by the Negotiation Team in response to public comment.

The *Nutrient Trading Fundamental Principles and Guidelines* document is accepted and endorsed by the Chesapeake Bay Program partners. It is recognized that if trading programs are developed, each jurisdiction will need to tailor that program in a manner necessary to meet their individual needs and nutrient reduction goals and efforts. However, the enumerated fundamental principals and guidelines in the document will serve as a common organizing and policy framework for the jurisdictions.

FOR THE COMMONWEALTH OF VIRGINIA	 
FOR THE STATE OF MARYLAND	 
FOR THE COMMONWEALTH OF PENNSYLVANIA	 
FOR THE DISTRICT OF COLUMBIA	 
FOR THE CHESAPEAKE BAY COMMISSION	 
FOR THE UNITED STATES OF AMERICA	 

Date: March 26, 2001

The final document is available for use by the states on a voluntary basis should they move forward in developing their own trading programs. This document is not a regulation or

mandatory in nature. The document is available on the Chesapeake Bay Program's web site at [www.chesapeakebay.net/trading.htm](http://www.chesapeakebay.net/trading.htm).

Essentially, trading is the transfer of pollution reduction credits from one source to another. In other words, if a source has reduced its effluent for a given parameter, say nitrogen, below what it is otherwise required to do, that additional reduction may be available to sell in the form of credits. Correspondingly, if a source cannot reduce its effluent to the point it needs to (for water quality, financial or population growth reasons for example) it has the option of buying the credits made available by the other source. Done properly, trading can be a very effective component to a watershed approach. Trading should not be viewed as a licence to pollute (as some have referred to it) but rather a way to get more reductions thereby improving water quality, a way to get reductions sooner, a way to get reductions less expensively, and a way to engage nonpoint sources where they might otherwise not participate. Being constantly mindful of the fact that much of the low hanging fruit in the area of nutrient reductions has already been picked, innovative incentives must be considered which will be attractive to more sources. Trading can also encourage technological innovation as engineers react to market potential. And finally, in the face of an ever increasing population, requiring the need to also increase our nutrient reduction measures at the same time, trading can provide an option to offset growth.

Is there a market for trading?? There exist approximately 347 large (or generally greater than 0.5 MGD) point source wastewater treatment plants in the Bay watershed. Of the 347 wastewater treatment plants, approximately 138 are, or will be, operating Biological Nutrient Removal by the year 2010 and many of them are getting better than expected results now. Thus, many point sources will be able to generate credits for sale. Additionally, growth pressures for some wastewater treatment plants will necessitate the need to consider an approach like trading to offset growth. It is also anticipated that trading will interest the nonpoint source community as they find that creating a wider buffer than, say, required by their management plan, or installing additional stormwater structures in urban areas will generate credits that they can sell to other sources that may need them.



Can trading be accomplished in an environmentally protective manner?? The fundamental principles are aimed at ensuring that trading can be accomplished in a way that also protects the environment. No local water quality impacts are allowed to occur with trading. Each trade must result in a **net reduction** in nutrient loadings or contribute to maintenance of a tributary nutrient cap. In other words, an environmental margin of safety should be built into a trading program so that trades will go beyond the status quo and result in additional benefits or maintain a capped load in the face of growth. The guidelines document also describes another environmental safety measure that should be incorporated into the design of a trading program: trading ratios. Several kinds of trading ratios exist in other trading programs in the country which account for losses of pollutants as they travel over land or in water, to account for the uncertainty of a particular type of reduction method efficiency or to ensure a net water quality benefit. For example, many point to nonpoint source trading relationships in the country use a 2/1 uncertainty trading ratio which means that for every pound reduction the nonpoint source generates, only half of that can be traded. This accounts for the uncertainties in monitoring and Best Management Reduction efficiencies for nonpoint source discharges.

*Chesapeake 2000* delineates steps to achieve the goal of removing the Bay from the list of nutrient impaired waters. One of these steps directs the Bay jurisdictions to develop new Tributary Strategies by 2002 which specify plans to meet this goal. Nutrient Trading will most likely be a component of these strategies. With the aid of the Chesapeake Bay Program Nutrient Trading Fundamental Principles and Guidelines document, the jurisdictions will already have a head start in terms of what the stakeholders will want to see in a trading program should they decide to move ahead and develop them.

**NUTRIENT TRADING  
IN THE CHESAPEAKE BAY  
WORKSHOP**

**There will be a “Nutrient Trading in the Chesapeake Bay” workshop on June 14, 2001 from 10 am - 3 pm at the WSSC Training Room, 14501 Sweitzer Lane, Laurel, MD. Contact: Allison Wiedeman 410-267-5733 or Ted Graham 202-962-3352**

## **References**

1. Maryland Department of the Environment, “Maryland Department of the Environment Concept Paper for a Nutrient Trading Policy”, August 1997.
2. Environmental Protection Agency, “Draft Framework for Watershed-Based Trading”, 1996.
3. Philip Services, for EPA, “Final Report, Results of Water-Based Trading Simulations”, 9/30/99.
4. Pennsylvania Joint Legislative Air and Water Pollution Control and Conservation Committee, “Report on Water Quality Credits and Trading, Pursuant to House Resolution 361 of 2000”, Feb. 2001.
5. Chesapeake Bay Program, Chesapeake Bay Program Nutrient Trading Fundamental Principles and Guidelines, March, 2001.