



Water Quality Trading Toolkit for Permit Writers

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Foreword

EPA is pleased to issue the Water Quality Trading Toolkit, the first-ever how-to-trade manual with real-world examples. In January 2003, EPA released the National Water Quality Trading Policy which laid out a framework for trading under the Clean Water Act. In 2004 we published the Water Quality Trading Assessment Handbook to help users determine whether trading is environmentally viable and financially attractive in a watershed. This Toolkit builds upon the two earlier documents and provides more detail regarding actual design and implementation of trading programs. This document will not only help permit writers incorporate trading into National Pollutant Discharge Elimination System (NPDES) permits but is a guide for anyone interested in establishing a water quality trading program in their watershed. We look forward to hearing about the innovative trading programs generated by this useful resource.

Benjamin H. Grumbles

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Disclaimer

This guidance expresses the U.S. Environmental Protection Agency's (EPA) support for implementation of water quality trading through National Pollutant Discharge Elimination System (NPDES) permitting. Implementation of water quality trading will be governed by existing requirements of the Clean Water Act (CWA) and EPA's NPDES implementing regulations. Those CWA provisions and regulations contain legally binding requirements. This document does not substitute for those provisions or regulations. The recommendations in this guidance are not binding; the permitting authority may consider other approaches consistent with the CWA and EPA regulations. The use of non-mandatory words like "should," "could," "would," "may," "might," "recommend," "encourage," "expect," and "can" in this guidance mean solely that something is suggested or recommended, and not that it is legally required, or that the suggestion or recommendation imposes legally binding requirements, or that following the suggestion or recommendation necessarily creates an expectation of EPA approval. When EPA makes a permitting decision, it will make each decision on a case-by-case basis and will be guided by the applicable requirements of the CWA and implementing regulations, taking into account comments and information presented at that time by interested persons regarding the appropriateness of applying these recommendations to the particular situation. EPA may change this guidance in the future.

Water Quality Trading Toolkit for Permit Writers

August 2007

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Abbreviations and Acronyms

| | |
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| AFO | animal feeding operation |
| AML | average monthly limit |
| AWL | average weekly limit |
| BMP | best management practices |
| BPJ | best professional judgment |
| CBOD | carbonaceous biochemical oxygen demand |
| CSO | combined sewer overflow |
| CWA | Clean Water Act |
| DMR | discharge monitoring report |
| EPA | U.S. Environmental Protection Agency |
| gpd | gallons per day |
| ICIS | Integrated Compliance Information System |
| LA | load allocation |
| MEP | maximum extent practicable |
| mgd | million gallons per day |
| MS4 | municipal separate storm sewer system |
| NPDES | National Pollutant Discharge Elimination System |
| NRCS | Natural Resources Conservation Service |
| PBTs | persistent bioaccumulative toxics |
| PCS | Permit Compliance System |
| POTW | publicly owned treatment works |
| RNC | reportable noncompliance |
| SISL | Surface Irrigation Soil Loss |
| SNC | significant noncompliance |
| SWCD | Soil and Water Conservation District |
| TBEL | technology-based effluent limitations |
| TKN | total Kjeldahl nitrogen |
| TMDL | total maximum daily load |
| TN | total nitrogen |
| TP | total phosphorus |
| TRE | toxicity reduction evaluations |
| USDA | U.S. Department of Agriculture |
| USLE | Universal Soil Loss Equation |
| WLA | wasteload allocation |
| WQBEL | water quality-based effluent limitations |

Water Quality Trading

KEYS TO SUCCESS

Every trading program should strive to be:

Transparent

Keep the public informed at every step of the process by:

- ★ Involving stakeholders in the design of the trading program
- ★ Communicating to the public information deemed necessary to maintain stakeholder confidence

Real

Show pollutant reductions and water quality improvement by:

- ★ Measuring reductions
- ★ Verifying BMP installation and maintenance, e.g., through a third party

Accountable

Manage the program effectively by:

- ★ Including trade tracking mechanisms in the program design
- ★ Periodically reviewing the program's process and results

Defensible

Base the program on sound science and protocol by:

- ★ Using dynamic water quality models
- ★ Requiring credit generators to certify credits
- ★ Developing scientifically based trading ratios

Enforceable

Establish responsibility for meeting or exceeding water quality standards by:

- ★ Incorporating clearly articulated trading provisions in NPDES permits

Introduction

For more than a decade, the U.S. Environmental Protection Agency (EPA) has promoted and supported the concept of water quality trading as an innovative approach for achieving water quality standards with flexibility and economic efficiency. A variety of pilot programs and projects have generated useful information on how to conduct water quality trading, yet the number of actual trades that have occurred is relatively small. EPA believes that as awareness of the potential benefits of water quality trading grows, National Pollution Discharge Elimination System (NPDES) permittees will be more interested in water quality trading and request permitting authorities to incorporate trading provisions into their permits. As a result, the process for crafting water quality trading programs and requirements should involve the permitting authority staff as early as possible. This will help ensure that trading programs are effective and workable and fully consistent with the implementation and compliance framework of the permitting authority’s NPDES program.

This *Water Quality Trading Toolkit for Permit Writers* (Toolkit) is intended to facilitate trading by providing NPDES permitting authorities with the tools they need to facilitate trading and to authorize and incorporate trading in NPDES permits. Although the Toolkit primarily targets state, tribal and EPA NPDES permitting authorities, it might also be useful to other stakeholders interested in water quality trading and the NPDES permitting process. Users of the Toolkit should have an existing, fundamental understanding of both water quality trading concepts and the NPDES permitting process. To ensure consistency and minimize redundancy, the Toolkit refers users to existing EPA guidance on water quality trading and NPDES permit development and issuance whenever possible.

This guidance is based on [EPA’s Water Quality Trading Policy](#) (Trading Policy) published in January 2003. The Trading Policy was written on the assumption that, if a total maximum daily load (TMDL) were in place, all trading partners would be covered by the TMDL. In this case, wasteload allocations (WLAs) and load allocations (LAs) under the TMDL form the baseline for trading. In all cases, permits must be designed to meet water quality standards as required under Clean Water Act (CWA) section 301(b)(1)(C). Inclusion of trading provisions in NPDES permits should facilitate meeting this requirement.

Water quality trading programs are necessarily tailored to meet the needs of the dischargers and stakeholders in the watersheds for which they are developed. Because each watershed is unique, water quality trading programs may exist in many different forms. It would be impracticable and cumbersome to attempt to cover in this document every possible type of program that might be developed to meet an individual watershed’s needs. This Toolkit attempts to equip program developers and permit writers with an understanding of the issues involved in water quality trading and the types of program characteristics that are best suited to address them. The fact that a particular trading program design or element is not represented in the examples presented in the Toolkit does not necessarily mean that it is not appropriate or would not be supported by EPA.

Fundamentals of Water Quality Trading

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|--------------|-----------------------------------|--|----------------------|------------------|----------------------------|---------------------------|---|----------------------|-------------------|---------------------------------|-------------------------------------|
| Introduction | Overview of Water Quality Trading | Essential Trading Information for Permit Writers | Tradeable Pollutants | Geographic Scope | Possible Trading Scenarios | Circumstances for Trading | Factors for Determining Pollutant Reduction Credits | Effluent Limit Types | Stakeholder Roles | Is the Trading Program Working? | NPDES Permits for Trading Scenarios |
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Toolkit Organization and Instructions

With the permitting authority as the primary target user, the Toolkit first addresses broad water quality trading policy issues and then focuses on specific trading scenarios. Water quality trading scenarios fall into two major categories: (1) point source–point source trading and (2) point source–nonpoint source trading. Point source–point source trading includes single point source–single point source trading, multiple facility point source trading, and point source credit exchanges. Point source–nonpoint source trading includes single point source–nonpoint source trading and nonpoint source credit exchanges.

The first section of the Toolkit, *Fundamentals of Water Quality Trading*, addresses broad water quality trading policy issues; this section applies to all Toolkit users. Within the Fundamentals section, the *Overview of Water Quality Trading* section addresses the role of NPDES permitting authorities in water quality trading and the legal and policy framework for water quality trading. The *Essential Trading Information for Permit Writers* section discusses specific water quality trading issues relevant to NPDES permitting authorities. Issues addressed in this section include the type of pollutants to be traded, definition of a pollutant reduction credit, circumstances conducive to trading, baselines for water quality trading, trading ratios, timing and duration of credits, and the geographic scope of trades. All Toolkit users should have a thorough understanding of the policy and technical issues addressed in these sections before proceeding to the specific trading scenario sections. Understanding of the important policy and technical issues contained in the initial sections of the Toolkit is essential to prevent ineffective or inappropriate water quality trading conditions in NPDES permits. After reviewing the initial sections of the Toolkit, the user is prepared to proceed to the appropriate section of the Toolkit that focuses on a specific trading scenario. The intent is to allow the Toolkit user to review only the information that applies to the specific trading scenario of interest. The following diagram (Figure 1) is intended to help navigate the trading scenario sections of the Toolkit:

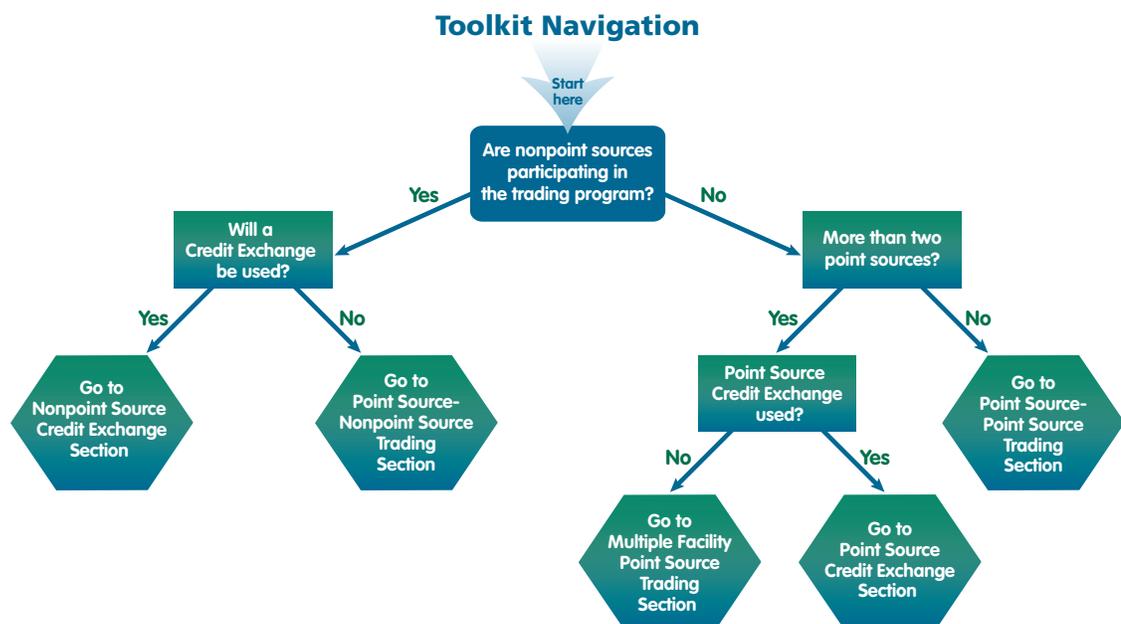


Figure 1. Toolkit navigation.

| Fundamentals of Water Quality Trading | | | | | | | | | | | |
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For example, a permitting authority developing conditions in a NPDES permit to authorize and facilitate trading between two single point sources would first review the Overview of Water Quality Trading and Essential Trading Information for Permit Writers sections for important policy and technical information and then carefully review the Single Point Source–Single Point Source Trading scenario for specifics pertaining to trading between two single point sources.

The Toolkit is intended to assist with developing and implementing NPDES permits that allow for water quality trading. Each trading scenario section walks NPDES permitting authorities through the normal process of developing the components of a NPDES permit and provides the tools they need to incorporate water quality trading into that process. Each section of the Toolkit contains two important components that supplement the narrative: (1) a hypothetical trading example and (2) real-world examples that apply the trading concepts discussed in the section. Each of these components of the Toolkit is presented in a unique format, as illustrated below, to ensure easy identification.

Hypothetical Examples

Hypothetical examples appear throughout each section highlighted in a blue-shaded text box.

Real-World Examples

Where applicable, each section includes either summaries of real-world examples or Web pages that provide more detailed information. These examples appear in a green-shaded text box. When actual permit provisions from these examples are available, see Appendix A for the exact permit language.

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Overview of Water Quality Trading

Water quality trading is an innovative, market-based approach that if used in certain watersheds can achieve water quality standards more efficiently and at lower cost than traditional approaches. Costs to control discharges compared with runoff for a given pollutant often vary significantly in a watershed, creating the impetus for water quality trading. Through water quality trading, facilities that face higher pollutant control costs to meet their regulatory obligations can purchase pollutant reduction credits from other sources that can generate these reductions at lower cost, thus achieving the same or better overall water quality improvement. In most cases, trading takes place on a watershed level under a pollutant cap (the total pollutant load that can be assimilated by a waterbody without exceeding water quality standards) developed through the TMDL process or a similar type of water quality analysis that produces information on pollutant loadings and resulting water quality conditions (USEPA 2004).

For example, where a TMDL has been established, the baselines relative to which point sources and nonpoint sources can generate credits are their WLAs and LAs (for definitions, see glossary), respectively. To generate tradable credits, a source would need to reduce loadings below the allocation set by the TMDL. A source buying credits would be able to increase its discharge over what would otherwise be allowed, but only by the amount of the credits purchased from another source (or sources) and subject to other conditions specified in the permit and trading program. The result would be that, at a minimum, the post-trade loadings from the trading sources would be equal to or less than the loadings that would have been discharged by the sources in the absence of trading. Trading programs may also be designed to require a net reduction in loadings when trading occurs.

EPA's *2004 Water Quality Trading Assessment Handbook* notes that, in water quality trading markets, the marketable product is the *over control* of pollutant loadings. A pollutant reduction credit is the amount (mass) of pollutant reduced over a specified time period (day, month, year) that is in excess of the required reduction for a certain source. The excess pounds of pollutant reduced can be made available for a NPDES permittee to purchase as credits. It is important to note that, due to trade ratios, one pound of pollutant reduced at the seller's discharge location is not necessarily equal to one pound of pollutant reduced at the buyer's location. Therefore, for the purposes of this Toolkit, one credit will be equal to one unit of load reduction per time (lb/day) at the location of the buyer.¹ One credit may be greater or less than one unit of load reduction per time at the location of the seller.

¹ The definition of a credit may vary from program to program.

Fundamentals of Water Quality Trading

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NPDES Permitting Authority Role in Water Quality Trading

EPA or an authorized state, territory, or tribe is the permitting authority for NPDES permits. When states are referenced in this document, it is meant to also include state, territorial, and tribal permitting authorities. Regardless of the entity issuing NPDES permits, the process for crafting water quality trading requirements should involve the permitting authority staff. This will help ensure that trading provisions are fully consistent with the implementation and compliance framework of the particular jurisdiction’s NPDES program. The role of NPDES permitting authorities in water quality trading should include the following:

- Advising state or local entities, as they develop trading frameworks, on what is needed for NPDES programs to authorize trading
- Developing enforceable trading provisions, NPDES permit limitations and conditions that meet the requirements of the CWA and its implementing regulations, consistent with the following:
 - EPA’s Trading Policy
 - State laws, regulations, and policy
 - Any applicable trading program
- Helping to develop and implement mechanisms to ensure accountability and compliance with trading requirements. Examples include the following:
 - Credit certification forms
 - Trade tracking mechanisms
 - Enforcement if permit requirements are not met
 - Review of monitoring data from credit buyers and sellers

In addition to the expertise used to develop permits and especially water quality-based effluent limits (WQBELs), the NPDES permitting authority will need an understanding of the following:

- The legal and policy framework for water quality trading
- The specific issues involved in incorporating water quality trading into NPDES permits
- The various trading scenarios and the types of sources, watersheds and pollutants for which they are appropriate

The remainder of this section briefly describes the federal legal and policy framework for water quality trading and provides examples of state regulations, policy, and guidance that establish a framework for trading or address specific aspects of trading.

Legal and Policy Framework for Water Quality Trading

Where trading is feasible, the terms of a trade will depend, in part, on the structure of a trading program or other trading requirements developed by the state or other permitting authority. These in turn must comply with federal and state rules that define the legal framework within which trading programs and requirements are developed.

Fundamentals of Water Quality Trading

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Federal Law, Regulations, and Policy

The CWA, 33 United States Code (U.S.C.) section 1251, et seq. and its implementing regulations establish the legal framework within which a trading program involving regulated point sources would be developed. The NPDES regulations at Title 40 of the *Code of Federal Regulations* (CFR) 122.44(d) describe the requirements for WQBELs that are set at levels necessary to achieve water quality standards. EPA’s Trading Policy provides states with guidance on how to facilitate trading consistent with the CWA and its implementing regulations. The Trading Policy is included in this document as Appendix B. Many of the concepts in the Trading Policy are explored in greater detail in the section on Essential Trading Information for Permit Writers. In addition, relevant portions of the Trading Policy are referenced throughout the Toolkit.

Under CWA section 301(b), NPDES permits must contain technology-based effluent limitations (TBELs) and more stringent effluent limitations when necessary to meet applicable water quality standards. Trading cannot be used to meet TBELs, except where specifically authorized by effluent guidelines (e.g., the *water bubble* provisions in the effluent guidelines for the Iron and Steel point source category). EPA has promulgated regulations at 40 CFR Part 122 specifying when WQBELs under CWA section 301(b)(1)(C) are necessary and how such limitations are to be derived. Among other things, EPA’s regulations at 40 CFR 122.44(d)(1)(vii) require the permitting authority to ensure that: (a) the level of water quality to be achieved by limits on point sources is derived from, and complies with, all applicable water quality standards; and (b) effluent limitations developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with the assumptions and requirements of any applicable WLA for the discharge prepared by the state and approved by EPA pursuant to 40 CFR 130.7. To be lawful, a WQBEL must be consistent with the requirements of CWA section 301(b)(1)(C) and EPA’s regulations at 40 CFR 122.44(d)(1).

WQBELs must also be calculated at levels that do not result in a shift in loadings that causes a localized impairment of designated uses. A localized impairment may occur wherever the applicable water quality criteria are exceeded. Where state or tribal water quality standards allow for mixing zones, the WQBELs must be consistent with the restrictions associated with those mixing zones.

The requirements of CWA section 301(b)(1)(C) and EPA’s regulations at 40 CFR Part 122 apply to all WQBELs, including those based on a water quality trade.

State Regulations, Policy, and Guidance

EPA issued its Trading Policy to encourage state regulatory agencies to include trading as an option for a point source to meet water quality standards. Some states have chosen to develop regulations, policy, or guidance to do any of the following:

- Establish a statewide or watershed trading framework
- Support local trading frameworks
- Address specific aspects of a trading program

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State trading rules should be consistent with the CWA, NPDES permit requirements, and state water quality standards. The following sections describe various state approaches for facilitating water quality trading.

Establishing a Statewide or Watershed Trading Framework

States may choose to develop state rules or regulations to facilitate the consistent and efficient implementation of a statewide or watershed-wide trading program and provide a regulatory framework for local rulemaking. Where a statewide or watershed trading program is in place, permittees or other stakeholders interested in pursuing trading know what is expected, what rules apply, and with whom they need to coordinate. NPDES authorities should participate in the development of state rules to ensure trading programs are consistent with NPDES permitting requirements and will address the needs of permit writers.

Connecticut has adopted trading legislation. Public Act No. 01-180 establishes the trading framework for a [Long Island Sound Nitrogen Credit Exchange Program](#) to be directed by a Nitrogen Credit Advisory Board appointed by the General Assembly and the governor. The Nitrogen Credit Exchange Program establishes a well-defined trading structure supported and regulated by limits mandated in state law. The state legislation specifies trading ratios (e.g., delivery and location ratios) and accounting methodologies to formalize all calculations used in trading.

States do not necessarily have to develop trading rules and regulations to provide a trading framework. Some states have developed guidance documents and other tools to assist dischargers interested in trading. Pollutant trading is recognized in Idaho’s Water Quality Standards regulations, and the Idaho Department of Environmental Quality (DEQ) has produced the [Pollutant Trading Guidance](#) that establishes the procedures to be followed for pollutant trading. The draft document specifies the conditions under which pollutant trading may take place, establishes record-keeping and reporting procedures, and prescribes how best management practices (BMPs) are to be developed for each watershed in which pollutant trading occurs. Idaho DEQ and EPA Region 10 will rely on this document to convey information to stakeholders about the state’s *ground rules* for authorizing and verifying trades and to ensure a level of regulatory consistency between the Lower Boise project and other emerging projects across the state. The nonprofit organization established to record trades for the Lower Boise and other watersheds with trading programs will also refer to the guidance for the transaction information it needs to record and make available to trading participants, EPA and DEQ, and the general public.

Trade Facilitation

The Virginia General Assembly passed legislation authorizing the creation of a [Chesapeake Bay Nutrient Credit Exchange Program](#) in 2005. This program includes the issuance of a watershed-based nutrient general permit that incorporates trading, as well as the formation of the Virginia Nutrient Credit Exchange Association, which coordinates and facilitates trading among its members. The Virginia Department of Environmental Quality (VA DEQ) is charged with developing the watershed-based permit and overseeing the credit exchange. The VA DEQ must certify the credits purchased by facilities and publish a record of all credits

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available as well as the trades that have taken place. In addition, the legislation established that the VA DEQ may conduct audits of the Virginia Nutrient Credit Exchange Association to ensure completeness and accuracy of reports.

Supporting Local Trading Frameworks

Some states allow trading without having state trading rules, policy, or guidance specifically addressing pollutant trading. For example, the North Carolina Department of Environment and Natural Resources (DENR) works with any watershed group interested in trading to develop a trading framework for that watershed and cover dischargers under an overlay permit. This trading framework originated in the [Neuse River](#) watershed. The state classified the river as a Nutrient Sensitive Water (NSW). Major fish kills in 1995 prompted legislation requiring nutrient controls and led the North Carolina Environmental Management Commission (EMC) to revise its 1988 Nutrient Management Strategy for the Neuse River Basin. The 1997 strategy established a goal that sources would reduce total nitrogen (TN) loads to the estuary by 30 percent by the year 2003. Subsequently, the North Carolina EMC adopted a rules package in 1998 to support the strategy. The rules were aimed at reducing TN impacts in the watershed by promoting nutrient management activities for agriculture, stormwater, point sources, and riparian areas. One of the rules under the strategy, the Wastewater Discharge Requirements rule, allowed dischargers to form an association to meet their allocated TN load collectively. Though not expressly stated in the rule, trading is allowed under this option among the members of the association. Members are allowed to purchase, sell, trade, or lease their individual portions of the estuary TN allocation (which are included in their permits as mass-based effluent limits) among co-permittees covered under an overlay permit so as long as they do not exceed the association’s overall estuary TN allocation (2.8 million pounds per year). Individual trades conducted under the overlay permits are typically not reviewed by the state.

Market Drivers

In most states, meeting water quality standards, WLAs under TMDLs, or other kinds of pollutant caps are the leading drivers for water quality trading markets; however, some states have developed state regulations to allow trading in other circumstances, such as on Wisconsin’s [Red Cedar River](#). The primary regulatory driver for point sources involved in trading on the Red Cedar River is Chapter NR 217 of the Wisconsin Administrative Code. This chapter of the code mandates 1 mg/L total phosphorus (TP) discharge limits for municipal treatment plants with a monthly discharge exceeding 150 pounds of TP and for industrial sources with a monthly discharge exceeding 60 pounds of TP. This cap is used to control phosphorous loadings and provides an incentive for water quality trading in the Red Cedar River watershed, as well as a baseline against which trading can be conducted.

There may be other specific aspects of a trading program that a state chooses to address through regulation, policy or guidance, such as selection of approved BMPs for generating tradable credits from nonpoint sources or general eligibility requirements (e.g., compliance history) for point sources wishing to engage in a trading program. Permitting authorities

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should be familiar with all applicable federal and state policies, regulations, and guidance before beginning to develop a permit that incorporates trading.

As is apparent from this discussion of the legal and policy framework for water quality trading, the decision to incorporate trading into a NPDES permit requires careful consideration. The permitting authority should, first, be aware of the broader state/local/watershed context for trading and consider how this context will affect the incorporation of trading provisions into NPDES permits. Specific permit conditions should be guided by state regulations and policies, including any established trading framework. The following section, Essential Trading Information for Permit Writers, provides an overview of issues that permitting authorities should consider, within the context of established regulation and policy, before developing permits that incorporate water quality trading.

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Essential Trading Information for Permit Writers

Permitting authorities are key players in any water quality trading program. Trades involving point sources, whether they are buyers or sellers, should be reflected in their NPDES permits. Listed below are some fundamental issues regulatory authorities should address when establishing a trading program or evaluating potential trading opportunities.² It is essential that the permitting authority have a clear understanding of these fundamental issues and how they will affect development of the NPDES permit that implements water quality trading.

- Pollutants most suitable for trading
- Geographic scope of trading
- Types of trading scenarios
- Appropriate circumstances for trading
- Definition of a pollutant reduction credit
- Definition of a baseline for generating credits
- Trading ratios
- Types of effluent limitations that may be met through trading
- Credit reconciliation based on timing and duration of credits
- Role of stakeholders
- Potential for and avoidance of localized exceedances of water quality standards

Appendix E provides the permit writer with a list of fundamental questions that should be answered when implementing water quality trading in a NPDES permit.

What Pollutant Trading Does EPA Support?

Not all pollutants are necessarily suitable for trading. Regulatory authorities should determine which pollutants may be traded within a specific watershed or as part of a particular trading program and may determine that certain pollutants may not be traded at all. EPA's Trading Policy supports trading for TN, TP, and sediment and indicates that other pollutants may be considered for trading on a case-by-case basis. EPA does not support trading of persistent bioaccumulative toxics (PBTs). For a list of pollutants that EPA considers PBTs see www.epa.gov/pbt/index.htm. In general, pollutants that cause adverse water quality effects

² This guidance is based on EPA's Trading Policy. The Trading Policy was written on the assumption that all trading partners would be covered by the same TMDL analysis. Thus, there are some suggestions within this document that may not apply to trades in which the trading partners are not under the same TMDL. In all cases where trading provisions are included in a permit, it remains the responsibility of the permitting authority to issue permits designed to meet water quality standards as required under CWA section 301(b)(1)(C).

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primarily as a result of cumulative loadings that are high relative to the contributions of any individual source are more suitable for trading than those that exert acute effects over small areas and in relatively low concentrations. Chapter 2 of EPA's *Water Quality Trading Assessment Handbook* provides more information regarding trading suitability analyses for specific pollutants.

Nonconventional Pollutants

EPA's Trading Policy explicitly supports trading to reduce nutrients. A number of established trading programs and pilot projects have shown that nitrogen and phosphorus can be successfully traded within a watershed to make progress toward meeting a TMDL and water quality standards. Appendices A and B of EPA's *Water Quality Trading Assessment Handbook* provide detailed information on evaluating trading suitability for phosphorus and nitrogen.

Trading of other types of nonconventional pollutants may be supported on a case-by-case basis provided the trading programs are properly designed and prior approval is provided through a NPDES permit, a TMDL, or in a state-, tribe-, or EPA-supported watershed plan or pilot trading project.

Nutrient trading programs:

- Long Island Sound, Connecticut
- Lower Boise River, Idaho
- Truckee River, Nevada
- Neuse River Basin, North Carolina
- Red Cedar River, Wisconsin
- Southern Minnesota Beet Sugar Cooperative, Minnesota

Conventional Pollutants

The Trading Policy explicitly supports trading to reduce sediment loads. Another conventional pollutant that may be suitable for trading is temperature, or thermal load. Appendices C and D of EPA's *Water Quality Trading Assessment Handbook* provide detailed information on evaluating trading suitability for temperature and sediments. Trading of other types of conventional pollutants may be supported on a case-by-case basis, as long as the trading program is properly designed to ensure that trades are consistent with water quality standards.

Conventional pollutant trading programs:

- Truckee River, Nevada: Total Dissolved Solids
- Clean Water Services, Oregon: Temperature

Does EPA Support Cross-Pollutant Trading?

EPA's *Trading Policy* supports cross-pollutant trading programs (i.e., trading between two different pollutant parameters) when mass loads that are approximately equal with respect to their impacts on the aquatic environment can be calculated. The Trading Policy explicitly supports cross-pollutant trading for oxygen-related pollutants where there is adequate information to establish and correlate impacts on water quality.

Rahr Malting Company, Minnesota

The Rahr Malting facility offsets 5-day carbonaceous biochemical oxygen demand (CBOD₅) discharges from its facility by funding upstream nonpoint source phosphorus reductions. This trade was implemented to reduce downstream oxygen demand (Breetz et al. 2004). Phosphorus loads affect oxygen demand and thus could be traded for CBOD₅ once correlations between the impacts of the upstream phosphorus discharges and the downstream CBOD₅ discharges were determined.

What Is the Appropriate Geographic Scope for Water Quality Trading?

EPA’s Trading Policy states that all water quality trading should occur either within a watershed or within a defined area for which a TMDL has been approved. But what, exactly, does “trading within a watershed” mean? For example, how large can the watershed be? Is it appropriate to trade between dischargers to different streams within the same watershed? Does it matter where the trading partners’ discharges are located relative to one another? The answers to these questions will vary on the basis of a number of factors. In general, the geographic scope of a trade should be no larger than necessary to encompass the universe of sources that contribute to a specific water quality problem that is to be addressed through trading. Beyond this, regulatory authorities should carefully consider the following factors when determining the appropriate geographic scope of a water quality trade. Many of the decisions regarding geographic scope are synonymous with decisions that define TMDLs. For this reason, EPA encourages the inclusion of specific trading provisions in the TMDL itself.

First, trading should occur only within a hydrologic unit that is appropriately defined to ensure that trades will maintain water quality standards within that unit, as well as within downstream and contiguous waters. Second, it is important to remember that the purpose of trading is to improve water quality. This can occur only if the parties to the trade discharge, either directly or indirectly, to the same waterbody where water quality improvement is necessary. This may involve trading across a wide geographic area if the waterbody to be addressed drains a large area (e.g., the Chesapeake Bay), or across a small area if the impaired waterbody is itself small (e.g., an individual stream segment). Inappropriate trading across geographic or hydrologic units (i.e., where the dischargers are not both contributing to the same water quality problem) will not improve, and could worsen, water quality downstream of the credit purchaser. Water quality trading is intended to provide opportunities for efficiently achieving and maintaining water quality standards within watersheds, as opposed to cleaning up one watershed at the expense of another.

As noted above, trades can also occur on a very small scale. The Trading Policy supports several types of trading that, by definition, would occur below the watershed scale. Specifically, pretreatment trading, intraplant trading, and intramunicipal trading are limited to the geographic scale that encompasses the collection system, facility, or municipality involved in trading.

The appropriate size of the area within which trading may occur depends on the specific characteristics of the site and the trade. Regulatory authorities should consider hydrogeologic conditions, fate and transport of pollutants, ecological parameters, the location and types of point sources, the parameters to be traded, and the regulations and management structure affecting the trading program in evaluating appropriate trading boundaries (USEPA 1996a). These factors, obviously, will vary from watershed to watershed and even within watersheds depending on the pollutants and trading partners. Some example considerations are provided below.

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Regulatory authorities should take into account the following factors in determining appropriate boundaries for a trading program and the geographic coverage of a permit that incorporates water quality trading:

- Where are the dischargers located relative to the waterbody for which reductions are needed?
- What is the distance between the potential trading partners' discharges, either along a shared receiving stream, or to the point where the receiving streams converge?³
- Is the potential credit purchaser upstream or downstream of the potential credit generator?
- If the credit generator is a nonpoint source, where is its loading released?
- Are there diversions, tributaries, impoundments, drinking water intakes, or other water withdrawals between the potential trading partners' discharges?
- What political boundaries exist between trading partners or within a watershed of interest that may impact the requirements or regulations affecting trades? Are potential partners regulated by the same permitting authority?
- What are the water quality impacts and fate and transport (e.g., decay) characteristics of the pollutant(s) to be traded?⁴
- Can appropriate trade ratios be established to account for the distance between trading partners' discharges?
- Are other water quality trades being conducted in the waterbody, and how might they affect the water quality impacts of the trade being considered?

Interstate trading may be a viable option in some parts of the country. For instance, in the Chesapeake Bay, CWA section 117(g) says that the administrator, in coordination with other members of the Chesapeake Bay Executive Council, "shall ensure that management plans are developed and implementation is begun by signatories to the Chesapeake Bay Agreement to achieve and maintain - (A) the nutrient goals of the Chesapeake Bay Program for the quantity of nitrogen and phosphorus entering the Chesapeake Bay and its watershed...". EPA interprets this language as supporting the Chesapeake Bay states in establishing multijurisdictional water quality trading programs as part of the *management* planning and *implementation* necessary to achieve the Bay's nutrient goals.

Also, trading could be an option under already established interstate compacts (e.g., Ohio River Valley Water Sanitation Commission (ORSANCO)). CWA section 103(b) expresses

³ The difference between these two measuring points relates to the location of the trading partners and the waterbody of concern. If the waterbody of concern is downstream from the trading partners, the permitting authority should compare the distance between the buyer and the waterbody of concern and the seller and the waterbody of concern to determine the appropriate location ratio. If the buyer is on the waterbody of concern, the permitting authority should determine the distance between the buyer and the seller to calculate the appropriate delivery ratio. More information on trade ratios is available later in this document.

⁴ Fate and transport modeling will often be needed and should be the same as or consistent with any model used to develop the TMDL.

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Congress' *consent* that states "negotiate and enter into agreements or compacts... for (1) cooperative effort and mutual assistance for the prevention and control of pollution and the enforcement of their respective laws relating thereto, and (2) the establishment of such agencies, joint or otherwise, as they may deem desirable for making effective such agreements and compacts." To be binding, the CWA says such agreements or compacts must be approved by Congress.

For interstate trading outside of congressionally approved compacts, section 103(a) of the CWA directs EPA to "encourage cooperative activities by the states for the prevention, reduction, and elimination of pollution, [and] encourage the enactment of improved and, so far as practicable, uniform state laws relating to the prevention, reduction, and elimination of pollution." EPA believes that encouraging states to engage in cooperative, interstate activities like establishing multijurisdictional water quality trading programs designed to prevent, reduce, and eliminate pollution is consistent with the directives in section 103(a).

In many cases, the trading boundaries will be established under a trading program or agreement, independent of the NPDES permit that implements the trade. As such programs and agreements are developed, NPDES permitting authorities should provide input on the appropriate trading boundaries on the basis of their experience permitting the facilities potentially involved. In any case, the permitting authority should write permit conditions in such way as to ensure that trades occur only within appropriate boundaries.

Types of Trading Scenarios

NPDES permitting authorities are likely to encounter a variety of trading scenarios. In general, however, all trades included in permits will involve either trading between point sources or trading between point sources and nonpoint sources. Trading between multiple point sources or between point sources and nonpoint sources can occur with or without an intermediary or broker to facilitate the trades. A third-party broker—a person, organization, or Web site—can help trading partners identify one another in a watershed. For example, NutrientNet acts as a Web-based broker.

NutrientNet®

The World Resources Institute has created a trading Web site (NutrientNet - www.nutrientnet.org), which acts as a trading broker, facilitating a way for buyers and sellers to connect, "by making it relatively easy for both point sources and nonpoint sources to estimate their remediation costs using standard, consistent methods, and by making the record of trade readily accessible. Specifically, NutrientNet is designed to serve the following functions:

- Provide potential market participants and other stakeholders with background information on nutrient trading;
- Provide farmers, municipal treatment works, and industrial plants with tools for estimating releases of nutrients to surface waters from their operations, exploring reduction options, estimating the costs of achieving reductions;

NutrientNet® (continued)

- Help market participants identify potential trading partners;
- Track the volume and type of trades within a watershed;
- Share lessons learned about trading across the watersheds where it is being tried or considered; and
- Provide information on water quality problems and trading as a possible means to address them.” (World Resources Institute 2004)

Point Source–Point Source Trading

Trading between point sources is the most basic form of water quality trading. Point source–point source trading is relatively straightforward, easily measurable, and directly enforceable. Trading between point sources is generally the easiest type of trading to implement, to measure reductions from, and to ensure compliance and enforcement with because all sources have a permit, the effectiveness of removal technologies is relatively well known, and monitoring protocols are in place. For example, in a particular watershed a publicly owned treatment works (POTW) that installs advanced technology to meet new nutrient limits could create credits by achieving greater reductions than necessary to meet its WQBELs. Other POTWs in the same watershed may find that, instead of installing expensive new technology, it is more economical for them to buy pollutant reduction credits to meet their own WQBELs.

Trading Between Two Point Sources

Single point source–single point source trades generally involve a trade agreement⁵ between two point sources (see Figure 2). In this type of trade, one point source is the credit generator and the other is the credit purchaser. For point source–point source trades, a single permit can be issued that incorporates or references the trade agreement and includes both point sources as co-permittees. Alternatively, each discharger can be issued an individual permit with trading provisions placed in each permit.

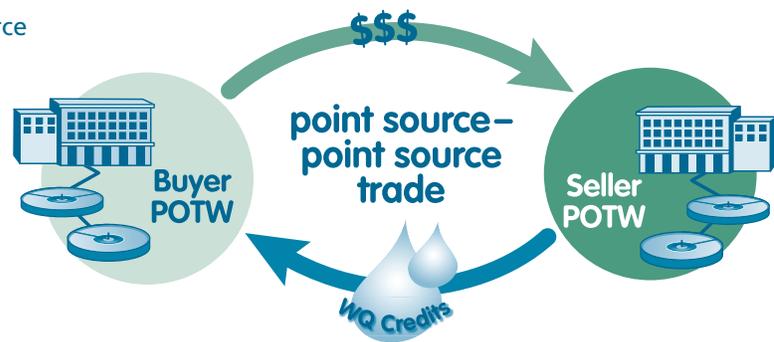


Figure 2. Point source–point source trade.

⁵ A trade agreement is a document that specifies the overall trading policies that a buyer and a seller must follow to participate in trading. The NPDES permitting authority could approve the trade agreement and either reference the terms of the trade agreement in the NPDES permit or include the trade agreement as part of the permit for each point source participating in a trade.

Multiple Facility Point Source Trading/No Exchange

Multiple facility point source trades involve a group of point sources operating under a single trade agreement (see Figure 3). The agreement can establish *ground rules* for trading to allow point sources to trade among themselves as needed. The trade agreement can specifically identify the point sources that may participate in water quality trading, or it can identify a geographic boundary (typically a watershed) or a type of discharger, or both, and allow qualifying point sources to participate in trading as desired or appropriate. An overall limit or cap set by the permit regulates all trades. Point sources trading under a multiple facility trade agreement are sometimes organized under a group that facilitates and oversees trading among the members.

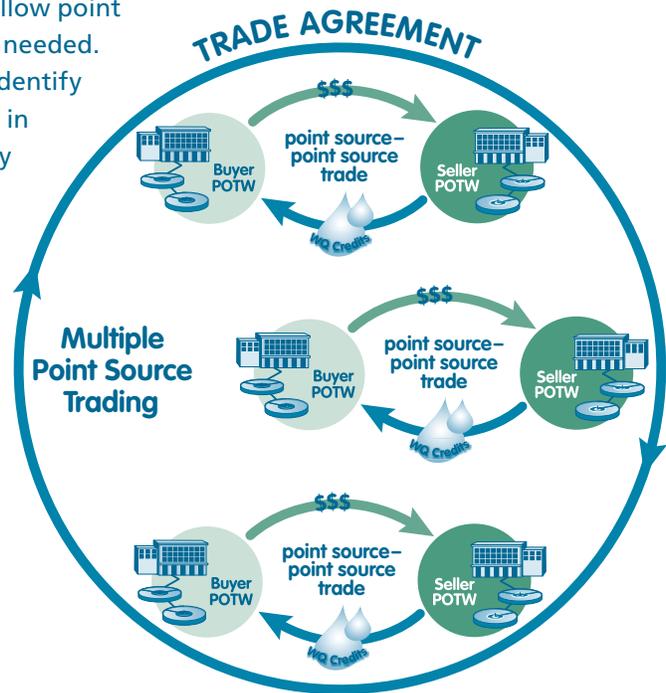


Figure 3. Multiple point source trading.

Neuse River Basin, North Carolina

Point sources participate in the Neuse River Compliance Association and have coverage under a group compliance permit that includes individual and group allocations of TN. Members of the association can trade with each other as long as they remain under the cap. If the cap is exceeded, members will be subject to their individual limits. The North Carolina Division of Water Quality may take enforcement action against the compliance association and any individual discharger. When trades occur that involve nonmembers or new or expanding dischargers within the Neuse River Basin, the group cap is modified. If credits are not available from existing dischargers, a new or expanding discharger can also obtain an allocation by paying into the Wetlands Restoration Fund; however, it must pay at double the rate of a compliance association member, and the purchase must be sufficient to fund 30 years of nitrogen reduction.

Point Source Credit Exchanges

Another type of multiple facility point source trade involves a group of point sources that may purchase credits from a central exchange as needed to comply with individual effluent limitations (see Figure 4). The credit exchange is maintained by a separate entity, which may be a state agency, a conservation district, or other organization established to administer the

credit exchange. Credits in the exchange are generated by point sources that over control their discharges. The trade agreement can specify how credits may be generated and purchased, how trade ratios are calculated, and individual and group responsibilities for meeting effluent limitations and overall pollutant loading caps. Credit exchanges do not hold credits for longer than the reconciliation period, which typically corresponds to the type of effluent limitation. For example, the reconciliation period for trades to meet monthly average effluent limitations for phosphorus would be one month. For each reconciliation period, new credits are generated for purchase. The credit exchange would likely have to be either operated by or approved and overseen by a state regulatory agency.

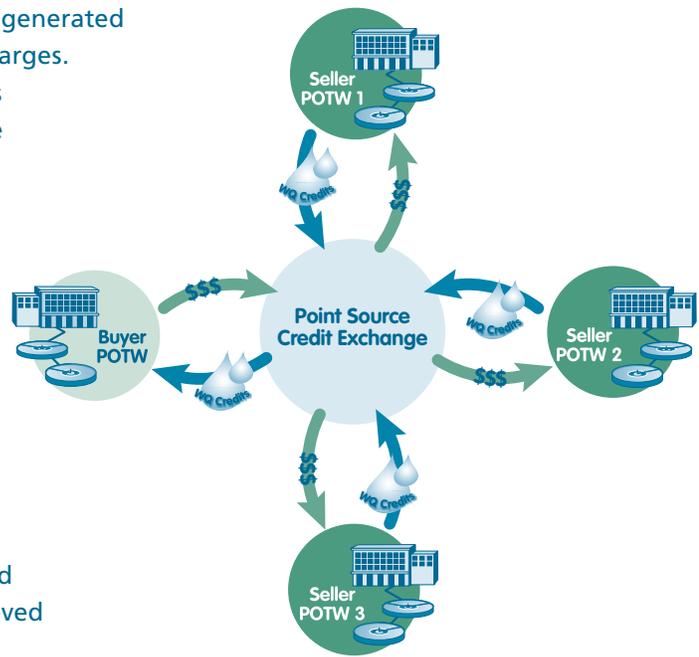


Figure 4. Point source credit exchange.

Long Island Sound, Connecticut

POTWs in the Connecticut portion of the Long Island Sound watershed may participate in the Nitrogen General Permit and Nitrogen Credit Exchange Program. Participating POTWs must individually meet the annual average discharge limits in the permit or purchase the necessary credits to achieve their individual limits through the program, which is administered by an advisory board and Connecticut Department of Environmental Protection. POTWs performing better than required by their permit limits generate credits to sell through the program. The reconciliation period for this program is one year.

Point Source–Nonpoint Source Trades

Trading between point source buyers and nonpoint source sellers provides another opportunity to meet water quality standards. In successful point source–nonpoint source trading programs, point sources benefit by purchasing credits for required reductions at lower cost than technology upgrades; nonpoint sources benefit by gaining income from better resource management; and water quality improves. One major advantage of trading is that it may reduce the cost to achieve water quality goals. For example, as shown in Figure 5, it is often less expensive to remove nutrients through the use of improved agricultural practices, such as conservation tillage, grass buffers, and enhanced animal waste management than through upgraded municipal waste treatment.⁶ In developing point source–nonpoint source trading programs and associated NPDES permits, extra care should be taken to ensure that nonpoint source load reduction uncertainty is addressed. EPA’s Trading Policy recommends that states

⁶ Data for this table was taken from information gathered to support the Chesapeake Bay Commission’s 2004 *Cost-Effective Strategies for the Bay*. There are other areas in the country where municipal waste treatment costs for TN have been shown to be lower, depending on the level of TN removal.

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Nutrient Reduction Costs

| BMP | Phosphorous (\$/lb) | Nitrogen (\$/lb) |
|--|---------------------|------------------|
| Municipal waste treatment | \$4.78-\$105.67 | \$5.73-\$10.78 |
| Conservation tillage | \$7.39 | \$1.59 |
| Agricultural grass buffers | \$20.69 | \$1.03 |
| Animal waste management/runoff control | \$30.55 | \$3.93 |

Figure 5. Nutrient reduction costs for Chesapeake Bay.

and tribes establish methods to account for uncertainties inherent in trading with nonpoint sources. These methods include monitoring to verify load reductions, the use of greater than 1:1 trading ratios between nonpoint and point sources (see the discussion of trading ratios later in this document), using demonstrated performance values or conservative assumptions in estimating the effectiveness of nonpoint source management practices, and retiring credits. Permitting authorities should be aware of such methods and incorporate them into permit requirements for point source–nonpoint source trades as appropriate. The nonpoint source trading scenario sections of this document include detailed discussions on using trading ratios to account for uncertainties in nonpoint source modeling, BMP effectiveness, and nonpoint source compliance.

There are a number of ways trading between point and nonpoint sources may occur. These include single point source–nonpoint source trades, multiple facility point source–nonpoint source trades, and multiple facility trades where credits are exchanged through a third party.

Single Point Source–Nonpoint Source Trades

Single point source–nonpoint source trades involve a trade agreement between a single point source and one or more nonpoint sources (see Figure 6). Under this type of trade, the nonpoint source(s) reduce(s) pollutant loads below the established baseline to generate credits, and these credits are purchased by the point source. Single point source–nonpoint source trades should be reflected in an individual permit for the point source that either references or incorporates the terms of the trade agreement.

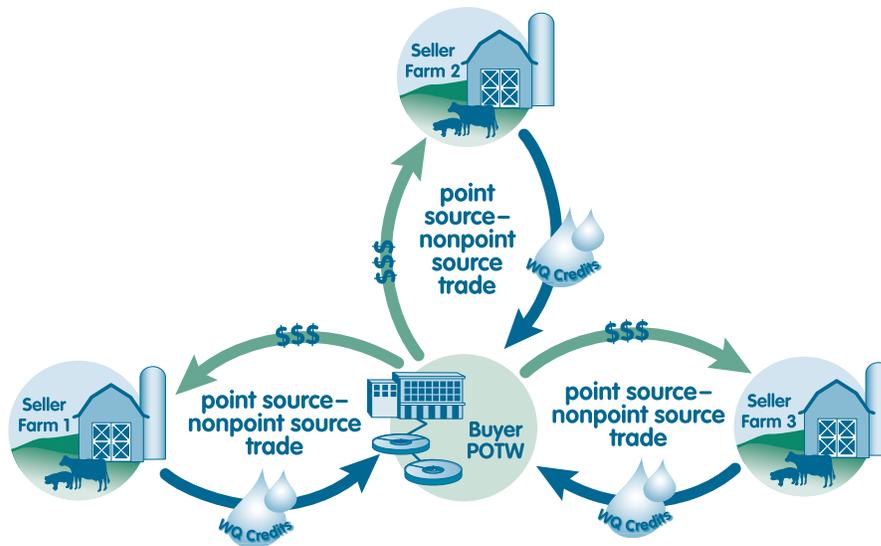


Figure 6. Point source–nonpoint source trade.

Southern Minnesota Beet Sugar Cooperative, Minnesota

The Southern Minnesota Beet Sugar Cooperative (SMBSC) wanted to build its own wastewater treatment plant; however, because of a WLA on the Lower Minnesota River, SMBSC had to completely offset its phosphorus discharge. To do so, SMBSC negotiated contracts with 256 of its member farmers to install BMPs (e.g., cover crops) to reduce their phosphorus loads.

Nonpoint Source Credit Exchange

In this scenario, a credit exchange program is established to buy credits from multiple nonpoint sources to sell to point sources (see Figure 7). A credit exchange could be managed by the state, a conservation district, a private entity, or another third party. A broker can be used to identify trading partners and facilitate trades. There are two general types of exchanges: (1) a broker-facilitated exchange where the broker brings parties together to trade directly with each other and (2) a central exchange where the point sources are not required to deal directly with nonpoint sources. For this second type of exchange, the credit sellers (nonpoint sources) generate pollutant load reductions using a variety of approved BMPs and sell the credits to the credit exchange. Point sources may then purchase

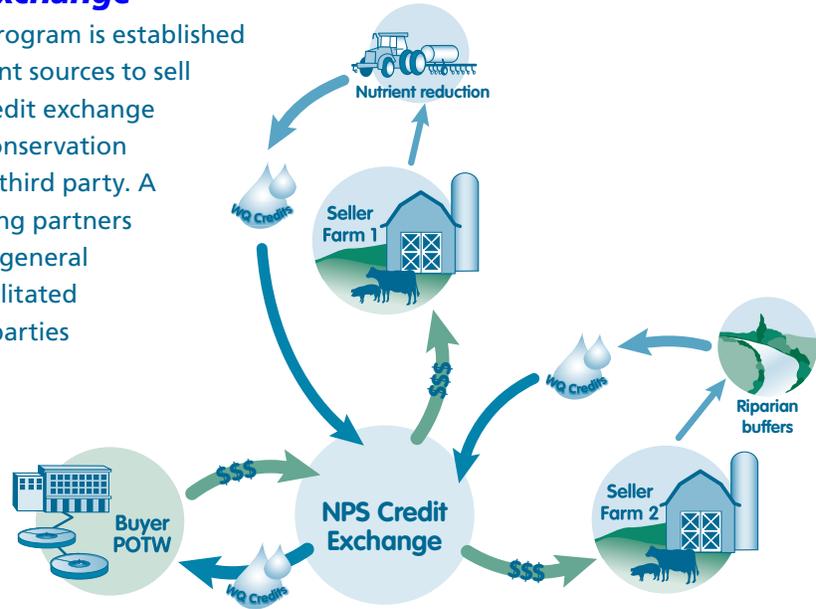


Figure 7. Nonpoint source credit exchange.

credits from the credit exchange rather than directly from the nonpoint sources. This can save transaction costs for the point source purchasers and minimizes administrative burden for credit sellers. In addition, the credit exchange can perform various other functions such as establishing standards for trading, incorporating monitoring, determining the maximum feasible nonpoint source load reductions available to generate credits in the watershed, setting credit prices, determining eligibility of credits, ensuring that the buyer has a steady supply of credits by creating a reserve pool of credits, verifying the operation and maintenance of BMPs, and tracking important trade information for all participants. The credit exchange would likely have to be either operated by or approved and overseen by a state regulatory agency.

Red Cedar River, Wisconsin

The city of Cumberland participated in the Red Cedar River Nutrient Trading Pilot Program, which involves paying farmers in the Red Cedar watershed to install BMPs that reduce phosphorus loads. The Barren County Land Conservation Department facilitates the trades by negotiating with farmers and establishing contracts between the farmers and the city of Cumberland.

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Under What Circumstances Does EPA Support Trading?

Trading is driven by regulation, motivated by economics, and governed by project-specific trading rules. The drivers for trading are typically new, more stringent WQBELs in NPDES permits derived from new or existing water quality criteria, a TMDL or the establishment of a pollutant cap. For trading to be economically viable, there must be other sources that can achieve excess reductions at lower cost than the permitted point source. Other factors, such as a stakeholder agreement to implement a trading program, may also play an important role.

Trading to Address Impaired Waters Under a Pollutant Loading Cap or TMDL

Trades and trading programs in impaired waters for which a TMDL has been approved or established by EPA should be consistent with the assumptions and requirements upon which the TMDL is established. EPA encourages the inclusion of specific trading provisions in the TMDL itself, in NPDES permits, in watershed plans and the continuing planning process (USEPA 2003).

TMDL development or the establishment of a pollutant cap often serves as the driver for point sources to get involved in trading. Therefore, water quality trading provisions included in NPDES permits often will address impaired waters where a TMDL or similar pollutant loading cap has been established. In these cases, the baseline water quality requirement for a particular point source is specified by a WLA in the TMDL and expressed in the point source's NPDES permit as a WQBEL that is consistent with the WLA. A point source's required pollutant reduction is the difference between the discharger's current pollutant load and the load required to meet the WQBEL.

The facility could potentially have three options for complying with its WQBEL. One option is to implement pollution prevention, reuse, or recycling measures adequate to meet the WQBEL at the point of discharge. The second option is to install treatment technology. The third option is trading. Trading allows the facility to purchase the needed reductions from point or nonpoint source credit sellers in the watershed. The facility also could choose to implement some treatment or pollution reduction measure to partially reduce its discharge of the pollutant and purchase the remaining reductions through trading.

If a discharger installs a control technology that results in pollutant reductions greater than those required by the WQBEL, the discharger may potentially generate credits. The number of credits generated would be the difference between the discharger's WQBEL in its permit implementing the WLA and the pollutant load actually discharged after installing treatment processes or other pollutant reduction measures.

Trading to Address Impaired Waters Pre-TMDL

EPA's Trading Policy specifically states that "EPA supports pre-TMDL trading in impaired waters to achieve progress toward or the attainment of water quality standards. EPA believes this may be accomplished by individual trades that achieve a net reduction of the pollutant

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traded or by watershed-scale trading programs that reduce loadings to a specified cap supported by baseline information on pollutant sources and loadings.”

Trading is an option in impaired waters to reduce pollutant loads where a TMDL has not yet been established. A pre-TMDL trade must not cause or contribute to further impairments of the waterbody. CWA 301(b)(1)(C); 40 CFR 122.44(d)(1)(vii)(A). The Trading Policy presents two approaches for pre-TMDL trading depending on the scale of the trade. One approach is individual trades, which could be individual point source–point source trades or individual point source–nonpoint source trades. These sources may choose to trade to eliminate the need for a TMDL or to ameliorate conditions for a pending TMDL. An example of this type of trading is the Great Miami River Watershed Trading Pilot Program. Trades should result in a net reduction of the pollutant traded to ensure that further impairment to the waterbody is avoided. (For details of this program, see [Appendix A](#).)

The other approach is where a pollutant loadings cap has been set for a waterbody at a watershed-scale through watershed-based permitting (e.g., [Neuse River](#)⁷) or a voluntary cap has been set on a downstream waterbody and a strategy has been developed to allocate reductions within the watershed (e.g., Chesapeake 2000 Bay Agreement and Tributary Strategies). A cap on total loadings can be derived from baseline information on pollutant sources and loadings that is consistent with water quality standards. Trades can occur to make progress toward or meet that cap.

To establish a target or loading cap below current conditions that represents progress in the attainment of water quality standards, it is necessary to quantify the current conditions. Current conditions would be the pollutant loads represented by current permit and regulatory requirements for point sources (i.e., the applicable effluent limitations or other quantified performance requirements) and the current level of pollutant loads from all nonpoint sources and background conditions. Once the total current pollutant load is quantified, EPA would support trading to achieve a target or cap representing a reduction in the overall pollutant load.

For discharges to impaired waters pre-TMDL, trading need not trigger the anti-backsliding provision of CWA section 402(o) or the limitations under CWA section 303(d)(4) even where the effect of the permit authorizing trading is to allow a greater actual discharge from the facility itself (because of the purchase of credits) than the previous permit issued to the trading point source. Allowing a facility to meet an established WQBEL through trading does not necessarily constitute a *less stringent* effluent limitation as specified in section 402(o) if the facility is still responsible for the same level of pollutant reduction. In that case, trading merely offers the discharger an additional means of achieving that limitation and must not result in a net increase in the pollutant discharged to the waterbody or in a localized impairment. Similarly, allowing a facility to meet a WQBEL through trading does not necessarily constitute a *revised* effluent limit under section 303(d)(4)(A) if a facility is still responsible for the same level of pollution reduction. All WQBELs, including those that are subject to CWA section 402(o), must meet the requirements of CWA section 301(b)(1)(C). Section 301(b)(1)(C)

⁷ In 1999 a TMDL was completed for the Neuse River. The Neuse River Compliance Association was formed before this TMDL, and the cap that was incorporated into the TMDL was set by the state as part of its 1997 nutrient strategy for the Neuse River.

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requires that the limitations be set at levels necessary to achieve water quality standards, which also includes avoiding localized impairments.

In the absence of a watershed-wide trading program to meet a specific target or pollutant loading cap, EPA supports individual pre-TMDL trades that achieve a net reduction in loadings of the pollutant traded and, thus, progress toward attainment of water quality standards.

Trading in Unimpaired Waters

Federal regulations (40 CFR 131.12) establish requirements for states and tribes to develop and adopt statewide **antidegradation** policies that, at a minimum, maintain and protect the level of water quality necessary to support existing uses and to protect high-quality waters including outstanding national resource waters. Where the level of water quality exceeds the level necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, federal regulations allow a state or tribe to authorize new or increased pollutant discharges to that water under two circumstances: (1) when the jurisdiction determines that the new or increased discharge would not lower water quality; or (2) when lower water quality will occur, but the jurisdiction finds that such lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing lower water quality, a state or tribe must assure water quality adequate to fully protect existing uses and also assure achievement of the most stringent statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable BMPs for nonpoint source control (40 CFR 131.12(a)(2)).

When drafting or interpreting their antidegradation policies, jurisdictions have the flexibility under current law to determine when a new or increased discharge lowers water quality. A jurisdiction can explicitly provide in its antidegradation policy that no lowering of water quality occurs within the meaning of 40 CFR 131.12(a)(2) in the case of new or increased discharges when, as a result of a water quality trade, there is no net increase of the pollutant being discharged into the waterbody and the trade will not result in any localized impairments. EPA encourages jurisdictions to use trading in high-quality waters for the purpose of mitigating the effects of new or increased discharges that, without the trade, might lower water quality.

It is important to note that this guidance does not preclude a jurisdiction from requiring an antidegradation review under 40 CFR 131.12(a)(2) or from finding that a lowering of water quality would occur as a result of a proposed new or increased discharge. Nor is this guidance intended to mean that there necessarily would be a lowering of water quality if there is a net increase of pollutants. Rather, it simply identifies a trade-related situation where a jurisdiction could authorize a new or increased discharge without a review because the increased load would be compensated for through trading.

Intraplant and Intramunicipal Trading

One straightforward form of trading is intraplant trading, or trading between different outfalls within a plant. Intraplant trading can be accomplished within the context of a single NPDES permit and, thus, does not require the establishment of a formal trading program.

EPA supports intraplant trading that involves the generation and use of credits between multiple outfalls that discharge to the same receiving water from a single facility that has been issued an NPDES permit (USEPA 2003).

A facility with multiple outfalls may receive a mass WLA of a particular pollutant through a TMDL, another watershed-level analysis, or calculation of individual effluent limitations. Typically a permitting authority would assign fixed, mass-based, effluent limitations to each outfall contributing the pollutant by apportioning the loading on the basis of the outfall’s historical or design flow. By incorporating intraplant trading into the permit, the permitting authority could assign the overall mass loading limitation to the facility but allow the permit holder to manage the facility as a system, apportioning the loading among outfalls in a way that makes the most sense both technically and economically. The NPDES permit should still ensure that the overall mass loading requirement for the facility is reflected in the effluent limitations and that there is no potential for creating a localized exceedance of water quality standards.

Another form of trading that would not require establishing a formal trading program is intramunicipal trading. Similar to intraplant trading, intramunicipal trading allows a municipality to manage its multiple discharges as a system. The difference is that intramunicipal trading involves trading among multiple facilities or point sources owned by a single municipality that, traditionally, would be covered under separate individual NPDES permits. A permitting authority could assign a mass loading of a particular pollutant to the municipality as a whole (if appropriate) or to its individual discharges on the basis of a TMDL or other watershed-level analysis. An overall mass loading assigned to the municipality would be appropriate only where localized impacts would not be expected from each of the municipality’s individual discharges. The municipality could apportion the overall allocation among its facilities to meet the overall mass limitation. Where its discharges received individual allocations, it still could trade among sources to allow them to meet those individual allocations. This type of trading may be more complex than intraplant trading because trade ratios for the different discharges may have to be established to address differences in their locations. Also, the intramunicipal trading would have to be incorporated into NPDES permits by either developing individual permits with coordinated requirements or developing an integrated municipal permit. Where facilities are assigned individual allocations, a facility would have to perform better than its WQBEL to generate credits. Any facility accepting credits would have to first meet any applicable TBELs and ensure that its discharge would not create a localized exceedance of water quality standards. This requirement could be implemented through a limit on the number of credits the facility may accept.

New sources and new dischargers, including those involved in intramunicipal trading must meet the requirements of 40 CFR 122.4(i), which states that

No permit may be issued to a new source or a new discharger, if the discharge from its construction or operation will cause or contribute to the violation of water quality standards. The owner or operator of a new source or new discharger proposing to discharge into a water segment which does not meet applicable water quality standards or is not expected to meet those standards even after the application of the effluent limitations required by sections 301(b)(1)(A) and

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301(b)(1)(B) of CWA, and for which the State or interstate agency has performed a pollutants load allocation for the pollutant to be discharged must demonstrate, before the close of the public comment period, that:

(1) There are sufficient remaining pollutant load allocations to allow for the discharge; and

(2) The existing dischargers into that segment are subject to compliance schedules designed to bring the segment into compliance with applicable water quality standards. The Director may waive the submission of information by the new source or new discharger required by paragraph (i) of this section if the Director determines that the Director already has adequate information to evaluate the request.

EPA interprets 40 CFR 122.4(i) to allow for a new source or new discharger to compensate for its entire increased load through trading. In the case of intramunicipal trading, new sources or dischargers operated by a municipality may discharge to an impaired water if their discharge does not cause the municipality to exceed its overall cap for the pollutant(s) of concern.

Clean Water Services, Oregon

Trading of oxygen-demanding parameters is permitted between two wastewater treatment plants operated by Clean Water Services, a public utility in the Tualatin River Basin responsible for wastewater and stormwater management. These facilities are covered under a general permit that specifically authorizes the Durham and Rock Creek Advanced Wastewater Treatment Facilities to trade CBOD₅ and ammonia.

Trading Involving Wet Weather Point Sources

Several classes of wet weather point sources, including combined sewer overflows (CSOs), discharges from municipal separate storm sewer systems (MS4), and stormwater discharges from industrial activities, are regulated under the NPDES program and could provide opportunities for trading. The general framework for trading involving point sources⁸ is applicable to wet weather point sources, with some additional considerations to account for the nature of the wet weather point sources and their permits. First, wet weather point sources cannot trade to meet their TBELs. EPA has not established effluent limitations guidelines for CSOs, MS4s or most types of stormwater discharges associated with industrial activities; however, the CWA provides technology-based standards for the different classes of wet weather point sources. For CSOs and stormwater discharges from industrial activities, the technology-based standard is Best Available Technology Economically Achievable/Best Conventional Pollutant Control Technology. For MS4s, the technology-based standard is Maximum Extent Practicable (MEP). Therefore, in the absence of effluent limitations guidelines, a permit writer must use the CWA's technology-based standard to establish TBELs on a permit-by-permit basis using the permit writers' best professional judgment (BPJ).

⁸ For more information about the general framework for trading involving point sources, see the discussion *What Discharge Limits Apply in Water Quality Trading?* in this document.

EPA supports trading involving wet weather point sources where it can be shown to have a water quality benefit. However, to ensure water quality improvement, the following conditions are generally necessary for trading involving wet weather point sources to occur:

A Wet Weather Point Source as a Seller:

- The seller meets its most stringent effluent limitation (baseline), which is either its TBEL or WQBEL. Reductions in excess of the most stringent effluent limitation are eligible to be sold as credits.
- The seller’s permit or fact sheet includes numeric effluent limitations or allowable loads. The fact sheet for the seller’s permit clearly describes the value of the trade in terms of a numeric pollutant load and clearly demonstrates that water quality objectives will be achieved after all trades have been made.
- The permit requires discharge monitoring to verify that all discharges involved in the trade are performing consistent with expectations of the trade.
- No credit can be generated without an actual reduction in pollutants. An existing discharge that is either uncontrolled or has existing controls with concentrations/ loads that do not *meet water quality standards* would not be able to generate credits without achieving additional reductions.

A Wet Weather Source as a Buyer:

- The buyer’s permit or fact sheet identifies numeric effluent limitations or allowable loads to be achieved to meet the technology-based standard (minimum control level).
- The permit or fact sheet identifies the actual controls that the buyer must implement to meet its minimum control level.
- Credits are purchased to meet the buyer’s baseline (WQBEL).
- Discharge monitoring data is available in advance of the trade to verify that the control measures for the wet weather sources are capable of meeting minimum control levels. After the trade, discharge monitoring data is able to ensure the goals of the trade are being met.

Credits are generated only by actual reductions of pollutants in discharges. Credits should not be for nondirect or indirect water quality-based measures such as educational programs, public outreach, and so on, unless these practices are translated into quantified load reductions.

Lake Lewisville, Texas

The city of Denton, Texas, draws its drinking water from and discharges its wastewater to Lake Lewisville. Lake Lewisville is also used for recreation. It is in the interest of the city of Denton to improve and maintain the quality of water in Lake Lewisville. Thus, Denton has implemented an aggressive water quality improvement program. More than 70 monitoring sites have been installed in the three watersheds that encompass the city. The city has monitored a variety of parameters monthly. This data plus extensive modeling has provided Denton with excellent data to assess the condition of its water as well as make future projections on the basis of expected growth. Denton is a stormwater phase II city and has gone well beyond the six minimum measures required by the stormwater phase II regulations. The city is investigating water quality trading as an option for developers as the city requires any sediment or nutrient loadings coming from development to be compensated for through other reductions. Because the city has extensive monitoring and modeling of the water quality in the three watersheds, it will have the data to set the baseline for trading at pre-development conditions.

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Using Flow as the Trading Parameter

State and local regulations that regulate stormwater flow may create a market for wet weather trading outside of the NPDES program. For example, state or local ordinances could require offsets for wet weather flow and thus create a market for trading flow across all wet weather sources to meet these requirements.

Portland, Oregon

The city of Portland, Oregon, is evaluating the viability of a stormwater trading program. An approach under evaluation would allow redevelopers to buy credits for flow reductions required for their site from other parties, for example from the city, which would install *green streets*. This trade may be viable where the permitting authority determined that the installation of green streets represented technology over and above what was determined to meet the MEP standard of the NPDES program. The first phase of the study will determine if the approach is economically beneficial and if the program can provide acceptable environmental results. If the trading approach is determined to be feasible, later phases of the study will outline the model approach, determine the geographic trading area, select appropriate BMPs, and develop economic models for program valuation. In later phases, the city also plans to demonstrate the operation of the trading system by implementing a pilot program.

Vermont

The state of Vermont is also developing an approach under which a form of trading could be used to meet flow restrictions. This approach would identify site-specific stormwater/hydrologic indicators for use as surrogate TMDL targets. The approach provides a tailored estimation of target stormwater runoff volumes and stream characteristics using reference watersheds that represent the stream channel conditions and pollutant loadings necessary to support aquatic life. In addition to providing a tailored target for TMDLs, this site-specific approach will also generate information to support the development of stormwater permit limits on a watershed-basis. These limits could then serve as a baseline for trading.

For the interim period before TMDL adoption, Vermont’s 2005 rules for stormwater discharges to impaired waters (Vermont Environmental Protection Rules, Chapter 22) specify that new development in impaired waters must cause no net increase in sediment loading or hydrologic impact (VTDEC 2005). To achieve this standard, the rules allow for one of the following: (1) the development of projects that offset the new discharges within the same watershed; (2) payment of a stormwater impact fee to the state to obtain the necessary *offset charge capacity*⁹ (the fee is based on amount of impervious cover created and is used to purchase the comparable amount of impervious cover removed—or the discharge equivalent) from a stand-alone *offset project* within the watershed; or (3) a combination of options 1 and 2. To determine the size of the offset project or the amount of offset charge capacity needed, the applicant must calculate the increase in impervious cover and sediment loading or hydrologic impact expected to result from the project following stormwater BMP implementation. The no-net-increase provision of the Vermont rules is consistent with 40 CFR 122.4(i) for new discharges to impaired waters.

⁹ *Offset Charge Capacity* is defined in Vermont’s 2005 Stormwater Rules as “the amount of reduction in sediment load or hydrologic impact that an offset project generates” (VTDEC, 2005).

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Pretreatment Trading

EPA supports a municipality or regional sewerage authority developing and implementing trading programs among industrial users that are consistent with the pretreatment regulatory requirements at 40 CFR Part 403 and the municipality's or authority's NPDES permit (USEPA 2003).

Pretreatment trading gives a municipality the flexibility to allow trading among industrial users to meet its maximum allowable load as an alternative to allocating the load among users directly. Under this trading scenario, the effluent limitations for the permitted wastewater treatment facility would not change. The trading program itself can be established and administered by the POTW that has responsibility for administering the pretreatment program. The permitting authority need not incorporate the details of individual trades into the wastewater treatment facility's permit; however, the permit should acknowledge that the permittee has or will establish a pretreatment trading program to facilitate and supervise trading among industrial users to meet the effluent limitations established in the permit. In addition, before including pretreatment trading in a NPDES permit, the permitting authority should confirm that pretreatment trading is permissible under municipal sewer use ordinances establishing local limits and other local requirements. In addition, indirect industrial users cannot trade to meet categorical effluent discharge limits based on federal pretreatment standards because these are technology-based standards or other national pretreatment standards (e.g., general and specific prohibitions at 40 CFR 403.5). There are no categorical pretreatment standards that specifically allow for trading. For more on pretreatment trading, see *Sharing the Load: Effluent Trading for Indirect Dischargers*.

Passaic Valley Sewerage Commissioners, New Jersey

Indirect dischargers to the POTW may participate in trading to meet uniform local pretreatment limits.

Some Trading Scenarios Are Not Supported

EPA's Trading Policy does not support trading to meet TBELs. The intent of a TBEL is to require a minimum performance level for point sources based on currently available treatment technologies. EPA expects all dischargers within a particular industrial category to achieve the defined basic level of pollutant control and does not support the use of water quality trading to meet technology standards. The only time trading is supported by EPA to meet TBELs is when federal regulations expressly authorize trading. For example, existing technology-based effluent guidelines for the iron and steel industry allow intraplant trading of conventional, nonconventional, and toxic pollutants between outfalls under certain circumstances. The Trading Policy does state that the Agency will consider including provisions for trading in the development of new and revised TBEL guidelines and other similar regulations. Unless such effluent guidelines have been promulgated, permitting authorities should not include trading provisions into a permit designed to achieve compliance with TBELs.

EPA does not support any use of credits or trading activity that would cause an impairment of existing or designated uses, adversely affect water quality at an intake for drinking water supply or that would exceed a cap established under a TMDL (USEPA 2003).

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NPDES permits must not incorporate trades that would cause impairment of a designated use (CWA 301(b)(1)(C); 40 CFR 122.44(d)(1)(vii)(A)). This restriction includes localized exceedances of water quality standards caused by increased pollutant loads from a credit purchaser.

Also, NPDES permits should not incorporate trades that would adversely affect drinking water systems by creating the need to increase the level of drinking water treatment over what was needed before the trade or by causing a water supplier to exceed regulatory standards established under the Safe Drinking Water Act.

What Are Some Factors Involved in Determining a Reduction Credit?

As stated earlier, EPA’s *Water Quality Trading Assessment Handbook* notes that, in water quality trading markets, the marketable product is the over control of pollutant loadings. A pollutant reduction credit is a measured or estimated unit of pollutant reduction per unit of time at the discharge location of the buyer or user of the credit.¹⁰ A seller generates excess load reductions by controlling its discharge beyond what is needed to meet its baseline. A buyer compensates a seller for creating the excess load reductions, which are then converted into credits by using trade ratios. Where appropriate, the buyer can use the credits to meet a regulatory obligation. To determine when a pollutant reduction credit has been generated, a regulatory authority will need to develop procedures for determining baselines for credit generation, trading ratios, timing of credit generation, and the duration of credits. These issues are summarized in the checklist in [Appendix E](#) and are explained in the following sections.

What Discharge Limits Apply in Water Quality Trading?

Trading participants should have an understanding of three types of discharge limits: baselines, minimum control levels, and trading limits (see Figure 8). Baselines apply to both a buyer and a seller. Minimum control levels are relevant only to the buyer and trading limits are relevant only to the seller. Each limit should be contained in the trade agreement.

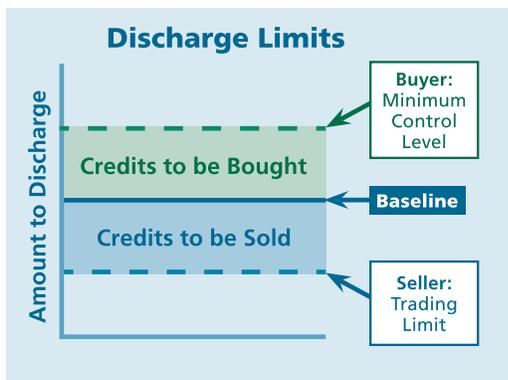


Figure 8. Point source discharge limits.

Baselines

The baselines for water quality trading are the NPDES permit limits (for point sources) or BMPs (for nonpoint sources) that would apply in the absence of trading. These baselines will vary depending on the sources involved and the specific circumstances under which trading will occur.

¹⁰It is important to note that, because of trade ratios, one pound of pollutant reduced at the seller’s discharge location is not necessarily equal to one pound of pollutant reduced at the buyer’s location. Therefore, for the purposes of this Toolkit, one credit will be equal to one unit of load reduction per time (lb/day) at the location of the buyer. One credit may be greater or less than one unit of load reduction per time at the location of the seller. Different programs may define credit differently.

Point Source Seller

The baseline for a point source seller is its most stringent effluent limitation. A point source seller generates credits when it reduces its discharge below its baseline.

Point Source Buyer

Because a buyer cannot buy credits to meet its TBEL, a point source would buy credits only if its WQBEL is more stringent than its TBEL. Therefore, the baseline for a point source buyer would be its WQBEL. WQBELs are developed to meet state water quality standards.

Nonpoint Source Seller

For a nonpoint source seller in a watershed under a TMDL, the source’s baseline would be derived from the nonpoint source’s LA. In the absence of a TMDL, EPA’s Trading Policy states that state and local requirements and/or existing practices should determine a nonpoint source’s baseline (see Figure 9). The trading program provisions could also specify some additional minimum level of control that nonpoint sources would have to achieve before they could generate credits. The baseline level of control should never be less than existing practice.

A more in-depth discussion of establishing a baseline for nonpoint sources is provided in the [nonpoint source trading scenario](#) sections of the Toolkit.

Minimum Control Levels

A discharger that chooses trading to meet its baseline can buy credits; however, the discharger would still be expected to meet a minimum control level at the point of discharge (see Figure 8). The minimum control levels are either the TBELs specified in a permit or the current discharge levels, depending on which are more stringent. TBELs are derived from secondary treatment standards for POTWs and effluent guidelines or BPJ for industries (see Figure 10). After a discharger meets its minimum control level through treatment, it can buy credits to meet its baseline.

A permitting authority can choose to impose a more stringent minimum control level than the TBEL or current discharge to prevent localized exceedances of water quality standards near the point of discharge but not one that is less stringent the TBEL. For a more detailed discussion of how these minimum control levels are incorporated into a permit, see the discussion in the trading scenario sections.

Nonpoint Source Seller Baseline for Trading

| NPS Seller With TMDL | NPS Seller Without TMDL |
|----------------------|---|
| Load allocation | State and local requirements and/or existing practice |

Figure 9. Nonpoint source seller baseline for trading.

Point Source Buyer Minimum Control Level

| POTW Buyer | Industrial Buyer |
|-----------------------|------------------|
| Secondary Treatment * | TBEL * |

* Must be stringent enough to avoid localized exceedances of water quality standards

Figure 10. Point source buyer minimum control level.

Trading Limits

To become a seller, a discharger would control its pollutant discharge beyond its baseline. The seller can choose to what level it will control its pollutant discharge (based on the technology or BMPs it will implement) and this level becomes its trading limit (see Figure 8). If the seller does not meet its trading limit, it could violate its trade agreement, and the buyer could be out of compliance with its permit. The number of credits generated could be calculated by taking the difference between the seller’s baseline and its trading limit and multiplying that difference by the applicable trading ratio.

Developing Trade Ratios

In many cases, pollutant credits are not generated on a “one pollutant pound-to-one pollutant credit” basis. Rather, some type of a trading ratio is used to either discount or normalize the value of pollutant credits. For example, a trading program with a trading ratio of 4:1 would require a buyer to purchase 4 pounds of nitrogen reduction to achieve a credit worth one pound of nitrogen reduction from its facility. There is no set limit for how high a trading ratio can be.

Trading ratios depend on the specific circumstances in the watershed. Factors that drive the use of trading ratios might relate to environmental conditions, pollutants, or programmatic goals. Although existing trading programs use various types of trading ratios and different terms to describe them, *the basic categories of trading ratios are delivery, location, equivalency, retirement, and uncertainty.*¹¹

Delivery or location ratios are calculated as part of the overall trading ratio for a particular pair of sources to account for pollutant attenuation because of the fate and transport characteristics of a pollutant, the unique characteristics of the watershed (e.g., hydrology, vegetation), distance, and time. This type of ratio accounts for the fact that a pound of a pollutant discharged upstream will not arrive as a pound of a pollutant at a given point downstream.

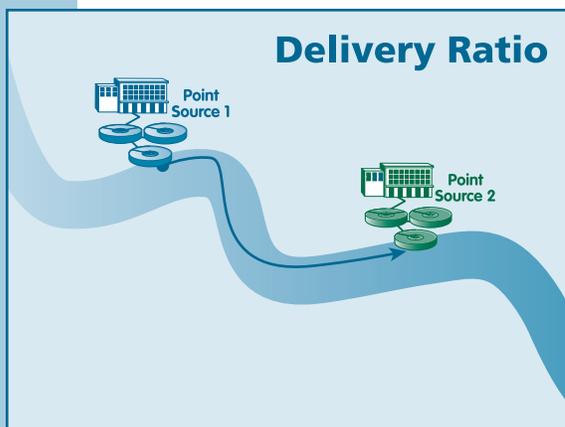


Figure 11. Delivery ratio.

- **Delivery ratios** are used when sources are directly discharging to the waterbody of concern. These ratios account for the distance and unique watershed features (e.g., hydrologic conditions) that will affect pollutant fate and transport between trading partners (see Figure 11). For example, an upstream point source is interested in trading with another point source that is several miles downstream. Because of the distance between the two dischargers, modeling shows that a 5:1 delivery ratio should be applied to trades between the two sources. This means that the downstream point source would need to purchase 5 pounds of pollutant credits to achieve the equivalent of one pound of pollutant reduction at its own discharge point. Sources that are closer in proximity with less intervening hydrological features are likely to have a lower delivery ratio.

¹¹ It is important to note that trading programs are likely to use a variety of names for trading ratios and the categories described are generalized for simplicity.

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- Location ratios** are used when sources are upstream of the waterbody of concern. These ratios account for the distance and unique watershed features between a pollutant source and the downstream waterbody (e.g., bay, estuary, lake, reservoir) that the trading program is trying to address (e.g., a hypoxic zone in a waterbody). The location ratio allows credits to be traded between unique sources by converting their loadings or reductions into credits needed or available at the waterbody of concern. Each source has a unique location ratio that reflects a source’s relative impact of pollutant loading or reduction on the waterbody of concern. There will likely be differences in the water quality impacts of a discharge of a pound of a pollutant near the area or waterbody of concern versus a pound of pollutant discharged farther upstream. Using Figure 12 to illustrate, sources in closer proximity to the downstream waterbody of concern will have lower location ratios than sources farther upstream. The lower location ratio indicates that the mass of a pollutant load (e.g., one pound of nitrogen) from a source nearer the waterbody of concern has a greater impact on the waterbody. If the two sources in Figure 12 wanted to trade, the location ratios of both sources would have to be figured into the trading ratio between the sources. For example, suppose the location ratio of the point source were 2:1 and the location ratio of the nonpoint source were 3:1. Then the trading ratio for the two sources would include a location component of 3:2. Note that while in this example consideration of location ratios leads to a > 1:1 trading ratio, this is not necessarily always the case. If the seller were closer to the waterbody of concern than the buyer, this could lead to a trading ratio of < 1:1.

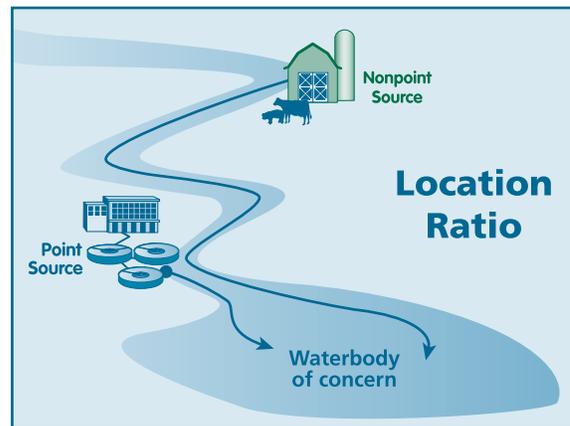


Figure 12. Location ratio.

Equivalency ratios adjust for trading different forms of the same pollutant. One pollutant can exist in different forms. While two sources may discharge the same pollutant, the composition of their discharges may differ with respect to the forms of the pollutant. Pollutants from different sources can be traded if they have the same effect on the waterbody of concern or if their effects can be related by some factor. This factor is known as an equivalency ratio. To calculate this ratio, the water quality impacts from each pollutant source need to be estimated. For nutrients, the effect on water quality is related to the percent of the nutrient that is biologically available in the source’s discharge. Biologically available nutrients are readily available for uptake by the biota. Nutrients can be present in forms that are immediately biologically available and in forms that are less accessible to the biota. Excess biologically available nutrients contribute to eutrophication and degradation of water quality. Those forms of nutrients that are not immediately biologically available can become accessible to the biota (biologically available) through different biological and chemical cycling mechanisms. Hence, nutrients can be present as readily biologically available or bound to sediment, and depending on environmental factors, such as climate, apparent

geology, residence time, and so on, have different effects on the waterbody of concern. The relative biological availability of nutrients in the trading sources' discharges should be incorporated into the equivalency ratio. For example, consider a point and nonpoint source trading phosphorous. Generally, a point source's discharge will have a higher proportion of biologically available phosphorous than a nonpoint source's discharge. While some of the nonpoint source's bound phosphorous will convert into biologically available phosphorous, it will generally still have a lower percentage of biologically available phosphorous than the point source during the time frame the point source must account for the reductions. It is important that the buyer offset its load with reductions that will have similar impacts on the waterbody at the time the offset is needed. The number of pounds of the nonpoint source's reduction that the point source will have to buy to have a similar impact on the biota in the waterbody is the equivalency ratio.

An equivalency ratio can also be used in cross-pollutant trading. While the general idea that the water quality effects of the two pollutants should be equivalent or related by a factor still holds, determination of the ratio may involve a more detailed study for cross-pollutant trading than for single-pollutant trading. As with consideration of location ratios, consideration of equivalency ratios may lead to either a greater or less than 1:1 trading ratio.

Uncertainty ratios account for multiple types of uncertainty that normally occur in point source–nonpoint source trades. Most point source–point source trades should not require an uncertainty ratio because measurement is relatively straightforward and both sources are required to perform discharge monitoring in accordance with the terms of their permits. However, challenges exist in accurately measuring nonpoint source credit generation because of complexities and cost associated with assessing and monitoring of pollutant load reductions from BMPs (see Figure 13). Measurement uncertainty addresses the level of confidence in the field testing of a nonpoint source BMP. Implementation uncertainty is also accounted for in this type of ratio, addressing the level of confidence that a nonpoint source BMP is properly designed, installed, maintained, and operated (Moffett 2005). Together, these factors contribute to performance uncertainty (the risk of a BMP failing to produce the expected results). All

trading programs involving nonpoint sources should address nonpoint source BMP performance uncertainty through ratios, use of conservative assumptions in calculating credits, or some other approach. Where uncertainty ratios are used, they will generally be greater than 1:1, because there is greater uncertainty associated with nonpoint sources (sellers) than with point sources (buyers). The method of reducing the uncertainty ratio is typically to improve the certainty of nonpoint source load reductions through monitoring, modeling, and estimating effectiveness.

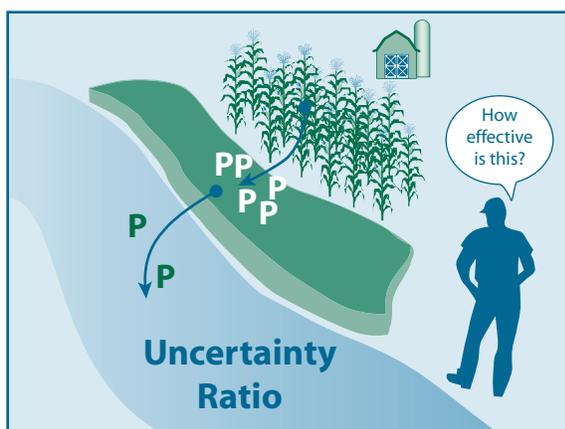


Figure 13. Uncertainty ratio.

Retirement ratios can be applied if a goal of the trading program is to accelerate achievement of water quality standards. These ratios *retire* a percentage of all credits generated, and these credits cannot be sold. Therefore, the overall loading to the waterbody is reduced with each trade that yields net water quality improvement. This form of ratio can be particularly useful in impaired waterbodies for which a TMDL has not yet been developed because the exact reductions required of individual sources to achieve water quality standards might not yet be known. For waterbodies where a TMDL has already been established, if each source meets its LA or WLA, either through adopting control technologies or through credit purchases, this should be sufficient to attain water quality standards. Where retirement ratios are used, they should always be greater than 1:1 because their purpose is to accelerate water quality improvements.

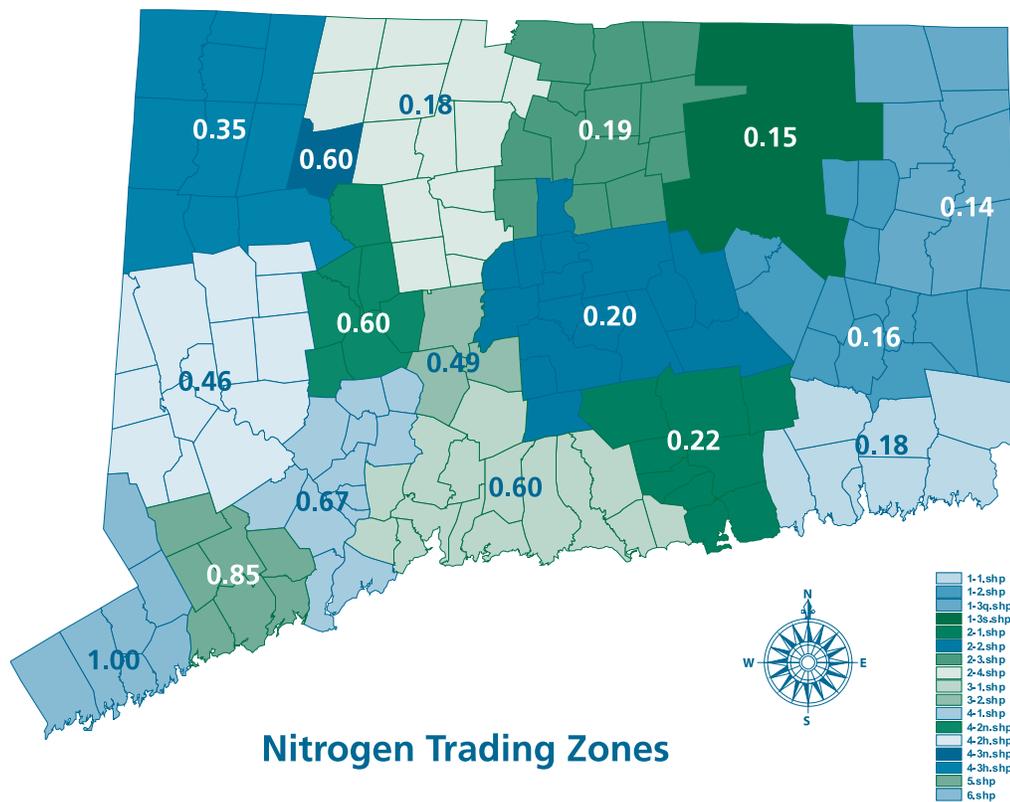
The trading ratio established for a particular trade might include one or more of these ratios depending on the scenario. Some of these ratios might be uniform for an entire trading program, while others might be specific to particular pairs of trading sources. EPA recommends that trading programs be as specific as possible about which underlying ratios are to be used and exactly how they are to be calculated when developing a trading ratio for a group of sources. The trading program design may also allow for adjustments to the trading ratios should uncertainties be greater or less than expected, means of control more or less effective, or if changes in watershed conditions occur. Being clear about how trading ratios are calculated will also foster transparency and public acceptance of the program.

Long Island Sound, Connecticut

The Connecticut Department of Environmental Protection (CTDEP) gained information on nitrogen attenuation factors in Long Island Sound and during riverine transport by using the LIS 3.0 Model and U.S. Geological Survey monitoring data for major tributaries. Attenuation factors were developed into location ratios, which are important for quantifying relationships between discharge points and actual delivery of nitrogen to Long Island Sound. These ratios combine to account for relative nitrogen impact on dissolved oxygen depletion in Long Island Sound from geographically distributed sources. They are used as trading ratios to put the 79 POTWs involved in trading on an equal basis, which is a critical component of the Nitrogen Credit Exchange. To calculate the overall trade ratios, CTDEP multiplied the river location ratios for a tier within a particular management zone by the Long Island Sound transport efficiency from Connecticut’s six management zones once the nitrogen reached the edge of the sound. Figure 14 illustrates the combined trading ratios for the management zones. CTDEP expresses the ratios as the decimal fraction of the nitrogen load delivered. CTDEP made the assumption that the tiers closest to the Long Island Sound have no nitrogen attenuation (i.e., they deliver 100 percent of the nitrogen load) and assigned the value of 1 as the ratio.

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Nitrogen Trading Zones

Figure 14. Long Island Sound, Connecticut, nitrogen planning zones.

Timing of Credit Generation and the Duration of Credits

The timing of credit generation and the duration of credits is tied to the credit reconciliation period. A credit reconciliation period is the period of time during which a seller generates water quality credits and a buyer may use those credits to offset a pollutant load that it discharges during that same period of time. Permitting authorities should be aware of how the trading program defines a reconciliation period through both the timing of credit generation and the duration of credits.

Timing of Credit Generation

The timing of trades is critical. A basic premise of water quality trading is that credits should not be used before the time frame in which they are generated. In general, a permitting authority should not allow for a pollutant reduction credit in a NPDES permit on the basis of the *proposed* treatment by another point source or an *unverified* commitment to install a BMP by a nonpoint source and their anticipated pollutant reduction.

Even after a practice is in place to achieve a reduction, the regulatory authority would need to decide at what point a credit is actually available to be used in a trade. For example, if point source requirements are based on a total annual load, the permitting authority might determine that credits from a point source that is *over controlling* its discharge would not be

available until the discharger has installed controls and has one year of monitoring data to demonstrate total annual loadings and reductions. This could be appropriate if there were uncertainty regarding the total amount of credits that would be generated, although this could also be addressed through an uncertainty ratio, which might be relaxed after the first year’s worth of monitoring data were available. Credits that are based on shorter time periods may also require a period of time to demonstrate reductions or provide an understanding of how loadings and reductions may vary over time. Also, credits generated by nonpoint sources through installation of BMPs may not be available immediately because of a time lag between installation of the BMP and its effectiveness in reducing loadings or otherwise improving water quality. In some cases, the credit generation could be prorated on the basis of the pollutant reduction the BMP is achieving during the current reconciliation period, even where the BMP has not reached its maximum expected pollutant reduction efficiency. This could be reflected in the trading ratio. The decisions as to when credits are available for use may have already been made in the program design. The permitting authority should be aware of these decisions.

Also, as noted previously, EPA’s *Water Quality Trading Assessment Handbook* indicates that trades should be consistent with the time periods that are used to determine compliance with effluent limitations. For example, a point source that has effluent limitations with monthly averaging periods should trade with sources that can generate credits on a monthly basis, and credits should be created in the same month they are expected to be used (e.g., a credit created in August 2006 should be used to compensate only for a discharge in August 2006). The permitting authority may have discretion to determine the appropriate averaging period for WQBELs, depending on the pollutants of concern and other watershed specific factors (see below).

Expiration of Credits

The permitting authority should decide whether and when a credit expires. Point sources generating credits should be able to continue to do so as long as they properly operate and maintain the appropriate controls and are able to demonstrate reductions below WQBELs. Credits generated by nonpoint sources, on the other hand, may decrease or expire if the BMP installed to generate the credit gradually becomes less effective over time and is not maintained or replaced.

Also, because of temperature differentials, there may be seasonal fluctuation in the amount of credits generated by either a point source or a nonpoint source and the amount of credits needed by a point source, particularly for pollutants such as nutrients. In many parts of the country, for point sources, nitrogen removal is much more effective in the summer than in the winter because of increased biological activity. Therefore, a point source might need more credits (or only need credits) to compensate for discharges in the wintertime. For nonpoint sources, the effectiveness of some land management BMPs fluctuates seasonally as well. Because it might be difficult to coordinate the timing of nutrient discharges, some permitting authorities have considered using annual mass-based discharge limits for nutrients, which facilitates trading these pollutants. Annual limits are appropriate only in certain circumstances (see discussion below, *Effluent Limits with Longer-Term (e.g., Annual) Compliance Periods*).

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Often, point sources interested in purchasing credits express a desire to enter into contracts that include long-term commitments from sources generating credits to ensure the future availability of credits needed to compensate for their pollutant loads. Where possible, trading programs should attempt to identify credit generators that are willing and able to reliably generate credits over an extended period of time (e.g., 5 to 10 years) to reduce the risk and uncertainty of trading for permitted point sources.

In all cases, permitting authorities should ensure that NPDES permits incorporating water quality trading provide for periodic evaluation of pollutant reduction credits to ensure that the credits are still available and consistent with established trading program rules.

Determining Maximum Feasible Nonpoint Source Load Reductions

It is not feasible for a nonpoint source to control 100 percent of its pollutant runoff to a waterbody. Therefore, it is important that some analysis be done to estimate the maximum amount of pollutant runoff that can be controlled from the nonpoint sources in a watershed. The difference between this estimate and the nonpoint source's baseline equals the maximum nonpoint source load reductions available for trading.¹² This is a way to ensure that credits being purchased result in actual reductions. This increases the surety that the trading program can meet its goal of achieving water quality standards.

The trading program might want to include a mechanism for ensuring that this maximum tradable nonpoint source load reductions is not exceeded. This could be done, for example, by specifying the maximum tradable nonpoint source load reductions in the program documentation and then tracking credit sales, and therefore load reductions, by nonpoint sources to ensure that this maximum is not exceeded.

A more in-depth discussion of determining the maximum feasible nonpoint source load reductions is provided in the [nonpoint source scenario](#) sections of the Toolkit.

What Types of Effluent Limitations Could Be Met Through Trading?

In general, WQBELs for nutrients, sediments and other parameters that do not have localized toxic effects are amenable to control via a trading system. WQBELs are most commonly expressed as maximum daily limits and average monthly limits (AMLs). EPA's *Water Quality Trading Assessment Handbook* notes that trades should be consistent with the time periods that are used to determine compliance with effluent limitations. Trading to meet monthly average limits is more manageable for phosphorous and sediments than for nitrogen. Facilities trading phosphorous or sediments would potentially conduct only 12 trades during the

¹² The maximum tradable nonpoint source load reduction is not equal to the maximum number of credits available for trading in a watershed because of the impact of trading ratios. Because trading ratios can vary depending on many factors (as described in the *Developing Trade Ratios* section), determining the maximum number of credits is not as useful as determining the maximum tradable nonpoint source load reduction for the purpose of ensuring that every trade results in a reduction of total load to the waterbody.

course of the year. At the end of each month, each buyer and each seller would account for credits bought and sold through credit tracking and certification. For facilities trading nitrogen, the permitting authority might want to consider setting annual limits due to the seasonal fluctuation in treatment effectiveness.

Effluent Limits With Longer-Term (e.g., Annual) Compliance Periods

The NPDES regulations at 40 CFR 122.45(d) require that all effluent limits be expressed, *unless impracticable*, as both AMLs and maximum daily limits (MDLs) for all dischargers other than POTWs, and as average weekly limits (AWLs) and AMLs for POTWs. EPA has identified some circumstances where limits expressed with these averaging periods are impracticable.

For nutrients, the concern generally is whether it is appropriate to establish effluent limitations with longer, rather than shorter, averaging periods. This issue is particularly important when considering trading, because nutrients are a frequent subject of trading programs. Permitting authorities have some discretion on the use of nutrient effluent limitations with longer averaging periods. EPA indicated its support for using annual limits, rather than MDLs, AWLs, and AMLs, to meet criteria for nutrients in the Chesapeake Bay and its tidal tributaries in a memorandum from James Hanlon, Director of the EPA Office of Wastewater Management to EPA Region 3 and the Chesapeake Bay Program Office, dated March 3, 2004 (*Annual Permit Limits for Nitrogen and Phosphorus for Permits Designed to Protect Chesapeake Bay and its tidal tributaries from Excess Nutrient Loading under the National Pollutant Discharge Elimination System*). In this memorandum, EPA affirmed that it is impracticable to express permit effluent limits for nitrogen and phosphorus discharges in the Bay watershed on the basis of nutrient criteria for the Chesapeake Bay and its tidal tributaries in terms of monthly average, weekly average, or maximum daily limitations because of a number of factors, such as (1) the long residence time for nutrient loadings to the Chesapeake Bay and its tidal tributaries, (2) the focus on the far-field effects of such nutrients (rather than in the immediate vicinity of the discharge), and (3) the need to reduce average pollutant loads globally rather than maximum loads from any one source.¹³

The circumstances in the Chesapeake Bay that make annual limits appropriate are not necessarily unique. For other areas of the country, the memorandum states that “The establishment of an annual limit with a similar finding of ‘impracticability’ pursuant to 40 CFR 122.45(d) may be appropriate for the implementation of nutrient criteria in other watersheds when: attainment of the criteria is dependent on long-term average loadings rather than short-term maximum loadings; the circumstances match those [in the Chesapeake Bay and its tidal tributaries]; annual limits are technically supportable with robust data and modeling... and appropriate safeguards to protect applicable water quality standards are employed.” Annual effluent limitations should be used only in these limited circumstances. Other than

¹³ The applicable water quality criteria for the Chesapeake Bay are expressed as an annual average, so the underlying analysis of the memo is also applicable to implementation of other nutrient criteria where attainment of the criteria is dependent on long-term average loadings rather than short-term maximum loadings. Examples of such criteria include EPA’s recommended CWA section 304(a) ecoregional nutrient criteria, which are expressed as an annual average.

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nutrients, most pollutants would not have annual limits. In addition, when considering annual limits or other longer-term limits, the permitting authority should be certain that its state regulations do not prohibit setting such limits.

Even for nutrients, the behavior of the pollutant and the type of criteria will affect whether longer-term limits are appropriate or necessary. For example, in free-flowing streams where there are no impoundments, annual limits for phosphorus might not be needed. Phosphorus removal is not temperature dependent and AMLs may be most appropriate to protect water quality. Furthermore, in cases where nutrient water quality criteria and WLAs to protect those criteria are expressed on a shorter-term basis (generally to protect against local nutrient impacts in rivers or streams), effluent limitations derived from those criteria or allocations also should be expressed on a shorter-term basis, such as AMLs.¹⁴

What Are the Roles of Stakeholders?

Permitting authorities should consider the roles of permittees, other trading partners, and key stakeholders when incorporating water quality trading in NPDES permits.

Permittees

The permittee can be either a buyer or a seller of pollutant credits. The permittee's primary responsibility is compliance with the provisions of the NPDES permit. Beyond basic compliance, however, permitting authorities should consider the additional roles of the permittee(s). For example, the permittee is likely to play a primary role in developing the specific trade agreement to be included or referenced in the NPDES permit. The permittee may be a good resource for information useful to developing trade agreement provisions and appropriate permit conditions. The permitting authority should consider the permittee's responsibilities under any trading provisions and should establish conditional requirements in the permit that apply if the permittee does not meet these trading responsibilities.

In some circumstances, the permittee may be the manager of a trading program (i.e., pre-treatment trading), or the sole trading participant (i.e., intraplant trading).

Unregulated Trading Partners

Often a permit will not place requirements on all of the partners involved in a trade, such as nonpoint sources or pollutant credit brokers. In those circumstances, the permitting authority should consider how default by the unregulated partners could affect the permittee(s)' compliance with the effluent limitations and conditions in the permit. To the extent possible, the permitting authority should incorporate appropriate, enforceable actions into the NPDES permit to address nonperformance by an unpermitted trading partner. For example, the trade agreement could provide that unregulated credit generators notify regulated credit

¹⁴ EPA Memorandum dated November 15, 2006, *Establishing TMDL 'Daily' Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of The Earth, Inc. v. EPA, et al., No 05-5015, (April 25, 2006) and Implications for NPDES Permits* states, "EPA does not believe that the *Friends of the Earth* decision requires any changes to EPA's existing policy and guidance describing how a TMDL's wasteload allocations are implemented in NPDES permits."

purchasers of any anticipated circumstance when the credits would not be available. In this instance, the permit could require the regulated credit purchaser to provide notice to the permitting authority, seek other credit sources, and implement alternate controls to reduce pollutant loads in the permitted discharge.

Federal and State Agencies

Permitting authorities should not overlook the role of federal agencies such as the Natural Resources Conservation Service; Forest Service; Agricultural Research Service; and the Cooperative State, Research, Education, and Extension Service, as well as similar state agencies, when developing permits incorporating trades with forestry and agriculture nonpoint sources. While NPDES permits cannot require nonpoint sources to implement pollutant reduction BMPs or management practices, research conducted by these agencies can help develop and evaluate trading ratios and monitoring requirements. These agencies may also have independent statutory and regulatory authorities that could be used to facilitate adoption or implementation of trading provisions. The role of state agencies that serve as the NPDES permitting authority is discussed in the Overview of the Toolkit.

Local Governments

Local governments can also play a major role in the administration of trading programs. In addition to being a stakeholder that may provide comments on TMDLs or permits or being a point source discharger within a watershed, local governments can manage and facilitate trading.

Red Cedar River, Wisconsin

The Barron County Land Conservation Department served as a third-party facilitator for the Red Cedar River Nutrient Trading Pilot Program, negotiating with farmers and establishing contracts between participating nonpoint sources and the city of Cumberland.

Citizens

Permitting authorities should take advantage of the potential contributions of interested citizens to water quality trading efforts under the NPDES program. Permitting authorities should develop permits and fact sheets that clearly describe the calculations and assumptions used to determine baselines and trade ratios. Particularly where nonpoint sources are involved in the trade, the permit should clearly articulate the uncertainties associated with BMPs, their implementation, maintenance and operation, and how these uncertainties will be addressed, to allow interested citizens the opportunity to provide information relative to the trade that otherwise might not be accessible to the permitting authority (e.g., citizen monitoring). Additionally, the permitting authority should require reporting of sufficient information to evaluate compliance with trade agreements and permit conditions and should make that information easily accessible to the public. Finally, EPA's Trading Policy encourages states and tribes to make electronically available to the public information on the trading partners, the

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quantity of credits generated and used, market prices where available, and delineations of watershed or trading boundaries. Permitting authorities can consider including reporting requirements associated with this information to allow interested citizens the opportunity to identify potential trades and to help establish public credibility for NPDES permits that include water quality trades. Interested citizens also have opportunities to participate in the development of a trading program. The public can comment on any applicable TMDL as well as the proposed permit before the permit takes effect. If the state establishes a statewide trading program, the state should issue a draft for public comment before finalizing the program.

How to Know if the Trading Program is Working

In this document, so far, we have covered five of the seven common elements of credible trading programs outlined in the Trading Policy. We have discussed (1) legal authority, (2) units of trade, (3) creation and duration of credits, (4) quantifying credits and addressing uncertainty, and (5) public participation and access to information. Compliance and enforcement mechanisms are covered in each of the scenarios under monitoring and reporting requirements and not covered here. This section focuses on the seventh element—program evaluation.

“However beautiful the strategy, you should occasionally look at the results.”

—Winston Churchill, 1874-1965

EPA’s Trading Policy suggests that trading programs conduct periodic assessments of environmental and economic effectiveness and make revisions as needed. “Environmental evaluations should include ambient monitoring to ensure impairments of designated uses (including existing uses) do not occur and to document water quality conditions. Studies should be performed to quantify nonpoint source load reductions, validate nonpoint source pollutant removal efficiencies and determine whether the anticipated water quality objectives have been achieved.”

To ensure that the trading program is meeting its goals, it is important that program evaluations be included in both the design and implementation of the trading program. This allows for adaptive management. Data and information collected can be used to assess whether the water quality goals of the program are being met and can be used to make program modifications where necessary. The results of these program evaluations and any changes that result should be made available for public comment.

Developing NPDES Permits for Specific Trading Scenarios

Once a NPDES permit writer has a clear understanding of the fundamentals of water quality trading in general and how the specific characteristics of the trading program involving regulated point sources will affect development of the NPDES permit, he or she should then begin to develop a NPDES permit that incorporates trading. To do this, the permit writer should determine the appropriate type of permit for the trading scenario and decide how the trading scenario can be incorporated into a NPDES permit.

What Type of Permit Best Suits the Trading Scenario?

The rest of this toolkit is arranged by type of trading scenario. There are some trading scenarios that are more conducive to watershed or general permits and some scenarios where individual permits are the best mechanism. For more on permitting, see EPA's series of guides on watershed-based permitting including the *Watershed-based National Pollutant Discharge Elimination System (NPDES) Permitting Implementation Guidance* (USEPA 2003b). Before a permitting authority can begin including water quality trading requirements in a NPDES permit, it should first determine the type of permit that is most appropriate for the parties involved in the trade or trades and the manner in which trading is conducted. There are two basic types of permits—a permit that covers a single point source and a permit that covers a group of point sources. A single point source permit is a permit specifically tailored to an individual facility and is commonly referred to as an individual NPDES permit. The permittee applies for a permit, and the permitting authority develops a permit for that particular facility on the basis of information contained in the permit application and other data submitted by the permittee or assembled from other sources. A permit also may be issued to a group of point sources. Some permitting authorities have issued permits that cover multiple sources but address only the particular pollutant or pollutants for which credits may be traded. This type of permit is issued in addition to the existing permits for the facilities involved and, hence, often is referred to as an *overlay* permit.

How Can the Trading Scenario Be Incorporated Into a NPDES Permit?

Trading may be incorporated into NPDES permits in a number of ways depending on the specifics of the trade. In some situations, the trade provisions may be reflected in the permit limits or other permit conditions imposed on the trading partners through the permit. Regardless of how water quality trades are included in NPDES permits, it is imperative that NPDES permitting authorities ensure the trades meet specific criteria such as enforceability, accountability, transparency, and consistency with water quality standards.

The permit should clarify what constitutes compliance with permit conditions, explain the measurement and timing of compliance, address compliance issues related to meeting permit limits using water quality trading, and address compliance schedules. Most state water

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quality standards or implementing regulations authorize using compliance schedules. If that authority is available, the permit writer may place a compliance schedule in the permit special conditions.

Where Can I Get More Information?

This concludes the key sections of the Toolkit that apply to all users. The remaining sections of the Toolkit focus on specific trading scenarios. To determine which trading scenario is appropriate to read next, use the Toolkit Navigation decision tree below (see Figure 15.) Note that EPA developed the Toolkit with the expectation that users would read only the sections applicable to their unique circumstances and interests; therefore, the trading scenario sections do repeat essential information to ensure that users get comprehensive information in the trading scenario that best applies.

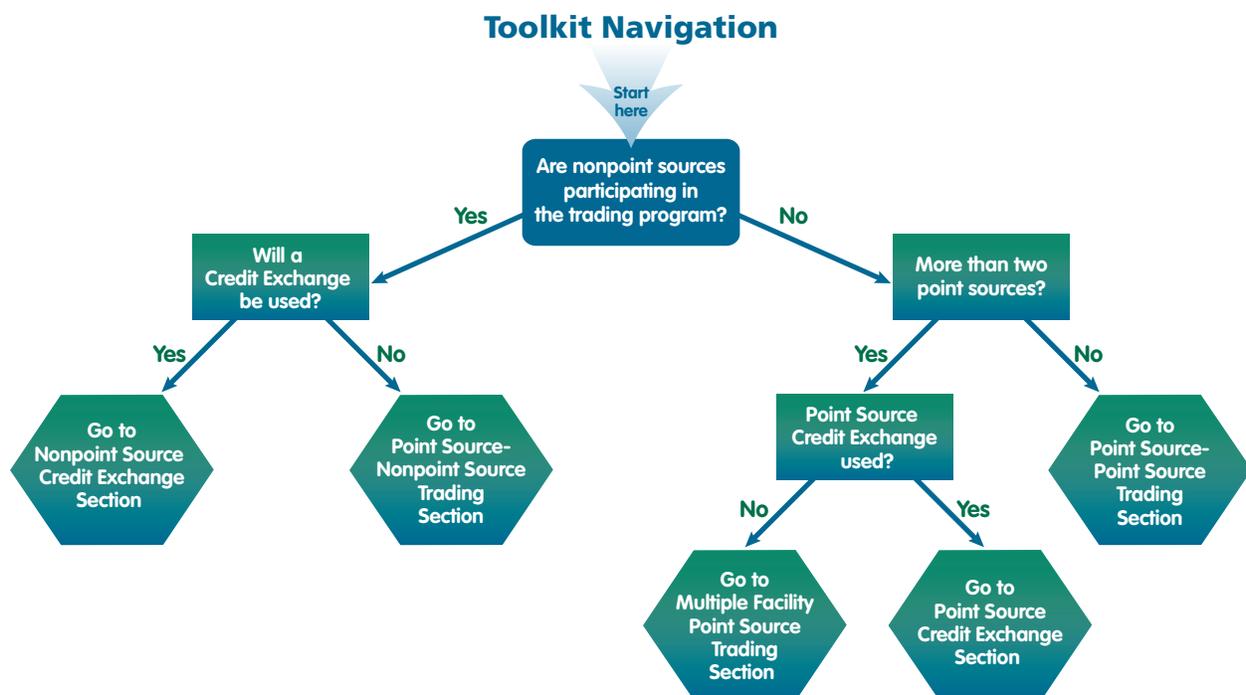


Figure 15. Toolkit navigation.

Water Quality Trading Scenario: Single Point Source–Single Point Source Trading

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Water Quality Trading Scenario: Single Point Source–Single Point Source Trading

This water quality trading scenario focuses on technical and programmatic issues related to single point source–single point source trading, illustrated in Figure 1. Issues addressed under this scenario include the following:

- Trade agreements
- Components of a National Pollutant Discharge Elimination System (NPDES) permit
 - Permit cover page
 - Effluent limitations
 - Monitoring
 - Reporting requirements
 - Special conditions

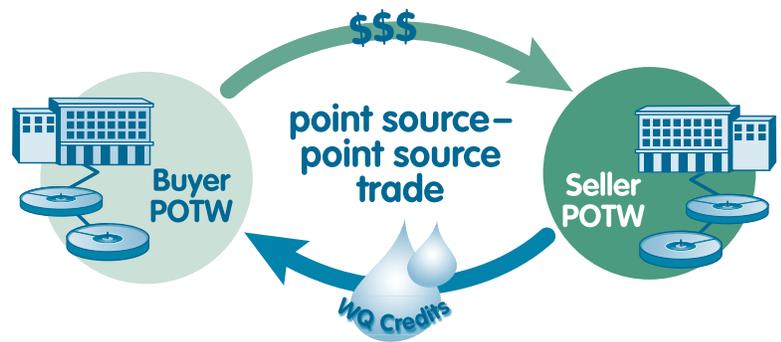


Figure 1. Point source–point source trade.

A hypothetical example (shown in highlighted boxes) is presented throughout this scenario to illustrate how NPDES permit writers might work with credit buyers and sellers to assist in trading and ensure each facility’s NPDES permit contains the appropriate limits, requirements, and other conditions. Keep in mind that there are a range of options for incorporating trading provisions into a NPDES permit. The hypothetical example discussed throughout this scenario illustrates just one of the many options a NPDES permit writer might use.

Trade Agreements

Typically, the terms that govern a trading program will be developed outside the NPDES permit process and can be incorporated or reflected in the permit (see [Appendix C](#)). The U.S. Environmental Protection Agency’s (EPA) *Water Quality Trading Policy* (Trading Policy) describes several mechanisms for implementing trading through NPDES permits (see [Appendix B](#)). NPDES permits authorizing water quality trading should reference any existing trade agreement in the permit or fact sheet. The permit writer may also incorporate specific provisions of the agreement as appropriate (e.g., shared responsibilities for conducting ambient monitoring) into the permit. All trade agreements referenced in NPDES fact sheets and permits should meet certain minimum standards to help ensure the trades authorized by the permit are consistent with water quality standards. At a minimum, the trade agreement should be a written agreement and signed and dated by authorized representatives of all trading partners. Verbal trade agreements should not be referenced in NPDES permits. The written trade agreement should contain sufficient detail to allow the permitting authority to determine with some degree of certainty that the terms of the agreement will result in loading reductions and generate sufficient credits to satisfy water quality requirements. If there is no formal, outside trade agreement, trading can still occur; however, the permit writer will need to more

Mystic River Example: Trade Agreements

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Newly approved TMDL^a for Total Phosphorus for the Mystic River

Credit Seller: *Meadeville Fertilizer Producers*

Current Load: 80 lbs/day (average monthly)

New WQBEL^b (based on WLA^c): 57 lbs/day (average monthly)

Existing TBEL: 35 mg/L (average monthly) at an average flow of 300,000 gpd^e = 82 lbs/day

Existing Treatment: None

Proposed New Treatment Capabilities: Treatment to 40 lbs/day (average monthly)

Credit Buyer: *Auburn Carpet Manufacturers*

Current Load: 40 lbs/day (average monthly)

New WQBEL (based on WLA): 29 lbs/day (average monthly)

Existing TBEL: 1 mg/L (average monthly) at an average flow of 5 mgd^f = 42 lbs/day

Existing Treatment Capabilities: Treatment to 40 lbs/day

Proposed New Treatment Capabilities: None

Notes: ^a TMDL = Total maximum daily load; ^b WQBEL = water quality-based effluent limitation; ^c WLA = wasteload allocation; ^d TBEL = technology-based effluent limitations; ^e gpd = gallons per day; ^f mgd = million gallons per day

Location: Meadeville Fertilizer Producers (credit seller) is approximately one mile upstream from Auburn Carpet Manufacturers (credit buyer) along the Mystic River.

Applicable Trade Ratios: None. In this case, it is not necessary to apply a delivery ratio because of the close proximity of the sources to each other, nor an equivalency ratio because the same pollutant form is being traded, nor an uncertainty ratio because both parties can accurately monitor end-of-pipe loads.

The minimum control level for Auburn Carpet Manufacturers is 40 lbs/day (existing discharge), because this level is more stringent than the TBEL (42 lbs/day) at the current level of discharge. Therefore, Auburn Carpet Manufacturers (buyer) needs to purchase credits equivalent to 11 lbs/day of total phosphorus (TP) to meet its WLA (baseline) under the TMDL. Auburn Carpet Manufacturers has arranged to purchase equivalent credits from Meadeville Fertilizer Producers. Meadeville Fertilizer Producers (seller) has a baseline of 57 lbs/day (WLA) and new treatment will treat to 40 lbs/day of TP loading. With this surplus of 17 lbs/day, Meadeville Fertilizer Producers can sell 11 TP credits to Auburn Carpet Manufacturers (with no applicable ratios) and will still have 6 lbs/day of surplus TP credits potentially available for sale to other permittees.

Mystic River Example: Trade Agreements *(continued)*

The NPDES permit writer worked with the facilities and other key stakeholders to craft the provisions of the trade agreement and provided the necessary information (e.g., baseline, minimum control levels) to facilitate the trade. As required, the permitting authority receives a written copy of the trade agreement that is signed and dated by authorized representatives of each facility. The permit writer reviews the written trade agreement to verify that the information is accurate and consistent with water quality standards. The permit writer develops permit requirements that are consistent with the provisions in the trade agreement, and incorporates those requirements in specific sections of the permit on effluent limitations (i.e., baseline, the minimum control level for the buyer and the trading limit for the seller), reporting and monitoring provisions.

The permit writer incorporates the Phosphorus Analysis Report provision of the trade agreement into the permit to require the facilities to submit trade information to the permitting authority. This will allow the permitting authority to determine whether the buyer and seller maintain compliance with WQBELs and applicable TBELs.

In addition to developing permit requirements coordinated with the provisions of the trade agreement, the permit writer will reference the written trade agreement in the fact sheets of each facility's NPDES permit and include copies of the signed trade agreement as an attachment. Each NPDES permit fact sheet will state that the facility's effluent limitation requirements are based on the WLA for the facility under the approved TMDL developed to achieve water quality standards; the permit authorizes the use of trading as a tool to comply with the required WQBELs, and the permit contains provisions that reflect the relevant terms of the written trade agreement signed by both parties.

The basic terms of the trade agreement are as follows:

- Trading partners more than one mile apart must apply a delivery ratio to all trades. Trading partners that discharge different forms of phosphorus must apply an equivalency ratio to all trades. (In the case of the trade between Meaderville Fertilizer Producers and Auburn Carpet Manufacturers, a delivery ratio is not necessary because they are only one mile from each other on the Mystic River. An equivalency ratio is not necessary because the facilities discharge the same form of phosphorus, and an uncertainty ratio is not necessary because each party is able to accurately monitor end-of-pipe loads.)
- A credit seller must first meet its baseline before generating credits eligible for trading. (Meaderville Fertilizer Producers will install control technologies that will treat to a phosphorus loading of 40 lbs/day and must meet its WLA (baseline) of 57 lbs/day, which will result in 17 lbs/day of surplus (monthly average) load reduction eligible for trading.)
- A credit seller is subject to trading limits. A trading limit is calculated by subtracting the quantity of credits sold from the baseline. (Meaderville Fertilizer Producers has a trading limit = 57 lbs/day – Quantity of Credits Sold.)
- A credit buyer can purchase credits to meet its facility's baseline. However, the credit buyer must first meet the facility's minimum control level before purchasing credits to meet the required baseline. (Auburn Carpet Manufacturers must meet its WLA (baseline) of 29 lbs/day. The facility's minimum control level equals the facility's current discharge of 40 lbs/day. This

Mystic River Example: Trade Agreements *(continued)*

current discharge meets the existing TBEL of 1 mg/L (average monthly) of TP at the current level of discharge (5 mgd), which is equivalent to 42 lbs/day at the current level of discharge. The facility must continue to meet the minimum control level of 40 lbs/day before purchasing credits to meet its baseline. When Meadville Fertilizer Producers' new control technologies are fully implemented, Auburn Carpet Manufacturers will purchase credits equivalent to 11 lbs/day of TP.)

- Credit buyers and sellers must conduct TP monitoring that complies with regulatory agency requirements. In addition, credit buyers and sellers must complete and exchange monthly Phosphorus Analysis Reports to track the amount of TP discharged and the total amount of TP load bought and sold between the facilities. (Each facility will continue to monitor TP as required under each facility's respective individual NPDES permit. Each facility will continue to complete and submit Discharge Monitoring Report (DMR) forms to the NPDES permitting authority, as required under each facility's respective NPDES permit. In addition, each facility will complete and exchange the monthly Phosphorus Analysis Reports.)
- Trades occur monthly, and credits may not be applied in any month other than the one in which the credits are generated.

In a separate contract, Meadville Fertilizer Producers and Auburn Carpet Manufacturers articulate the financial and liability conditions that the two facilities have agreed upon.

explicitly describe the trading program in the fact sheet and authorize specific aspects of the trading program as permit conditions. Trading partners can specify the details pertaining to the negotiated terms of the trade (e.g., credit price, payment schedule, consequences for failure to fulfill negotiated terms) in a separate, written and signed contract.

Components of a NPDES Permit

NPDES permits that authorize water quality trading are no different than typical NPDES permits in many respects—they require the same structure, analyses, and justification. All permits have five basic components: (1) cover page; (2) effluent limitations; (3) monitoring and reporting requirements; (4) special conditions; and (5) standard conditions. Standard conditions are the same for all NPDES permits and will not be addressed in this Toolkit. In addition, consistent with Title 40 of the *Code of Federal Regulations* (CFR) section 124.6, all permits are subject to public notice and comment. This process provides all interested parties an opportunity to comment on the trading provisions in the permit.

Each NPDES permit is accompanied by a permit fact sheet. The information in these fact sheets is not enforceable. The purpose of the fact sheet is to explain the requirements in the permit to the public. Thus, at a minimum, the fact sheet should explain any trading provisions in the permit. There is a wide variety of options for including trading information in the fact sheet that ranges from explaining the minimum control level (buyer) or trading limit (seller) to including the entire trading program.

There are a variety of issues, however, that may require special consideration when developing a permit incorporating water quality trading. Appendix E provides the permit writer with a list of fundamental questions that should be addressed during the permit development process.

Permit Cover Page

The cover page of a NPDES permit typically contains the name and location of the permittee, a statement authorizing the discharge, the specific locations for which a discharge is authorized (including the name of the receiving water), and the effective period of the permit (not to exceed 5 years). A permit incorporating or referencing provisions of a trade agreement can refer to water quality trading on the cover page, but this is not necessary. If the state has issued regulations or policy documents authorizing water quality trading, the permit writer should consider referencing the regulations in the Authority section of the cover page. For example, if trading is considered a water-quality management tool in a state’s Water Quality Management Plan, this establishes clear authority for integrating trading into NPDES permits and can be referenced on the cover page (Jones 2005).

Clean Water Services, Oregon

The Oregon Department of Environmental Quality addresses water quality trading on the cover page of the permit issued to Clean Water Services. For more information about this trading program, see Appendix A.

Effluent Limitations

Effluent limitations are the primary mechanism for controlling the discharge of pollutants from point sources into receiving waters. When developing a permit, the permitting authority focuses much of its effort on deriving appropriate effluent limitations. As in all NPDES permits, permits that include trading must include any applicable TBELs, or the equivalent and, where necessary, WQBELs, that are derived from and comply with all applicable technology and water quality standards. Furthermore, limits must be enforceable, and the process for deriving the limits should be scientifically valid and transparent.

EPA’s Trading Policy does not support trading to meet TBELs unless trading is specifically authorized in the categorical effluent limitation guidelines on which the TBELs are based. Applicable TBELs thus serve as the minimum control level below which the buyer’s treatment levels cannot fall. This section discusses the overarching principles of how to express all applicable effluent limitations in permits for dischargers participating in water quality trades.

Credit Buyers

Permits for credit buyers should include both the baseline, which is the WQBEL that defines the level of discharge the buyer would have to meet through treatment **when not** trading and a minimum control level that must be achieved through treatment **when** trading. The permit should also include the amount of pollutant load to be offset (minimum control level – baseline) through credit purchases when trading. Most often, the applicable TBEL will serve as the minimum control level. A permitting authority can choose to impose a more stringent minimum control level than the TBEL to prevent localized exceedances of water quality standards

Mystic River Example: Effluent Limitations

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Newly approved TMDL for Total Phosphorus for the Mystic River

Credit Seller: *Meadeville Fertilizer Producers*

Current Load: 80 lbs/day (average monthly)

New WQBEL (based on WLA): 57 lbs/day (average monthly)

Existing TBEL: 35 mg/L (average monthly) at an average flow of 300,000 gpd = 82 lbs/day

Existing Treatment: None

Proposed New Treatment Capabilities: Treatment to 40 lbs/day (average monthly)

Credit Buyer: *Auburn Carpet Manufacturers*

Current Load: 40 lbs/day (average monthly)

New WQBEL (based on WLA): 29 lbs/day (average monthly)

Existing TBEL: 1 mg/L (average monthly) at an average flow of 5 mgd = 42 lbs/day

Existing Treatment Capabilities: Treatment to 40 lbs/day

Proposed New Treatment Capabilities: None

Location: Meadeville Fertilizer Producers (credit seller) is approximately one mile upstream from Auburn Carpet Manufacturers (credit buyer) along the Mystic River.

Applicable Trade Ratios: None.

Auburn Carpet Manufacturers' existing permit includes a TBEL based on state treatment standards for TP, which the facility currently meets. Meadeville Fertilizer Producers is also subject to a TBEL based on existing federal effluent limitation guidelines. Existing effluent limitations for each facility are less stringent than the limitations needed to meet the new WLAs established in the Mystic River TMDL.

Meadeville Fertilizer Producers has recently been upgraded and has the potential to treat its discharge to a phosphorus loading of 40 lbs/day. The facility's baseline requirement for trading is 57 lbs/day (i.e., most stringent effluent limitation). Treating to the maximum capacity of the publicly owned treatment works (POTW) would result in an excess phosphorus reduction of 17 lbs/day (baseline – treatment capacity).

Auburn Carpet Manufacturers has no funds to upgrade to meet the facility's new WLA. The permitting authority is allowing the facility to trade to meet its new WQBEL (baseline based on WLA). The facility's current discharge of 40 lbs/day meets the existing TBEL of 42 lbs/day at the current level of discharge. To participate in trading, the facility must continue to treat to the current level of loading

Mystic River Example: Effluent Limitations *(continued)*

(minimum control level) before purchasing credits to meet its baseline. Auburn Carpet Manufacturers would then be allowed to purchase credits equivalent to the difference between the minimum control level and the baseline (40 lbs/day – 29 lbs/day = 11 lbs/day).

On the basis of the provisions of the trade agreement, the permitting authority has verified that no trade ratios are necessary: fate and transport is not a significant issue because of the proximity of the facilities; they are discharging the same form of phosphorus; and there is no uncertainty because of direct measurement of TP loads.

If Meadeville Fertilizer Producers chooses to sell 11 lbs/day of the credits generated by the over treatment of its discharge, a trading limit will apply as follows:

$$\text{Baseline} - \text{Credits Traded} = \text{Trading Limitation}$$

$$57 \text{ lbs/day} - 11 \text{ lbs/day} = 46 \text{ lbs/day}$$

Meadeville Fertilizer Producers will be required to demonstrate that its discharge has an actual loading of no more than 46 lbs/day during any period it is selling 11 lbs/day of credits to Auburn Carpet Manufacturers.

New permits are being developed to implement the new WLAs and authorize trading between the two facilities. The permits contain both interim and final effluent limitations. Interim effluent limitations are equal to current discharge, which is less than the existing TBEL for each facility. The new WQBELs and, therefore, trading provisions apply 2 years after the effective date of the permit. The permits will include effluent limitations equal to baselines, minimum control levels, and trading limits.

Permit Language:

Meadeville Fertilizer Producers

A. Meadeville Fertilizer Producers (permittee) is subject to interim and final effluent limitations for the discharge of total phosphorus from Outfall 001. As of **<insert permit effective date>**, the permittee must meet an interim mass-based effluent limitation for total phosphorus of 80 lbs/day as a monthly average at Outfall 001. Through treatment or other pollutant reductions at the facility, the permittee must meet a final mass-based effluent limitation for total phosphorus of 57 lbs/day as a monthly average at Outfall 001. Compliance with the final effluent limitations is required on **<insert date 24 months after permit effective date>**.

B. The permittee is authorized to generate and sell credits to an authorized credit Buyer or Buyers by further treating or otherwise reducing the discharge of phosphorus at Outfall 001. If the permittee sells such credits, the average monthly effluent limitation of 57 lbs/day no longer applies and the trading limit for total phosphorus at Outfall 001 shall apply instead as follows:

$$\text{Monthly Average Trading Limitation} = 57 \text{ lbs/day} - \text{Quantity of Credits Sold.}$$

C. Credits sold and purchased may be applied only to the calendar month(s) in which they were generated.

Mystic River Example: Effluent Limitations *(continued)*

Permit Language (continued):

Auburn Carpet Manufacturers

- A. Auburn Carpet Manufacturers (permittee) is subject to interim and final effluent limitations for the discharge of total phosphorus from Outfall 001. As of **<insert permit effective date>**, the permittee must meet an interim mass-based effluent limitation for total phosphorus of 40 lbs/day as a monthly average at Outfall 001. Through treatment or other pollutant reductions at the facility, the permittee must meet a final mass-based effluent limitation for total phosphorus of 29 lbs/day as a monthly average at Outfall 001. Compliance with the final effluent limitations is required on **<insert date 24 months after permit effective date>**.
- B. If the final effluent limitation is met through trading, the permittee must purchase credits from authorized Sellers in an amount sufficient to compensate for the discharge of total phosphorus from Outfall 001 that is in excess of 29 lbs/day as a monthly average, but at no time shall the maximum mass discharge of total phosphorus from Outfall 001 exceed 40 lbs/day. Thus, the maximum mass discharge to be offset through credit purchases is 11 lbs/day as a monthly average.
- C. Credits sold and purchased may be applied only to the calendar month(s) in which they were generated.

near the point of discharge but not one that is less stringent than the TBEL. In a NPDES permit fact sheet, the effluent limitations for a credit buyer could be described as follows:

- The Discharger must meet, through treatment or trading, a mass-based effluent limitation for Pollutant A of **<insert baseline>**. If this effluent limitation is met through trading, the Discharger must purchase credits from authorized Sellers in an amount sufficient to compensate for the discharge of Pollutant A from Outfall 001 in excess of **<insert baseline>**, but at no time shall the maximum mass discharge of Pollutant A during **<insert averaging period>** exceed the minimum control level of **<insert minimum control level>**. Thus, the maximum mass discharge of Pollutant A to be offset through credit purchases is **<insert minimum control level – baseline>**.

Credit Sellers

When a potential credit seller is able to reduce its discharge below its most stringent applicable effluent limitation (i.e., its baseline), it may generate credits to sell. The quantity of credits that any given seller actually will be able to sell depends on the market for credits, agreements made with buyers, and any treatment requirements placed on potential buyers (i.e., the buyers' minimum control levels). Because of these factors, it is possible that a discharger will not be able to sell all the credits it generates.

A credit seller's permit will include both the most stringent effluent limitation that would apply without trading (e.g., baseline) and a trading limit. The seller can choose to what level it will control its pollutant discharge (using technology or best management practices (BMPs)

it will implement), and this level becomes its trading limit. The baseline and trading limit could be described in the permit fact sheet as follows:

- Through treatment, the Discharger must meet a mass-based effluent limitation for Pollutant A of <insert baseline>. The Discharger is authorized to further treat its discharge, remove additional loading of Pollutant A, and generate and sell credits to an authorized credit Buyer or Buyers. If the Discharger sells such credits, the <insert averaging period, e.g., average monthly> effluent limitation <insert baseline> no longer applies and the trading limit for Pollutant A at Outfall 001 shall apply instead as follows: Trading Limitation = <insert baseline> – Quantity of Pounds Sold.

The permit must include monitoring and reporting requirements for Pollutant A sufficient to demonstrate that the Seller actually has generated the credits it sells and, therefore, is meeting its trading limit.

Pollutant Form, Units of Measure, and Timing Considerations

The permit should explicitly identify the **pollutant or pollutants being traded**. The permitting authority should ensure that the trading program or agreement and the calculated WQBELs are consistent in terms of the form of the pollutant, units of measure, and timing.

For example, if the pollutant specified in the WQBEL is nitrate-nitrogen, credits generated under the trade agreement should be for nitrate-nitrogen and not for total Kjeldahl nitrogen (TKN) or some other form. If, on the other hand, the WQBEL is for total nitrogen (TN), buyers and sellers should trade TN credits. In this case, a discharger may be required to measure TN. If there are concerns about localized impacts, and WQBELs are also specified for a particular form or forms of nitrogen, the discharger may be required to monitor TKN, nitrite, and nitrate (all expressed as N) and then calculate its TN discharge.

Also an **equivalency ratio** may be needed when two sources are trading pollutants such as TN or TP but are actually discharging different forms of nitrogen or phosphorus (e.g., one discharger’s phosphorus discharge is made up primarily of biologically available phosphorus, while its trading partner’s discharge is primarily composed of bound phosphorus). An equivalency ratio may also be needed in cross-pollutant trading of oxygen-demanding pollutants (e.g., phosphorus and biochemical oxygen demand (BOD)). In this case, the equivalency ratio would equal the ratio between the two pollutants’ impacts on oxygen demand. The trading program should account for any necessary equivalency ratios with regard to pollutant form or type; the permit writer needs to be aware of the pollutant form or type addressed in the trade agreement to ensure that the permit is consistent.

In addition, consistent **reconciliation periods** are essential in trading between point sources. The credit purchaser’s permit limits for the traded pollutant and the credit seller’s permit limits should have the same units and averaging period. Because both sets of limits are designed to address the same water quality problem, both should use the averaging period and units that make the most sense to address that problem. Consistent units and averaging periods will also simplify reconciliation of credit sales and purchases.

Mystic River Example: Pollutant Form, Units of Measure, and Timing

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Newly approved TMDL for Total Phosphorus for the Mystic River

Credit Seller: *Meadeville Fertilizer Producers*

Credit Buyer: *Auburn Carpet Manufacturers*

Pollutant Form

Both trading partners discharge phosphorus year round. The TMDL indicates a need to control TP discharges. Each facility discharges the same form of phosphorus at the same percentage of solubility; therefore, no provisions are necessary in the permit to address the issue of pollutant form.

Units of Measure

The TP WQBELs based on the TMDL WLA are expressed in lbs/day as a monthly average to correspond with the units and averaging period in the TMDL. The TP limits in Meadeville Fertilizer Producers' existing permit are also expressed in lbs/day as a monthly average. Monthly trades will be based on average monthly reductions demonstrated through monitoring.

Timing of Credits

Consistent with the state water quality standards, the permits include a 2-year compliance schedule for the new WQBELs derived from the TMDL requirements. These compliance schedules are included in the Special Conditions section of the permits for Meadeville Fertilizer Producers and Auburn Carpet Manufacturers. According to these compliance schedules, Auburn Carpet Manufacturers would not have a need to purchase credits until 24 months after permit issuance. This allows 12 months for Meadeville Fertilizer Producers to get its control technology fully operational and 12 months for the facility to gather monitoring data to verify that the technology is achieving the expected treatment efficiency and will generate credits as expected. These data are necessary to better understand how loading and reduction may vary over time and to develop monthly credit generation data to correspond with monthly average effluent limitations. Trades will occur monthly to correspond with monthly average effluent limitations. Meadeville Fertilizer Producers will be able to continue to generate credits as long as the controls are properly operated and maintained, the facility is able to demonstrate reductions, and the facility does not become subject to more stringent requirements (i.e., newly promulgated effluent guidelines or other more stringent technology-based controls, additional WQBELs to avoid localized exceedances of water quality standards) that would reduce or eliminate the credits. The ability of Meadeville Fertilizer Producers to continue to generate credits will be assessed during the renewal of the permit every 5 years.

Anti-backsliding, Antidegradation, and New Discharges Special Considerations

The Trading Policy discusses anti-backsliding and antidegradation and how these provisions can be met through trading.

Anti-backsliding

The term *anti-backsliding* refers to a statutory provision (Clean Water Act (CWA) section 402(o)) that, in general, prohibits the renewal, reissuance, or modification of an existing NPDES permit that contains WQBELs, permit conditions, or standards that are less stringent than those established in the previous permit (USEPA 1996b). The CWA establishes exceptions to this general anti-backsliding prohibition. EPA has consistently interpreted section 402(o)(1) to allow for less stringent effluent limitations if either an exception under section 402(o)(2) or, for WQBELs, the requirements of section 303(d)(4) are met (USEPA 1996b). Section 402(o)(2) and 40 CFR 122.44(l) provide exceptions for circumstances such as material and substantial alterations to the facility, new information, events beyond the permittee’s control, and permit modifications under other sections of the CWA. Section 303(d)(4), which applies only to WQBELs, allows a less-stringent WQBEL in a reissued permit when the facility is discharging to a waterbody attaining water quality standards as long as the waterbody continues to attain water quality standards even after the WQBEL is relaxed. In addition, revising the limitation must be consistent with the state’s antidegradation policy. If the discharge is to a waterbody that is not attaining water quality standards, a less stringent WQBEL is allowed only when the cumulative effect of all revised effluent limitations results in progress toward attainment of water quality standards. (For a detailed discussion of the anti-backsliding exceptions, see EPA’s *NPDES Permit Writers’ Manual* (EPA-833-B-96-003)). EPA’s Trading Policy states:

EPA believes that the anti-backsliding provisions of Section 303(d)(4) of the CWA will generally be satisfied where a point source increases its discharge through the use of credits in accordance with alternate or variable water quality based effluent limitations contained in an NPDES permit, in a manner consistent with provisions for trading under a TMDL, or consistent with the provisions for pre-TMDL trading included in a watershed plan.

A permit writer should simply explain in the fact sheet of the permit how the limitations in the permit, after accounting for any trading provisions, are at least as stringent as the limits in the previous permit or, alternatively, how anti-backsliding provisions of the CWA are satisfied.

Antidegradation

As repeated throughout this document, NPDES permits may not facilitate trades that would result in nonattainment of an applicable water quality standard, including the applicable antidegradation provisions of water quality standards. Permitting authorities should ensure that WQBELs developed to facilitate trade agreements accord with antidegradation provisions and that antidegradation reviews are performed when required. Nothing in the Trading Policy per se changes how states apply their antidegradation policies, though states may modify their antidegradation policies to recognize trading.

The Trading Policy states:

EPA does not believe that trades and trading programs will result in “lower water quality”...or that antidegradation review would be required under EPA’s regulations when the trades or trading programs achieve a no net increase of the pollutant traded and do not result in any impairment of designated uses.

Special considerations for antidegradation relative to water quality trading depend on the tier of protection applied to the waterbody as described below.

Tier 1 is the minimum level of protection under antidegradation policies. For Tier 1 waters, the antidegradation policy mandates protection of existing instream uses. Because EPA neither supports trading activities nor allows issuance of permits that violate applicable water quality standards, which should protect existing uses at a minimum, any supported trading activities incorporated into a NPDES permit should not violate antidegradation policies applicable to Tier 1 waters.

Tier 2 protects waters where the existing water quality is higher than required to support aquatic life and recreational uses. Water quality in Tier 2 waters may be lowered (only to the level that would continue to support existing and designated uses), but only if an antidegradation review finds that (1) it is necessary to lower water quality to accommodate important social or economic development, (2) all intergovernmental and public participation provisions have been satisfied, and (3) the highest statutory and regulatory requirements for point sources and BMPs for nonpoint sources have been achieved. The Trading Policy supports trading to maintain high water quality when trading is used to compensate for new or increased discharges. Thus, the Trading Policy supports reductions of existing pollutant loadings to compensate for the new or increased load so that the result is *no lowering of water quality*. A state, in applying its antidegradation policy, may decide to authorize a new or increased discharge to high-quality water and may decide to use trading to completely or partially compensate for that increased load. If the increased load to Tier 2 waters is only partially compensated for by trading, an antidegradation review would be required to address the increased load.

Tier 3 protects the quality of outstanding national resource waters and waters of exceptional recreational or ecological significance. In general, antidegradation policies do not allow any increase in loading to Tier 3 waters that would result in lower water quality. EPA supports trading in Tier 3 waters to maintain water quality.

Monitoring

Permitting authorities may want to consider developing monitoring and reporting requirements to characterize waste streams and receiving waters, evaluate wastewater treatment efficiency, and determine compliance with permit conditions in the trade agreement. Monitoring and reporting conditions of a NPDES permit may contain specific requirements for sampling location, sample collection method, monitoring frequencies, analytical methods, recordkeeping, and reporting. If the permit conditions include compliance with provisions in a trade agreement, the permitting authority should include monitoring, recordkeeping and reporting requirements that facilitate compliance evaluations and, where necessary, enforcement actions related to the trading requirements. Discharge monitoring requirements should be consistent with the provisions of the trade agreement in terms of pollutants and forms of pollutants monitored, reporting units, and timing. The permit provisions should ensure that the results of discharge monitoring will be useful to the permittees, the permitting authority, and the general public in determining whether the provisions of the trade agreement are being met.

Sample Collection and Analysis

If appropriate, the sampling locations should be consistent with the sampling location in each facility's existing individual NPDES permit. For example, the same location used to sample for compliance with effluent limitations in the existing permit should be used for determining compliance with new effluent limitations developed for traded parameters. Samples collected as part of a self-monitoring program required by a NPDES permit must be performed in accordance with EPA-approved analytical methods specified in 40 CFR Part 136 (Guidelines for Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act) where Part 136 contains methods for the pollutant of concern. Where no Part 136 methods are available, the permit writer should specify which method should be used for compliance monitoring.

Ambient Monitoring

Ambient monitoring is one way to show whether a trade agreement meets or improves water quality. In addition to traditional discharge monitoring requirements, ambient water quality monitoring may be appropriate at strategic locations to ensure that the trade is not creating localized exceedances of water quality standards and to document the performance of the overall trading program. Permits with mixing zones may include monitoring requirements as appropriate to ensure that water quality criteria are not exceeded at the edge of the applicable mixing zone.

Mystic River Example: Monitoring

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Approved TMDL for Total Phosphorus on the Mystic River

Credit Seller: *Meadville Fertilizer Producers*

Credit Buyer: *Auburn Carpet Manufacturers*

Each facility is covered under an existing permit that includes a TBEL; therefore, each facility is currently required to monitor its effluent monthly for TP to determine compliance. New permits have been developed for both facilities that incorporate new effluent limits based on the approved TMDL, as well as the necessary provisions and effluent limits to authorize trading.

In the new permits, each discharger will be required to monitor for TP weekly. Ambient receiving water monitoring requirements are included in the existing NPDES permits and are adequate to ensure that localized exceedances of water quality standards do not develop as a result of trades.

Permit Language:

Both facilities

The permittee shall monitor effluent total phosphorus a minimum of one time per week. The permittee shall determine the average monthly mass loading based on actual monthly average flow. Flow monitoring shall be continuous.

Reporting Requirements

Reporting requirements should be established to support the permitting authority’s evaluation of water quality trading programs. For example, in addition to reporting discharge monitoring results, permitting authorities might require a permittee to report the number of credits purchased. Permitting authorities might also require an annual monitoring report specific to the pollutants involved in the trade to provide information on annual loading in accordance with the requirements of the trading program. Permits incorporating water quality trades should require reporting at a frequency appropriate to determine compliance with the trading provisions. Permitting authorities should consider any requirements of the trading programs related to monitoring and reporting and ensure the permits are consistent with these requirements. Permits may require reporting of monitoring results at a frequency established through the permit on a case-by-case basis, but in no case may that frequency be less than once per year.

Trading programs may establish other reporting and tracking requirements as well. For example, it is essential to have a mechanism for tracking trades. An additional form may be used such as a credit certificate form (see [Appendix C](#)). The permitting authority can hold point sources liable if they violate any trading provision included in the permit or any trade agreement incorporated by reference into the permit, and point sources are also liable if they do not meet their permit limits.

Data Reporting to EPA

EPA administers two systems to store NPDES permit data and track compliance, the Permit Compliance System (PCS) and the new Integrated Compliance Information System (ICIS). PCS is the old computerized management information system that contains data on NPDES permit-holding facilities to track the permit, compliance, and enforcement status of these facilities.

The new system, ICIS, was deployed in June 2006 to approximately 20 states. ICIS contains integrated enforcement and compliance information across most of EPA’s programs including all federal administrative and judicial enforcement actions. In addition, ICIS has the capability to track other activities occurring in an EPA Region that support enforcement and compliance programs. These include Incident Tracking, Compliance Assistance, and Compliance Monitoring. In the future, ICIS will be deployed to all states, and PCS will no longer be used.

Neither PCS nor ICIS is structured to actually track trades.

PCS is designed to compare actual discharge monitoring data against required effluent limitations to determine a facility’s compliance with its NPDES permit. To determine compliance under a trading scenario, it is necessary for the NPDES permitting authority to compare actual discharge monitoring data and the quantity of credits purchased or pounds sold against required effluent limitations. For credit sellers, compliance is tracked against the WQBEL, which serves as the facility’s baseline. For credit buyers, compliance is actually tracked against two effluent limitations—the minimum control level and the baseline. The challenge in using PCS to determine compliance under a trading scenario is that the system does not automatically make adjustments to the reported actual discharge—it will not add or subtract the load

traded. Therefore, this type of adjustment must be done before entering information into PCS so that the system has only one reported number to compare against an effluent limitation.

To determine compliance for a credit seller, the NPDES permitting authority will need to know that the sum of a credit seller’s actual discharge and the number of pounds sold is less than or equal to the most stringent effluent limitation (i.e., the baseline). Therefore, point source credit sellers could report the sum of the facility’s actual discharge and the number of pounds sold and that amount would be entered into PCS. PCS would then compare the sum of the actual discharge and the number of pounds sold against the facility’s baseline; the sum should be less than or equal to the facility’s baseline to indicate that the facility is in compliance.

Point source credit buyers not only have a baseline, but also a minimum control level (the facility’s TBEL or current discharge, whichever is more stringent). To determine compliance for a credit buyer, the NPDES permitting authority will need to know that (1) the facility’s actual discharge is less than or equal to its minimum control level, and (2) that the number of credits purchased result in the facility achieving its baseline. Therefore, point source credit buyers could report two types of information: (1) the facility’s actual discharge, and (2) the difference between the actual discharge and the quantity of credits purchased. Both numbers would be entered into PCS to determine compliance. PCS would compare the actual discharge against the minimum control level to determine permit compliance and eligibility as a credit buyer. PCS would also compare the difference between the actual discharge and the quantity of credits purchased against the facility’s baseline; the difference should be less than or equal to the WQBEL to indicate that the facility has purchased enough credits to meet its baseline and remain in compliance with its WQBEL. PCS can accommodate two different effluent limits for the same parameter; therefore, it has the capability to determine compliance with both the minimum control level and the baseline for a credit buyer.

ICIS also allows the NPDES permitting authority to report two limits; therefore, this system can also accommodate both the baseline and the minimum control level for credit buyers. New DMR forms will also have two lines to report both the baseline and the minimum control level. Like PCS, ICIS does not actually adjust actual discharges with the load traded. Under the current design, ICIS will allow a facility with an existing NPDES permit to also have a trading partner entered into the system. Once a trading partner is entered for a facility, ICIS will allow the entry of an adjusted value—this is the reported actual discharge adjusted by the number of credits bought or sold. If an adjusted value is entered, this value is used to determine permit violations and percent exceedances (USEPA 2006).

In addition to challenges related to limits and the type of information to report, NPDES permits with trading provisions might also raise issues related to reporting periods and automated compliance tracking. PCS will not support a reporting extension beyond 30 days. This type of reporting extension might be necessary in some instances to allow adequate time for the administrative activities necessary for trading partners to coordinate and reconcile trades. ICIS, however, will support a 45-day reporting period. In rare instances when a permitting authority uses annual limits, both PCS and ICIS will allow for one limit to be monthly and one to be annual. However, the permitting authority will have to manually flag annual limit effluent violations for reportable noncompliance (RNC) and significant noncompliance (SNC) to track compliance.

Mystic River Example: Reporting

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Approved TMDL for Total Phosphorus on the Mystic River

Credit Seller: *Meadeville Fertilizer Producers*

Credit Buyer: *Auburn Carpet Manufacturers*

Trades must be completed by a credit transfer deadline specified in the permit, and credits must be used in the same month they are generated; however, the permit allows the facilities 30 days to report the trades to account for administrative time and processing of notification forms. For the permitting authority to gauge compliance, the permit writer develops permit language that requires each discharger to submit monthly DMRs to the permitting authority by the 15th of the month following monitoring. In conjunction with DMR reporting, the permit writer requires each facility to complete monthly Phosphorus Analysis Reports to track the amount of TP discharged and the total amount of TP load bought and sold between the facilities. Each discharger must submit the monthly Phosphorus Analysis Reports to the permitting authority and to the other facility.

Permit Language:

Meadeville Fertilizer Producers

The Permittee must submit monthly discharge monitoring reports (DMRs) by the 15th day of the month following monitoring to the [Permitting Authority] for determining compliance with the effluent limitations provided in Section X of this permit. If the Permittee sells credits, as authorized under Section X of this permit, the Permittee must also complete and submit a monthly Phosphorus Analysis Report to both the permitting authority and all authorized credit buyers. The Phosphorus Analysis Report must contain the information provided on the monthly DMR and the amount of credits sold to all authorized credit buyers.

Auburn Carpet Manufacturers

The Permittee must submit monthly discharge monitoring reports (DMRs) by the 15th day of the month following monitoring to the [Permitting Authority] for determining compliance with the effluent limitation provided in Section X of this permit. If this effluent limitation is met through trading, the Permittee must complete and submit a monthly Phosphorus Analysis Report to both the permitting authority and all authorized credit sellers. The Phosphorus Analysis Report must contain the information provided on the monthly DMR and the amount of credits purchased from all authorized credit sellers to compensate for the discharge of total phosphorus from Outfall 001.

Special Conditions

Special conditions are developed to supplement effluent limitations and may include requirements such as BMPs, additional monitoring activities, ambient stream surveys, and toxicity reduction evaluations (TREs). Special conditions also include permit modification and reopen conditions, and can be used to address water quality trading or incorporate compliance schedules (if authorized by the permitting authority). Special conditions of a NPDES permit will be very important in incorporating the terms of a trade agreement. Even where the specific terms of the agreement are not directly incorporated into the permit, the special conditions can be used to refer to, and require compliance with, the trade agreement housed in a separate document.

The special conditions included in a NPDES permit that incorporates trading will depend on provisions of the trade agreement and the effluent limitations and monitoring and reporting requirements established in the permit. However, the permitting authority should consider incorporating special conditions that support the trading conditions.

Special conditions may also be used to establish provisional requirements that apply if the credits on which the trading limits are based are unavailable. Special conditions addressing group and individual liability, provisional requirements that apply when credits are unavailable or when an individual or collective limit is exceeded, and outlining the specific requirements for establishing trade agreements among permittees can be important in issuing acceptable permits that will not require modification each time circumstances change for one of the dischargers covered under the permit.

In addition, the special conditions section of the permit could include a compliance schedule. Compliance schedules for WQBELs are allowed only when state water quality standards or state regulations implementing such standards provide authority for using compliance schedules as well as when those limits are derived from water quality standards that were newly adopted or substantially revised after July 1, 1977. Most state water quality standards or implementing regulations authorize using compliance schedules. If compliance schedule authority is available, the permit writer could place a compliance schedule in the permit special conditions that would give the discharger time to comply with provisions related to WQBELs and trading when those provisions are intended to be phased in over time.

Mystic River Example: Special Conditions

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Approved TMDL for Total Phosphorus on the Mystic River

Credit Seller: *Meadeville Fertilizer Producers*

Credit Buyer: *Auburn Carpet Manufacturers*

The permit writer has developed the appropriate effluent limitations, monitoring, and reporting requirements for each facility. The special conditions for each facility’s permit focus on general authority, credit definition, permit reopeners and modification provisions, compliance schedule, and enforcement liability.

Permit Language:

General Authority

The permittee is authorized to participate in trading for the purposes of complying with the total phosphorus effluent limitations in Section X of this permit. The authority to use trading for compliance with these limits is derived from: <insert state law if applicable> and section 402 of the federal Clean Water Act 33 United States Code (U.S.C.) section 1342. EPA’s policies on Water Quality Trading (1/13/03) and Watershed-Based NPDES Permitting (1/7/03) endorse water quality credit trading. Additionally the Mystic River TMDL authorizes water quality trading as a means of achieving the allocations established by the TMDL.

Credit Definition

One credit will be equal to one in pound of total phosphorous per day on a monthly average basis. No trade ratios apply to the permittee’s trades; therefore, each credit purchased by an authorized buyer shall correspond to a one pound per day reduction by an authorized seller.

Permit Reopeners, Modification Provisions

The permitting authority may, for any reason provided by law, by summary proceedings or otherwise, revoke or suspend this permit or reopen and modify it to establish any appropriate conditions, schedules of compliance, or other provisions which may be necessary to protect human health or the environment or to implement the Mystic River TMDL. The permitting authority may also reopen and modify the permit to suspend the ability to trade credits to comply with the total phosphorus effluent limitations in Section X of this permit.

Compliance Schedule

This permit includes both interim and final effluent limitations for the discharge of total phosphorus from Outfall 001. Compliance with the final effluent limitations is required on <insert date 24 months after permit effective date>.

Mystic River Example: Special Conditions *(continued)*

Permit Language (continued):

By March 1 of each year, the permittee shall submit a Compliance Plan Annual Report to describe the progress of actions undertaken to reduce total phosphorus discharges in the effluent discharged from Outfall 001 or to purchase equivalent credits and achieve compliance with the final effluent limitations for the discharge of total phosphorus from Outfall 001 by **<insert date 24 months after permit effective date>**.

Enforcement Liability

The permittee is liable for meeting its most stringent effluent limitation. No liability clauses contained in other legal documents (e.g., trade agreements, contracts) established between the permittee and other authorized buyers and sellers are enforceable under this permit.

Water Quality Trading Scenario: Multiple Facility Point Source Trading

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Water Quality Trading Scenario: Multiple Facility Point Source Trading

This water quality trading scenario focuses on technical and programmatic issues related to multiple facility point source trading, illustrated in Figure 1. Multiple facility point source trading is distinguished from single point source–single point source trading by the fact that a group of point sources operate under a single trade agreement. All trades will be limited by the overall limit or cap set by the permit. Issues addressed under this scenario include the following:

- Trade agreements
- Components of a National Pollutant Discharge Elimination System (NPDES) permit
 - Permit cover page
 - Effluent limitations
 - Monitoring
 - Reporting requirements
 - Special conditions

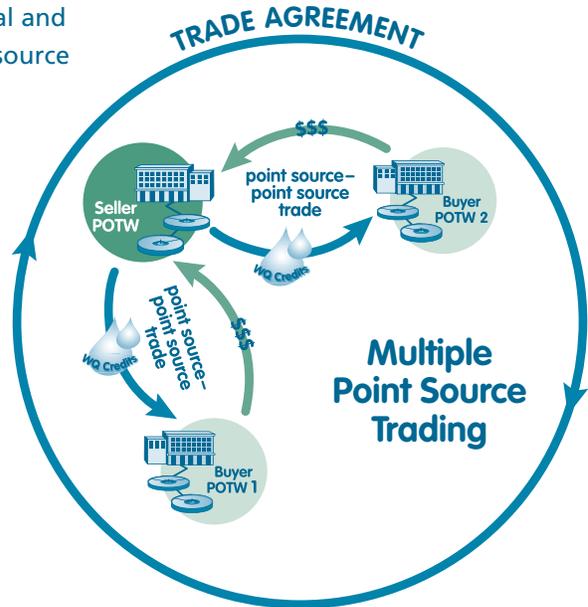


Figure 1. Multiple point source trading.

A hypothetical example (shown in highlighted boxes) is presented throughout this scenario to illustrate how NPDES permit writers might work with credit buyers and sellers to assist in trading and ensure each facility’s NPDES permit contains the appropriate limits, requirements, and other conditions. Keep in mind that there are a range of options for incorporating trading provisions into a NPDES permit. The hypothetical example discussed throughout this scenario illustrates just one of the many options a NPDES permit writer might use.

Trade Agreements

Under multiple facility point source trading, trade agreements can specify the individual trades between specific point sources or can establish *ground rules* for trading to allow point sources to trade among themselves as needed. Typically, the terms that govern a trading program will be developed outside of the NPDES permit process and can be incorporated or reflected in the permit (see Appendix C). The U.S. Environmental Protection Agency’s (EPA) *Water Quality Trading Policy* (Trading Policy) describes several mechanisms for implementing trading through NPDES permits (see Appendix B). NPDES permits authorizing water quality trading should reference any existing trade agreement in the permit and fact sheet. The permit writer may also incorporate specific provisions of the agreement as appropriate (e.g., shared responsibilities for conducting ambient monitoring) into the permit. All trade agreements referenced in NPDES fact sheets and permits should meet certain minimum standards to help ensure the trades authorized by the permit are consistent with water quality standards. At a minimum, the trade

agreement should be a written agreement, signed and dated by authorized representatives of all trading partners. Verbal trade agreements should not be referenced in NPDES permits. The written trade agreement should contain sufficient detail to allow the permitting authority to determine with some degree of certainty that the terms of the agreement will result in loading reductions and generation of sufficient credits to satisfy water quality requirements. If there is no formal, outside trade agreement, trading can still occur; however, the permit writer will need to more explicitly describe the trading program in the fact sheet and authorize specific aspects of the trading program as permit conditions. Trading partners can specify the details pertaining to the negotiated terms of the trade (e.g., credit price, payment schedule, consequences for failure to fulfill negotiated terms) in a separate written and signed contract.

St. Martin River Example: Trade Agreements

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Newly approved TMDL^a for Total Phosphorus for the St. Martin River Watershed

Credit Seller: *Shepherd County POTW^b*

Existing TBEL^c: 120 lbs/day (average monthly)

Current Loading: 120 lbs/day (average monthly)

New WQBEL^d (based on WLA^e): 110 lbs/day (average monthly)

POTW Treatment Capabilities: Treatment to 20 lbs/day (average monthly)

Credit Buyer #1: *City of Oakdale WWTP^f*

Existing TBEL: 50 lbs/day (average monthly)

Current Loading: 50 lbs/day (average monthly)

New WQBEL (based on WLA): 35 lbs/day (average monthly)

WWTP Treatment Capabilities: Treatment to 50 lbs/day (average monthly)

Credit Buyer #2: *Town of Barkley WWTP*

Existing TBEL: 50 lbs/day (average monthly)

Current Loading: 50 lbs/day (average monthly)

New WQBEL (based on WLA): 35 lbs/day (average monthly)

WWTP Treatment Capabilities: Treatment to 50 lbs/day (average monthly)

Notes: ^a TMDL = Total maximum daily load; ^b POTW = publicly owned treatment works; ^c TBEL = technology-based effluent limitations; ^d WQBEL = water quality-based effluent limitations; ^e WLA = wasteload allocation; ^f WWTP = wastewater treatment plant

Watershed: Shepherd County POTW (credit seller) is approximately 9 miles upstream from the city of Oakdale WWTP (credit buyer 1) and 10 miles upstream from the town of Barkley WWTP (credit

St. Martin River Example: Trade Agreements *(continued)*

buyer 2) along the St. Martin River. All three facilities discharge into a segment of the river that has been listed as impaired for nutrients, and a phosphorus TMDL has just been approved.

Applicable Trading Ratios:

- **Delivery:** On the basis of best available science, a delivery ratio of 3:1 ratio is needed for trades between Shepherd County POTW and either of the two credit buyers to account for the fate and transport of total phosphorus (TP) over the distance between the facilities. It is not necessary to apply an equivalency ratio because the same pollutant form is being traded, nor an uncertainty ratio because all parties can accurately monitor end-of-pipe loads.

The facilities' existing individual permits include TBELs based on state treatment standards for TP. The permittees currently meet these TBELs. These existing effluent limitations are less stringent than the limitations needed to meet the new WLAs established in the St. Martin River TMDL. To facilitate meeting the TMDL, the permitting authority has issued a watershed-based overlay permit that addresses phosphorus discharges from each of the three facilities. This permit also authorizes trading between Shepherd County and each of the two WWTPs downstream.

Shepherd County POTW is a large, new facility and has the potential to treat its discharge to a phosphorus loading of 20 lbs/day. The facility's baseline requirement for trading is 110 lbs/day (i.e., most stringent effluent limitation). Treating to the maximum capacity of the POTW would result in an excess phosphorus reduction of 90 lbs/day (baseline – treatment capacity = excess reduction).

The city of Oakdale and the town of Barkley WWTPs have not been upgraded and have no funds to upgrade to meet the new WLA. Both are small, rural localities and are not projecting substantial growth. The permitting authority is allowing both facilities to trade to meet their new WLAs (i.e., baselines). However, to trade, both WWTPs would need continue to treat their discharges to meet the existing TBELs (i.e., the minimum control level). Both facilities would then be allowed to purchase credits equivalent to the difference between the minimum control level and the baseline (50 lbs/day – 35 lbs/day = 15 lbs/day).

According to best available science, the permitting authority has determined that the application of a 3:1 delivery ratio is necessary to account for the fate and transport of phosphorus over the distance between the seller (Shepherd County POTW) and the buyers. Therefore, for the buyers to account for the 15 lbs/day of phosphorus loading necessary to compensate for each WWTP's discharge and meet their baselines, each must purchase 45 lbs/day (monthly average) from the Shepherd County POTW (15 lbs/day offset needed × 3:1 delivery ratio = 45 lbs/day needed). The POTW seller can generate 90 lbs/day and, therefore, has an adequate supply of phosphorus credits to sell.

The facilities have decided to enter into a trade agreement with each other. The basic terms of the trade agreement are as follows:

- A trade ratio of 3:1 applies to trades between the buyer and sellers because of the distance between them.
- Shepherd County POTW (seller) will install control technologies that will result in a 90 lbs/day of surplus load reduction eligible for trading.

St. Martin River Example: Trade Agreements *(continued)*

- Shepherd County POTW has a trading limit = 110 lbs/day – Quantity of Pounds Sold.
- City of Oakdale WWTP (credit buyer 1) has a WQBEL (baseline) of 35 lbs/day that must be met through trading, treatment, or pollution prevention. The facility’s minimum control level is the existing TBEL of 50 lbs/day (average monthly) based on the TBEL for TP. The facility’s current discharge of 50 lbs/day meets the existing TBEL.
- City of Oakdale WWTP (credit buyer 1) needs to purchase credits equivalent to 15 lbs/day of TP (baseline–minimum control level).
- Town of Barkley (credit buyer 2) has a WQBEL (baseline) of 35 lbs/day that must be met through trading, treatment or pollution prevention. The facility’s minimum control level is its existing TBEL, which is a loading limit of 50 lbs/day of TP. The facility’s current discharge of 50 lbs/day meets the existing TBEL.
- Town of Barkley WWTP (credit buyer 2) needs to purchase credits equivalent to 15 lbs/day of TP (baseline–minimum control level).
- Each facility will continue to monitor TP as required under each facility’s respective individual NPDES permits.
- Trades occur monthly and credits may not be applied in any month other than the one in which the credits are generated.
- Each facility will continue to complete and submit Discharge Monitoring Report (DMR) forms to the NPDES permitting authority, as required under each facility’s NPDES permit. In addition to DMR reporting, each facility will complete and exchange monthly Phosphorus Analysis Reports to track the amount of TP discharged and the total amount of TP load bought and sold between the facilities.
- Separate contracts between the seller and two buyers articulate the financial and liability conditions that each pair of facilities has agreed upon.

The NPDES permit writer for the facilities receives a written copy of the trade agreement that is signed and dated by authorized representatives of each facility. The permit writer reviews the written trade agreement to identify information that is pertinent to each facility’s NPDES permit. The permit writer incorporates provisions that outline trade-specific effluent limitations (i.e., baselines, the minimum control levels for the buyers, and the trading limit for the seller) and reporting and monitoring provisions.

The permit writer incorporates the Phosphorus Analysis Report provision of the trade agreement into the permit to require the facilities to submit trade information to the permitting authority. This will allow the permitting authority to determine whether the buyers and seller maintain compliance with WQBELs and applicable TBELs. Other components of the trade agreement, such as issues of liability and penalty payment, are not enforceable through the NPDES permit and, therefore, would not be incorporated into the compliance provisions of each NPDES permit.

The permit writer, with input from the permittees, will develop an overlay NPDES permit that addresses only TP requirements for the three facilities. The permit writer will reference the written trade agreement in the fact sheet of the group’s overlay NPDES permit.

Components of a NPDES Permit

NPDES permits that authorize water quality trading are no different than typical NPDES permits in many respects—they require the same structure, analyses, and justification. All permits have five basic components: (1) cover page; (2) effluent limitations; (3) monitoring and reporting requirements; (4) special conditions; and (5) standard conditions. Standard conditions are the same for all NPDES permits and will not be addressed in this Toolkit. In addition, consistent with Title 40 of the *Code of Federal Regulations* (CFR) section 124.6, all permits are subject to public notice and comment. This process provides all interested parties an opportunity to comment on the trading provisions in the permit.

Each NPDES permit is accompanied by a permit fact sheet. The information in these fact sheets is not enforceable. The purpose of the fact sheet is to explain the requirements in the permit to the public. Thus, at a minimum, the fact sheet should explain any trading provisions in the permit. There is a wide variety of options for including trading information in the fact sheet that ranges from explaining the minimum control level (buyer) or trading limit (seller) to including the entire trading program.

There are a variety of issues, however, that may require special consideration when developing a permit incorporating water quality trading. Appendix E provides the permit writer with a list of fundamental questions that should be addressed during the permit development process.

Permit Cover Page

The cover page of a NPDES permit typically contains the name and location of the permittee(s), a statement authorizing the discharge, the specific locations for which a discharge is authorized (including the name of the receiving water), and the effective period of the permit (not to exceed 5 years). A permit incorporating or referencing a trade agreement can refer to water quality trading on the cover page, but this is not necessary. If the state has issued regulations or policy documents authorizing water quality trading, the permit writer should consider referencing the regulations in the Authority section of the cover page. For example, if trading is considered a water-quality management tool in a state’s Water Quality Management Plan, this establishes clear authority for integrating trading into NPDES permits and can be referenced on the cover page (Jones 2005).

The cover page may also address the specific pollutants regulated by the permit. For instance, the cover page of an overlay permit for TP may state that the overlay permit addresses only TP and that other parameters are addressed in each facility’s individual permit.

Clean Water Services, Oregon

The Oregon Department of Environmental Quality addresses water quality trading on the cover page of the permit issued to Clean Water Services. For more information about this trading program, see Appendix A.

Effluent Limitations

Effluent limitations are the primary mechanism for controlling the discharge of pollutants from point sources into receiving waters. When developing a permit, the permitting authority focuses much of its effort on deriving appropriate effluent limitations. As in all NPDES

permits, permits that include trading must include any applicable TBELs, or the equivalent, and where necessary, WQBELs that are derived from and comply with all applicable technology and water quality standards. Furthermore, limits must be enforceable, and the process for deriving the limits should be scientifically valid and transparent.

EPA's Trading Policy does not support trading to meet TBELs unless trading is specifically authorized in the categorical effluent limitation guidelines on which the TBELs are based. Applicable TBELs thus serve as the minimum control level below which the buyer's treatment levels cannot fall. This section discusses the overarching principles of how to express all applicable effluent limitations in permits for dischargers participating in water quality trades.

Credit Buyers

Permits for credit buyers should include both the baseline, which is the WQBEL that defines the level of discharge the buyer would have to meet through treatment **when not** trading, and a minimum control level that must be achieved through treatment **when** trading. The permit should also include the amount of pollutant load to be offset (minimum control level – baseline) through credit purchases when trading. Most often, the applicable TBEL will serve as the minimum control level. A permitting authority can choose to impose a more stringent minimum control level than the TBEL to prevent localized exceedances of water quality standards near the point of discharge but not one that is less stringent than the TBEL. In a NPDES permit fact sheet, the effluent limitations for a credit buyer could be described as follows:

- The Discharger must meet, through treatment or trading, a mass-based effluent limitation for Pollutant A of <insert baseline>. If this effluent limitation is met through trading, the Discharger must purchase credits from authorized Sellers in an amount sufficient to compensate for the discharge of Pollutant A from Outfall 001 in excess of <insert baseline>, but at no time shall the maximum mass discharge of Pollutant A during <insert averaging period> exceed the minimum control level of <insert minimum control level>. Thus, the maximum mass discharge of Pollutant A to be offset through credit purchases is <insert minimum control level – baseline>.

Credit Sellers

When a potential credit seller is able to reduce its discharge below its most stringent applicable effluent limitation (i.e., its baseline), it may generate credits to sell. The quantity of credits that any given seller actually will be able to sell depends on the market for credits, agreements made with buyers, and any treatment requirements placed on potential buyers (i.e., the buyers' minimum control levels). Because of these factors, it is possible that a discharger will not be able to sell all the credits it generates.

A credit seller's permit will include both the most stringent effluent limitation that would apply without trading (e.g., baseline) and a trading limit. The seller can choose to what level it will control its pollutant discharge (using technology or best management practices (BMPs) it will implement), and this level becomes its trading limit. The baseline and trading limit could be described in the permit fact sheet as follows:

- Through treatment, the Discharger must meet a mass-based effluent limitation for Pollutant A of <insert baseline>. The Discharger is authorized to further treat its

discharge, remove additional loading of Pollutant A, and generate and sell credits to an authorized credit Buyer or Buyers. If the Discharger sells such credits, the <insert averaging period, e.g., average monthly> effluent limitation <insert baseline> no longer applies and the trading limit for Pollutant A at Outfall 001 shall apply instead as follows: Trading Limitation = <insert baseline> – Quantity of Pounds Sold.

The permit must include monitoring and reporting requirements for Pollutant A sufficient to demonstrate that the seller actually has generated the credits it sells and, therefore, is meeting its trading limit.

Aggregate or Individual Limitations

It may be appropriate for permit writers to include aggregate WQBELs that apply to the group of point sources covered under a general or watershed permit. An aggregate effluent limitation typically represents the sum of the pollutant WLAs for all permittees covered by the permit. This allows maximum flexibility for trades among dischargers within the watershed but should be considered only if localized exceedances of water quality standards are not a concern. An aggregate limitation allows individual dischargers to discharge or trade among themselves to any degree as long as the aggregate limitation is met and each discharger complies with any applicable TBELs. An aggregate effluent limit may be most appropriate in a trading scenario involving many individual dischargers within a watershed having a large-scale load reduction driver such as a TMDL for the entire waterbody or a percent load reduction requirements for the watershed as a whole. This is functionally equivalent to having a series of individual WQBELs and no trading limits.

Truckee Meadows Water Reclamation Facility, Nevada

The Nevada Division of Environmental Protection authorized individual and aggregate effluent limitations in a permit issued to Truckee Meadows Water Reclamation Facility. For more information about this trading program, see Appendix A.

EPA does not endorse setting a multisource aggregate limit without also including in the permit individual limits for each source covered. If the group of facilities does not meet its aggregate limit and an individual source does not meet its limit on its own and does not trade to meet it, enforcement action may be taken against this individual source. This approach keeps co-permittees under the general or watershed permit that have met their requirements free from liability when other co-permittees are responsible for the group discharging above the aggregate limit.

Neuse River Basin, North Carolina

The Neuse River Compliance Association (NRCA) general permit has an aggregate TN allocation and each member of the association has an individual allocation. If the NRCA meets the aggregate limit for the year, the NRCA and each permittee are in compliance. If the aggregate limit is exceeded, then the NRCA is out of compliance and any member that exceeds its individual TN limit is also out of compliance and subject to enforcement action. For more information about this trading program, see Appendix A.

St. Martin River Example: Effluent Limitations

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Newly approved TMDL for Total Phosphorus for the St. Martin River Watershed

Credit Seller: *Shepherd County POTW*

Existing TBEL: 120 lbs/day (average monthly)

Current Loading: 120 lbs/day (average monthly)

New QBEL (based on WLA): 110 lbs/day (average monthly)

POTW Treatment Capabilities: Treatment to 20 lbs/day (average monthly)

Credit Buyer #1: City of Oakdale WWTP

Existing TBEL: 50 lbs/day (average monthly)

Current Loading: 50 lbs/day (average monthly)

New QBEL (based on WLA): 35 lbs/day (average monthly)

WWTP Treatment Capabilities: Treatment to 50 lbs/day (average monthly)

Credit Buyer #2: Town of Barkley WWTP

Existing TBEL: 50 lbs/day (average monthly)

Current Loading: 50 lbs/day (average monthly)

New QBEL (based on WLA): 35 lbs/day (average monthly)

WWTP Treatment Capabilities: Treatment to 50 lbs/day (average monthly)

Watershed: Shepherd County POTW (credit seller) is approximately 9 miles upstream from the city of Oakdale WWTP (credit buyer 1) and 10 miles upstream from the town of Barkley WWTP (credit buyer 2) along the St. Martin River. The segment of river to which all three facilities discharge has been listed as impaired for nutrients, and a phosphorus TMDL has just been approved.

Applicable Ratios:

- **Delivery:** The trading program has established a 3:1 ratio for trades between Shepherd County POTW and either of the two credit buyers to account for the distance between the facilities.

The facilities' existing individual permits include TBELs based on state treatment standards for TP. The permittees currently meet these TBELs. These existing effluent limitations are less stringent than the limitations needed to meet the new WLAs established in the St. Martin River TMDL. To facilitate meeting the TMDL, the permitting authority has issued a watershed-based overlay permit that addresses phosphorus discharges from each of the three facilities. This permit also authorizes trading between Shepherd County POTW and each of the two WWTPs downstream.

St. Martin River Example: Effluent Limitations (continued)

If the Shepherd County POTW chooses to sell 90 lbs/day of the credits generated by the over control of its discharge, a trading limit will apply as follows:

$$\text{Baseline} - \text{Pounds Sold} = \text{Trading Limitation}$$

$$110 \text{ lbs/day} - 90 \text{ lbs/day} = 20 \text{ lbs/day}$$

The POTW will be required to demonstrate that its discharge has an actual loading of no more than 20 lbs/day during any period it is trading with the buyer WWTPs.

A new overlay permit is being developed, which implements the new phosphorus WQBELs and authorizes trading between the facilities. Upon issuance of the permits, the new WQBELs and trading provisions will apply. The permits will include effluent limitations equal to baselines, minimum control levels, and trading limits.

Table 1. Monthly average mass-based effluent limitations for TP

| Facility | Units | Effluent limitation without trading | Effluent limitation with trading |
|----------------------|---------|-------------------------------------|----------------------------------|
| Shepherd County POTW | lbs/day | 110 (Baseline/WQBEL) | 20 ^a |
| City of Oakdale WWTP | lbs/day | 35 (Baseline/WQBEL) | 50 (Minimum Control Level/TBEL) |
| Town of Barkley WWTP | lbs/day | 35 (Baseline/WQBEL) | 50 (Minimum Control Level/TBEL) |

^aTrading limit = (WQBEL – pollutant loading necessary to generate quantity of credits sold)

Permit Language:

Shepherd County POTW

- A. The permittee shall be in compliance with the monthly average effluent limitations for total phosphorus in this permit if:
 - a. The permittee has not sold any credits and the permittee’s average monthly mass loading of total phosphorus is less than or equal to the Baseline (Effluent Limitation Without Trading) set forth in Table 1; or,
 - b. The permittee has sold total phosphorus credits such that the effluent loading does not exceed the Trading Limit (Effluent Limitation with Trading) established in Table 1.
- B. Credits sold and purchased may be applied only to the calendar month(s) in which they were generated.

City of Oakdale WWTP and Town of Barkley WWTP

- A. The permittee shall be in compliance with the monthly average effluent limitations for total phosphorus in this permit if:
 - a. The permittee has not purchased any credits and the permittee’s average monthly mass loading of total phosphorus is less than or equal to the Baseline (Effluent Limitation Without Trading) set forth in Table 1; or,

St. Martin River Example: Effluent Limitations *(continued)*

Permit Language (continued):

- b. The permittee’s effluent loading does not exceed the Minimum Control Level (Effluent Limitation With Trading) established in Table 1 and the permittee has purchased credits equivalent or greater than the difference between the baseline and the minimum control level.
- B. Credits sold and purchased may be applied only to the calendar month(s) in which they were generated.

Pollutant Form, Units of Measure, and Timing Considerations

The permit should explicitly identify the **pollutant or pollutants being traded**. The permitting authority should ensure that the trading program or agreement and the calculated WQBELs are consistent in terms of the form of the pollutant, units of measure, and timing.

For example, if the pollutant specified in the WQBEL is nitrate-nitrogen, credits generated under the trade agreement should be for nitrate-nitrogen and not for total Kjeldahl nitrogen (TKN) or some other form. If, on the other hand, the WQBEL is for total nitrogen (TN), buyers and sellers should trade TN credits. In this case, a discharger may be required to measure TN. If there are concerns about localized impacts, and WQBELs are also specified for a particular form or forms of nitrogen, the discharger may be required to monitor TKN, nitrite, and nitrate (all expressed as N) and then calculate its TN discharge.

Also, an **equivalency ratio** may be needed when two sources are trading pollutants such as TN or TP but are actually discharging different forms of nitrogen or phosphorus (e.g., one discharger’s phosphorus discharge is made up primarily of biologically available phosphorus, while its trading partner’s discharge is primarily composed of bound phosphorus). An equivalency ratio may also be needed in cross-pollutant trading of oxygen demanding pollutants (e.g., phosphorus and biochemical oxygen demand (BOD)). In this case, the equivalency ratio would equal the ratio between the two pollutants’ impacts on oxygen demand. The trading program should account for any necessary equivalency ratios with regard to pollutant form or type; the permit writer needs to be aware of the pollutant form or type addressed in the trade agreement to ensure that the permit is consistent.

In addition, consistent **reconciliation periods** are essential in trading between point sources. The credit purchaser’s permit limits for the traded pollutant and the credit seller’s permit limits should have the same units and averaging period. Because both sets of limits are designed to address the same water quality problem, both should use the averaging period and units that make the most sense to address that problem. Consistent units and averaging periods will also simplify reconciliation of credit sales and purchases.

St. Martin River Example: Pollutant Form, Units of Measure, and Timing

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Approved TMDL for Total Phosphorus on the St. Martin River

Credit Seller: *Shepherd County POTW*

Credit Buyers: *City of Oakdale and Town of Barkley WWTPs*

Pollutant Form

All trading partners discharge phosphorus year round. The TMDL indicates a need to control TP discharges. Each facility discharges the same form of phosphorus at the same percentage of solubility; therefore, no provisions are necessary in the permit to address the issue of pollutant form.

Units of Measure

The TP WQBELs based on the TMDL WLAs are expressed in lbs/day as a monthly average to correspond with the units and averaging period in the TMDL. The limits in the trading partners' permits are also expressed in lbs/day as a monthly average. Monthly trades will be based on average monthly reductions demonstrated through monitoring.

Timing of Credits

Credits will be available immediately upon permit issuance. Trades will occur monthly to correspond with monthly average effluent limitations. The purchased credits must be applied by the buyers during the same month that the seller generates them. The POTW will be able to continue to generate credits as long as the controls are properly operated and maintained, the facility is able to demonstrate reductions, and the facility does not become subject to more stringent requirements (i.e., newly promulgated effluent guidelines or other more stringent technology-based controls or additional WQBELs to avoid localized exceedances of water quality standards) that would reduce or eliminate the credits generated. The ability of the seller to continue to generate credits will be assessed during the renewal of the individual permits every 5 years.

Anti-backsliding, Antidegradation, and New Discharges Special Considerations

The Trading Policy discusses anti-backsliding and antidegradation and how these provisions can be met through trading.

Anti-backsliding

The term *anti-backsliding* refers to a statutory provision (Clean Water Act (CWA) section 402(o)) that, in general, prohibits the renewal, reissuance, or modification of an existing NPDES permit that contains WQBELs, permit conditions, or standards that are less stringent than those established in the previous permit (USEPA 1996b). The CWA establishes exceptions to this general anti-backsliding prohibition. EPA has consistently interpreted section 402(o)(1)

to allow for less-stringent effluent limitations if either an exception under section 402(o)(2) or, for WQBELs, the requirements of section 303(d)(4) are met (USEPA 1996b). Section 402(o)(2) and 40 CFR 122.44(l) provide exceptions for circumstances such as material and substantial alterations to the facility, new information, events beyond the permittee’s control, and permit modifications under other sections of the CWA. Section 303(d)(4), which applies only to WQBELs, allows a less-stringent WQBEL in a reissued permit when the facility is discharging to a waterbody attaining water quality standards as long as the waterbody continues to attain water quality standards even after the WQBEL is relaxed. In addition, revising the limitation must be consistent with the state’s antidegradation policy. If the discharge is to a waterbody that is not attaining water quality standards, a less-stringent WQBEL is allowed only when the cumulative effect of all revised effluent limitations results in progress towards attainment of water quality standards. For a detailed discussion of the anti-backsliding exceptions, see EPA’s *NPDES Permit Writers’ Manual* (EPA-833-B-96-003). EPA’s Trading Policy states:

EPA believes that the anti-backsliding provisions of Section 303(d)(4) of the CWA will generally be satisfied where a point source increases its discharge through the use of credits in accordance with alternate or variable water quality based effluent limitations contained in an NPDES permit, in a manner consistent with provisions for trading under a TMDL, or consistent with the provisions for pre-TMDL trading included in a watershed plan.

A permit writer should simply explain in the fact sheet of the permit how the limitations in the permit, after accounting for any trading provisions, are at least as stringent as the limits in the previous permit or, alternatively, how anti-backsliding provisions of the CWA are satisfied.

Antidegradation

As repeated throughout this document, NPDES permits may not facilitate trades that would result in nonattainment of an applicable water quality standard, including the applicable antidegradation provisions of water quality standards. Permitting authorities should ensure that WQBELs developed to facilitate trade agreements accord with antidegradation provisions and that antidegradation reviews are performed when required. Nothing in the Trading Policy per se changes how states apply their antidegradation policies, though states may modify their antidegradation policies to recognize trading.

The Trading Policy states:

*EPA does not believe that trades and trading programs will result in “lower water quality” . . . or that antidegradation review would be required under EPA’s regulations when the trades or trading programs achieve a **no net increase** of the pollutant traded and do not result in any impairment of designated uses.*

Special considerations for antidegradation relative to water quality trading depend on the tier of protection applied to the waterbody as described below.

Tier 1 is the minimum level of protection under antidegradation policies. For Tier 1 waters, the antidegradation policy mandates protection of existing instream uses. Because EPA

neither supports trading activities nor allows issuance of permits that violate applicable water quality standards, which should protect existing uses at a minimum, any supported trading activities incorporated into a NPDES permit should not violate antidegradation policies applicable to Tier 1 waters.

Tier 2 protects waters where the existing water quality is higher than required to support aquatic life and recreational uses. Water quality in Tier 2 waters may be lowered (only to the level that would continue to support existing and designated uses) but only if an antidegradation review finds that (1) it is necessary to lower water quality to accommodate important social or economic development, (2) all intergovernmental and public participation provisions have been satisfied, and (3) the highest statutory and regulatory requirements for point sources and BMPs for nonpoint sources have been achieved. The Trading Policy supports trading to maintain high water quality when trading is used to compensate for new or increased discharges. Thus, the Trading Policy supports reductions of existing pollutant loadings to compensate for the new or increased load so that the result is *no lowering of water quality*. A state, in applying its antidegradation policy, may decide to authorize a new or increased discharge to high quality water, and may decide to use trading to completely or partially compensate for that increased load. If the increased load to Tier 2 waters is only partially compensated for by trading, an antidegradation review would be required to address the increased load.

Tier 3 protects the quality of outstanding national resource waters and waters of exceptional recreational or ecological significance. In general, antidegradation policies do not allow any increase in loading to Tier 3 waters that would result in lower water quality. EPA supports trading in Tier 3 waters to maintain water quality.

Monitoring

Permitting authorities may want to consider developing monitoring and reporting requirements to characterize waste streams and receiving waters, evaluate wastewater treatment efficiency, and determine compliance with permit conditions in trade agreements. Monitoring and reporting conditions of a NPDES permit may contain specific requirements for sampling location, sample collection method, monitoring frequencies, analytical methods, recordkeeping, and reporting. If the permit conditions include compliance with provisions in a trade agreement, the permitting authority should include monitoring, record-keeping, and reporting requirements that facilitate compliance evaluations and, where necessary, enforcement actions related to the trading requirements. Discharge monitoring requirements should be consistent with the provisions of the trade agreement in terms of pollutants and forms of pollutants monitored, reporting units, and timing. The permit provisions should ensure that the results of discharge monitoring will be useful to the permittees, the permitting authority, and the general public in determining whether the provisions of the trade agreement are being met.

Sample Collection and Analysis

The same discharge sampling location used for compliance in any existing NPDES permits should be used for determining compliance with effluent limitations developed for traded parameters. Samples collected as part of a self-monitoring program required by a NPDES

permit must be performed in accordance with EPA-approved analytical methods specified in 40 CFR Part 136 (*Guidelines for Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act*) where Part 136 contains methods for the pollutant of concern. Where no Part 136 methods are available, the permit writer should specify which method should be used for compliance monitoring.

Parties Responsible for Monitoring

The trade agreement specifies the types and frequency of monitoring needed as well as the parties responsible for monitoring. The individual facilities are ultimately responsible to ensure that effluent monitoring is completed and reported to the permitting authority. Any enforcement actions for failure to monitor and report will be against the individual facilities. The permitting authority should ensure that sufficient monitoring is required to allow permittees, agency compliance personnel, and the public to gauge whether dischargers are meeting their individual effluent limitations and requirements under the trade agreement.

Neuse River Basin, North Carolina

The state of North Carolina Department of Environment and Natural Resources included monitoring provisions in a permit issued to the NRCA and its co-permittee members to control nitrogen discharges. These provisions require members of the NRCA to monitor their discharge as specified in their individual permits. In addition, the NRCA compiles and submits members' nitrogen monitoring results. Each member also has individual ambient monitoring requirements, but the NRCA is not required to conduct ambient monitoring. For more information about this trading program, see Appendix A.

The permitting authority might use a different approach for specifying monitoring requirements, depending on the type of permit. For example, discharge monitoring under a multiple facility permit would be required of all individual dischargers and should be listed in the permit. If the permit is an overlay permit used to incorporate water quality trading for specific pollutants, the permitting authority may establish certain monitoring requirements, such as monitoring location, by reference to the facility's individual NPDES permit for consistency. Alternatively, the overlay permit could specifically list the monitoring location and requirements for each permittee or co-permittee.

The permitting authority may consider establishing more frequent monitoring for facilities with higher design flows than those with lower design flows. Monitoring and reporting requirements in a multiple facility permit, such as a watershed-based permit, may be a combination of individual and watershed-wide requirements as described below.

Ambient Monitoring

Ambient monitoring is one way to show whether a trade agreement meets or improves water quality. In addition to traditional discharge monitoring requirements, ambient water quality monitoring may be appropriate at strategic locations to ensure that the trade is not creating localized exceedances of water quality standards and to document the performance of the overall trading program. Permits with mixing zones may include monitoring requirements as appropriate to ensure that water quality criteria are not exceeded at the edge of the applicable mixing zone.

St. Martin River Example: Monitoring

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Approved TMDL for Total Phosphorus on the St. Martin River

Credit Seller: *Shepherd County POTW*

Credit Buyers: *City of Oakdale and Town of Barkley WWTPs*

Location: The dischargers are in the St. Martin River watershed.

The facilities have existing TP monitoring requirements. The overlay permit will require monitoring at the same locations as established in the existing permits. In addition, the existing permit requires monthly monitoring for TP. Each discharger will be required to monitor for phosphorus weekly. For the permitting authority to gauge compliance, the permit writer will develop permit language that requires each discharger to submit monthly DMRs to the permitting authority by the 15th of the month following monitoring. Ambient receiving water monitoring requirements are included in the existing NPDES permits and are adequate to ensure that localized exceedances of water quality standards do not develop as a result of trades.

Permit Language:

Each permittee shall monitor effluent total phosphorus a minimum of one time per week at existing discharge monitoring locations established in each facility's existing NPDES permit. Each permittee shall determine the average monthly mass loading based on actual monthly average flow. Flow monitoring shall be continuous.

General or watershed-based permits may establish a comprehensive watershed monitoring program. For example, to fulfill monitoring requirements that are applied to multiple dischargers, permittees could establish a monitoring consortium to collect ambient water quality data that supplements end-of-pipe monitoring data required by the permit. Through this group-wide monitoring consortium, permittees could generate data to use in watershed assessments.

Reporting Requirements

Reporting requirements should be established to support the permitting authority's evaluation of water quality trading programs. For example, in addition to reporting discharge monitoring results, permitting authorities might require a permittee to report the number of credits purchased. Permitting authorities might also require an annual monitoring report specific to the pollutants involved in the trade, to provide information on annual loading in accordance with the requirements of the trading program. Permits incorporating water quality trades should require reporting at a frequency appropriate to determine compliance with the trading provisions. Permitting authorities should consider any requirements of the trading programs related to monitoring and reporting and ensure the permits are consistent with these requirements. Permits may require reporting of monitoring results at a frequency

established through the permit on a case-by-case basis but in no case may that frequency be less than once per year.

Trading programs may establish other reporting and tracking requirements as well. For example, it is essential to have a mechanism for tracking trades. An additional form could be required such as a credit certificate form (see [Appendix C](#)). The permitting authority can hold point sources liable if they violate any trading provision included in the permit or any trade agreement incorporated by reference into the permit, and point sources are also liable if they do not meet their permit limits.

St. Martin River Example: Reporting

■ What You Need to Know...

Pollutant: Total Phosphorus

Credit Seller: *Shepherd County POTW*

Credit Buyers: *City of Oakdale and Town of Barkley WWTPs*

Location: The dischargers are located in the St. Martin River watershed.

Applicable Ratios:

- **Delivery:** The trading program has established a 3:1 ratio for trades between Shepherd County POTW and either of the two credit buyers to account for the distance between the facilities.

An overlay permit is being developed for permittees in the St. Martin River watershed to facilitate trading. In addition to their existing, individual NPDES permits, each of the trading partners has applied for coverage under the overlay permit. The permit requires, in addition to monitoring reports, regular reporting of any changes to the trade agreement and reports for tracking trades. Because the facilities' individual permits contain monthly average effluent limitations for TP, monthly trade transactions will be necessary to maintain compliance. The trade agreement between the dischargers indicates that trades will be tracked by individual dischargers. Also, trading notification forms for trades between trading partners and monthly trading summaries for the entire program will be submitted by each discharger. Credits must be used in the same month they are generated and trading notification forms must be submitted to the regulatory agency by the 15th of the month following the trade. The permit gives the facilities 15 days to report the trades to account for administrative time and processing notification forms.

In addition, the permit requires biannual reporting to summarize year-to-date transactions and actual reductions and loading reflected by monitoring.

Permit Language:

No trade is valid unless it is recorded by both the credit buyer and the credit seller and trading notification forms and a monthly summary of all trades for each calendar month are submitted to the permitting authority. The record-keeping system employed by the permittee must be capable of ensuring that a particular credit is not sold to more than one trading participant. Trading notification forms for each monthly trade must be submitted to **<the Permitting Authority>** by the 15th day of the month following the trade.

Data Reporting to EPA

EPA administers two systems to store NPDES permit data and track compliance, the Permit Compliance System (PCS) and the new Integrated Compliance Information System (ICIS). PCS is the old computerized management information system that contains data on NPDES permit-holding facilities to track the permit, compliance, and enforcement status of these facilities.

The new system, ICIS, was deployed in June 2006 to approximately 20 states. ICIS contains integrated enforcement and compliance information across most of EPA's programs including all federal administrative and judicial enforcement actions. In addition, ICIS has the capability to track other activities occurring in an EPA Region that support enforcement and compliance programs. These include Incident Tracking, Compliance Assistance, and Compliance Monitoring. In the future, ICIS will be deployed to all states, and PCS will no longer be used.

Neither PCS nor ICIS is structured to actually track trades.

PCS is designed to compare actual discharge monitoring data against required effluent limitations to determine a facility's compliance with its NPDES permit. To determine compliance under a trading scenario, it is necessary for the NPDES permitting authority to compare actual discharge monitoring data and the quantity of credits purchased or pounds sold against required effluent limitations. For credit sellers, compliance is tracked against the WQBEL that serves as the facility's baseline. For credit buyers, compliance is actually tracked against two effluent limitations—the minimum control level and the baseline. The challenge in using PCS to determine compliance under a trading scenario is that the system does not automatically make adjustments to the reported actual discharge—it will not add or subtract the load traded. Therefore, this type of adjustment must be done before entering information into PCS so that the system has only one reported number to compare against an effluent limitation.

To determine compliance for a credit seller, the NPDES permitting authority will need to know that the sum of a credit seller's actual discharge and the number of pounds sold is less than or equal to the most stringent effluent limitation (i.e., the baseline). Therefore, point source credit sellers could report the sum of the facility's actual discharge and the number of pounds sold, and that amount would be entered into PCS. PCS would then compare the sum of the actual discharge and the number of pounds sold against the facility's baseline; the sum should be less than or equal to the facility's baseline to indicate that the facility is in compliance.

Point source credit buyers not only have a baseline, but also a minimum control level (the facility's TBEL or current discharge, whichever is more stringent). To determine compliance for a credit buyer, the NPDES permitting authority will need to know that (1) the facility's actual discharge is less than or equal to its minimum control level, and (2) that the number of credits purchased result in the facility achieving its baseline. Therefore, point source credit buyers could report two types of information: (1) the facility's actual discharge, and (2) the difference between the actual discharge, and the quantity of credits purchased. Both numbers would be entered into PCS to determine compliance. PCS would compare the actual discharge against the minimum control level to determine permit compliance and eligibility as a credit

buyer. PCS would also compare the difference between the actual discharge and the quantity of credits purchased against the facility's baseline; the difference should be less than or equal to the WQBEL to indicate that the facility has purchased enough credits to meet its baseline and remain in compliance with its WQBEL. PCS can accommodate two different effluent limits for the same parameter; therefore, it has the capability to determine compliance with both the minimum control level and the baseline for a credit buyer.

ICIS also allows the NPDES permitting authority to report two limits; therefore, this system can also accommodate both the baseline and the minimum control level for credit buyers. New DMR forms will also have two lines to report both the baseline and the minimum control level. Like PCS, ICIS does not actually adjust actual discharges with the load traded. Under the current design, ICIS will allow a facility with an existing NPDES permit to also have a trading partner entered into the system. Once a trading partner is entered for a facility, ICIS will allow the entry of an adjusted value—this is the reported actual discharge adjusted by the number of credits bought or sold. If an adjusted value is entered, this value is used to determine permit violations and percent exceedances (USEPA 2006).

In addition to challenges related to limits and the type of information to report, NPDES permits with trading provisions might also raise issues related to reporting periods and automated compliance tracking. PCS will not support a reporting extension beyond 30 days. This type of reporting extension might be necessary in some instances to allow adequate time for the administrative activities necessary for trading partners to coordinate and reconcile trades. ICIS, however, will support a 45-day reporting period. In rare instances when a permitting authority uses annual limits, both PCS and ICIS will allow for one limit to be monthly and one to be annual. However, the permitting authority will have to manually flag annual limit effluent violations for reportable noncompliance (RNC) and significant noncompliance (SNC) to track compliance.

Special Conditions

Special conditions are developed to supplement effluent limitations and may include requirements such as BMPs, additional monitoring activities, ambient stream surveys, and toxicity reduction evaluations (TREs). Special conditions also include permit modification and reopen conditions and can be used to address water quality trading or incorporate compliance schedules (if authorized by the permitting authority). Special conditions of a NPDES permit will be very important in incorporating the terms of a trade agreement. Even where the specific terms of the agreement are not directly incorporated into the permit, the special conditions will be used to refer to, and require compliance with, the trade agreement housed in a separate document.

The special conditions included in a NPDES permit that implements trading will depend on provisions of the trade agreement and the effluent limitations and monitoring and reporting requirements established in the permit. However, the permitting authority should consider incorporating special conditions that support the trading conditions. For example, the special conditions of the permit may specify how and when trades may be conducted among permittees or how an exceedance of an aggregate loading cap will be enforced among the permittees responsible for exceeding their individual loading limits.

Special conditions may also be used to establish provisional requirements that apply if the credits on which the trading limits are based are unavailable. Special conditions addressing group and individual liability, provisional requirements that apply when credits are unavailable or when an individual or collective limit is exceeded, and outlining the specific requirements for establishing trade agreements among permittees can be important in issuing acceptable permits that will not require modification each time circumstances change for one of the dischargers covered under the permit.

In addition, the special conditions section of the permit could include a compliance schedule. Compliance schedules for WQBELs are allowed only when state water quality standards or state regulations implementing such standards provide authority for using compliance schedules as well as when those limits are derived from water quality standards that were newly adopted or substantively revised after July 1, 1977. Most state water quality standards or implementing regulations authorize using compliance schedules. If compliance schedule authority is available, the permit writer could place a compliance schedule in the permit special conditions that would give the discharger time to comply with provisions related to WQBELs and trading when those provisions are intended to be phased in over time.

St. Martin River Example: Special Conditions

■ What You Need to Know...

Pollutant: Total Phosphorus

Credit Seller: *Shepherd County POTW*

Credit Buyers: *City of Oakdale and Town of Barkley WWTPs*

Location: The dischargers are in the St. Martin River watershed.

Applicable Ratios:

- **Delivery:** The trading program has established a 3:1 ratio for trades between Shepherd County POTW and either of the two credit buyers to account for the distance between the facilities.

The permit writer has developed the appropriate effluent limitations, monitoring, and reporting requirements for each facility. The special conditions for each facility’s permit focus on general authority, credit definition, permit reopeners and modification provisions, and enforcement liability.

Permit Language:

General Authority

The permittee is authorized to participate in trading for the purposes of complying with the total phosphorus effluent limitations in Section X of this permit. The authority to use trading for compliance with these limits is derived from: <insert state law if applicable>; section 402 of the federal Clean Water Act 33 United States Code (U.S.C.) section 1342; and EPA’s policies on Water Quality Trading (1/13/03) and Watershed-Based NPDES Permitting (1/7/03) endorse water quality credit trading. Additionally the St. Martin River TMDL authorizes water quality trading as a means of achieving the allocations established by the TMDL.

Credit Definition

One credit purchased by the buyers will be equal to three pounds of total phosphorous per day on a monthly average basis generated by the seller.

Permit Reopeners, Modification Provisions

The permitting authority may, for any reason provided by law, summary proceedings or otherwise, revoke or suspend this permit or reopen and modify it to establish any appropriate conditions, schedules of compliance, or other provisions which may be necessary to protect human health or the environment or to implement the St. Martin River TMDL. The permitting authority may also reopen and modify the permit to suspend the ability to trade credits to comply with the total phosphorus effluent limitations in Section X of this permit.

Enforcement Liability

The permittee is liable for meeting its most stringent effluent limitation. No liability clauses contained in other legal documents (e.g., contracts) established between the permittee and other authorized buyers and sellers are enforceable under this permit.

Water Quality Trading Scenario: Point Source Credit Exchange

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Water Quality Trading Scenario: Point Source Credit Exchange

This water quality trading scenario focuses on technical and programmatic issues related to water quality trading through a point source credit exchange, illustrated in Figure 1. Point sources that over control their discharges generate the credits in the exchange, and a separate entity maintains the credit exchange. The credit exchange would likely have to be either operated by or approved and overseen by a state regulatory agency. Issues addressed under this scenario include the following:

- Credit exchange administration
- Trade agreements
- Components of a National Pollutant Discharge Elimination System (NPDES) permit
 - Permit cover page
 - Effluent limits
 - Monitoring
 - Reporting requirements
 - Special conditions

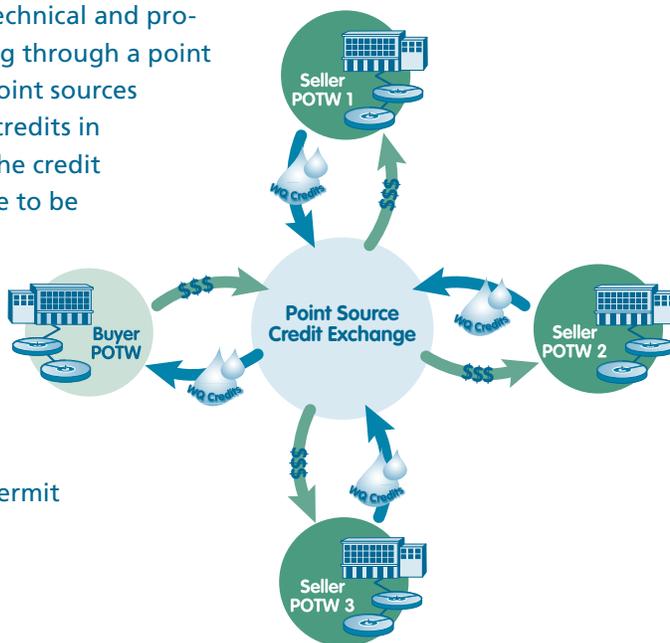


Figure 1. Point source credit exchange.

A hypothetical example (shown in highlighted boxes) is presented throughout this scenario to illustrate how NPDES permit writers might work with credit buyers and sellers to assist in trading and ensure each facility's NPDES permit contains the appropriate limits, requirements, and other conditions. Keep in mind that there are a range of options for incorporating trading provisions into a NPDES permit. The hypothetical example discussed throughout this scenario illustrates just one of the many options a NPDES permit writer might use.

Credit Exchange Administration

A variety of entities can establish and administer credit exchanges, including state agencies, local governments, nonprofit nongovernmental entities, soil and water conservation districts, private entities or other third parties. Management responsibilities for a credit exchange will vary according to the watershed and needs of the trading partners. To address the potential inadequacy of generated credits (i.e., treatment control failure), credit exchanges should consider reserving credits that would be available to credit purchasers if the primary credit source is insufficient. Entities administering credit exchanges can reserve credits in a number of ways. One option is for the credit exchange to *overbuy* available credits from point sources approved to generate credits. Another option is to require point source dischargers that want the ability to purchase credits from the credit exchange—now or in the future—to pay a user fee to the credit exchange that will in turn finance additional point source treatment controls approved to generate credits.

Trade Agreements

Typically, the terms that govern a trading program will be developed outside the NPDES permit process and can be incorporated or reflected in the permit (see [Appendix C](#)). The U.S. Environmental Protection Agency’s (EPA) *Water Quality Trading Policy* (Trading Policy) describes several mechanisms for implementing trading through NPDES permits (see [Appendix B](#)). NPDES permits authorizing water quality trading should reference any existing trade agreement in the permit and fact sheet. The permit writer may also incorporate specific provisions of the agreement as appropriate (e.g., shared responsibilities for conducting ambient monitoring) into the permit. All trade agreements referenced in NPDES fact sheets and permits should meet certain minimum standards to help ensure the trades authorized by the permit are consistent with water quality standards. At a minimum, the trade agreement should be a written agreement and signed and dated by authorized representatives of all trading partners. Verbal trade agreements should not be referenced in NPDES permits. The written trade agreement should contain sufficient detail to allow the permitting authority to determine with some degree of certainty that the terms of the agreement will result in loading reductions and generation of sufficient credits to satisfy water quality requirements. If there is no formal, outside trade agreement, trading can still occur; however, the permit writer will need to more explicitly describe the trading program in the fact sheet and authorize specific aspects of the trading program as permit conditions. Trading partners can specify the details pertaining to the negotiated terms of the trade (e.g., credit price, payment schedule, consequences for failure to fulfill negotiated terms) in a separate, written and signed contract.

For a credit exchange to succeed, adequate credits should be available to meet the demand of the purchasers; therefore, a trade agreement could contractually obligate the credit generators to create a certain number of credits to participate in the program. Likewise, the administrator of the credit exchange might want to ensure that point sources purchase a certain number of credits and include this obligation in an agreement, as well. The obligations could be for a defined period, such as one permit term. Penalties for not meeting the terms of the trade agreement should be clearly specified in the agreement and incorporated by reference into a NPDES permit.

Flowing River Example: Trade Agreements

■ *What You Need to Know...*

Pollutant: Total Phosphorus

Driver: Newly approved TMDL^a for Total Phosphorus for the Flowing River Watershed

Point Source Credit Exchange: *Flowing River Watershed Phosphorus Credit Exchange (administered by the state)*

Participating Facilities: *Chuck’s Potash Company, Green and Go Fertilizers, Shag Rug, Inc., Troyville POTW^b, Alpha Limited*

Notes: ^a TMDL = Total maximum daily load; ^b POTW = publicly owned treatment works

Location: All facilities are less than a mile apart from each other along the Flowing River.

Flowing River Example: Trade Agreements *(continued)*

Applicable Trade Ratios: None. In this case, it is not necessary to apply a delivery ratio because of the close proximity of the sources to each other, nor an equivalency ratio because the same pollutant form is being traded, nor an uncertainty ratio because both parties can accurately monitor end-of-pipe loads.

The state and stakeholders in the Flowing River watershed have cooperatively participated in the development of the Flowing River Watershed Phosphorus Credit Exchange to meet the point source facilities' wasteload allocation (WLA) under the approved phosphorus TMDL. To facilitate trading, the Flowing River Watershed Phosphorus Credit Exchange drafted a trade agreement that buyers and sellers must sign to participate. The basic terms of the trade agreement are as follows:

- The trade agreement establishes a contractual obligation between the credit buyers and sellers to participate for a period of 5 years.
- Participants that sign the trade agreement acknowledge that the facility's phosphorus discharges will be covered under a separate phosphorus overlay permit for all participants in the Flowing River Watershed Phosphorus Credit Exchange, as opposed to the facility's existing NPDES permit. The overlay permit is scheduled to be completed and become effective in one year.
- Trades occur annually at the end of the TMDL *season* (June 1–September 30) on the basis of the seasonal mass loading of total phosphorus (TP) compared to seasonal phosphorus discharge limits for each facility.
- Monitoring and flow data is to be submitted to the Exchange quarterly by the end of the month following the quarter (April, July, October, and January).
- Before reconciling trade requirements, the Flowing River Watershed Phosphorus Credit Exchange will determine the value of a phosphorus credit on the basis of capital costs of TP removal, as well as operation and maintenance costs of pollutant controls.
- Each year, the Flowing River Watershed Phosphorus Credit Exchange will reconcile credit sales and purchases by March of the following calendar year.
- Each participant in the Flowing River Watershed Phosphorus Credit Exchange will have a baseline. Buyers will also have minimum control levels, and sellers will also have trading limits (baseline – credits sold) included in an appendix to the trade agreement. Facilities performing better than their baselines will receive payment from the Flowing River Watershed Phosphorus Credit Exchange for phosphorus credits generated, on the basis of annual price. Facilities that do not achieve their baseline, while meeting their minimum control levels, will owe payment to the Flowing River Watershed Phosphorus Credit Exchange for phosphorus credits equal to the amount discharged above their baseline.
- Each facility will be responsible for conducting weekly monitoring and monthly reporting to the permitting authority as required under the overlay permit.

The Flowing River Watershed Phosphorus Credit Exchange will purchase excess phosphorus credits to ensure that sellers receive compensation for their phosphorus credits. However, the Flowing River Watershed Phosphorus Credit Exchange will not hold excess credits or make these credits available for future purchase.

Flowing River Example: Trade Agreements *(continued)*

The NPDES permit writer for the facilities participating in the Flowing River Watershed Phosphorus Credit Exchange receives a written copy of the trade agreement that is signed and dated by authorized representatives of each participating facility. Although the NPDES permit writer is already familiar with the terms of the trade agreement because of participating in the development of the Flowing River Watershed Phosphorus Credit Exchange, the written and signed trade agreement indicates which facilities are planning to participate and should have coverage under the overlay permit.

The permit writer will incorporate monitoring and reporting requirements necessary to determine compliance with the annual phosphorus discharge limits for each facility and facilitate trading through the Flowing River Watershed Phosphorus Credit Exchange. The NPDES permit writer will also specify compliance conditions, including the need to purchase phosphorus credits in a specified amount at a specified time to achieve the baseline, that are consistent with the terms of the trade agreement. However, the permit would not specify the cost for phosphorus credits or have the ability to name buyers and sellers.

Components of a NPDES Permit

NPDES permits that authorize water quality trading are no different than typical NPDES permits in many respects—they require the same structure, analyses, and justification. All permits have five basic components: (1) cover page; (2) effluent limitations; (3) monitoring and reporting requirements; (4) special conditions; and (5) standard conditions. Standard conditions are the same for all NPDES permits and will not be addressed in this Toolkit. In addition, consistent with Title 40 of the *Code of Federal Regulations* (CFR) section 124.6, all permits are subject to public notice and comment. This provides all interested parties an opportunity to comment on the trading provisions in the permit.

Each NPDES permit is accompanied by a permit fact sheet. The information in these fact sheets is not enforceable. The purpose of the fact sheet is to explain the requirements in the permit to the public. Thus, at a minimum, the fact sheet should explain any trading provisions in the permit. There is a wide variety of options for including trading information in the fact sheet that ranges from explaining the minimum control level (buyer) or trading limit (seller) to including the entire trading program.

There are a variety of issues, however, that may require special consideration when developing a permit incorporating water quality trading. Appendix E provides the permit writer with a list of fundamental questions that should be addressed during the permit development process.

Permit Cover Page

The cover page of a NPDES permit typically contains the name and location of the permittee(s), a statement authorizing the discharge, the specific locations for which a discharge is authorized (including the name of the receiving water), and the effective period of the permit (not to exceed 5 years). If numerous permittees are covered, they can be listed in an appendix or attachment that is referenced on the cover page. A permit incorporating or

referencing a trade agreement can refer to water quality trading on the cover page, but this is not necessary. If the state has issued regulations or policy documents authorizing water quality trading, the permit writer should consider referencing the regulations in the Authority section of the cover page. For example, if trading is considered a water-quality management tool in a state’s Water Quality Management Plan, this may establish authority for integrating trading into NPDES permits and can be referenced on the cover page (Jones 2005).

The cover page may also address the specific pollutants regulated by the permit. For instance, the cover page of an overlay permit for TP may state that the overlay permit addresses only TP and that other parameters are addressed in each facility’s individual permit.

Long Island Sound, Connecticut

Connecticut’s General Permit for Nitrogen Discharges establishes the authority to discharge nitrogen as follows:

(a) Eligible Activities or Discharges

This general permit authorizes the discharge of total nitrogen (TN) from the POTWs listed in Appendix 1 (of the original permit), provided the activities are conducted in accordance with this general permit.

This general permit does not authorize any discharge of water, substance or material into the waters of the state other than the one specified in this section. Any person or municipality that initiates, creates, originates or maintains such a discharge must first apply for and obtain authorization under Section 22a-430 of the General Statutes.

For more information about this trading program, see Appendix A.

Effluent Limitations

Effluent limitations are the primary mechanism for controlling the discharge of pollutants from point sources into receiving waters. When developing a permit, the permitting authority focuses much of its effort on deriving appropriate effluent limitations. As in all NPDES permits, permits that include trading must include any applicable technology-based effluent limitations (TBELs), or the equivalent and, where necessary, water quality-based effluent limitations (WQBELs), that are derived from and comply with all applicable technology and water quality standards. Furthermore, limits must be enforceable, and the process for deriving the limits should be scientifically valid and transparent.

EPA’s Trading Policy does not support trading to meet TBELs unless trading is specifically authorized in the categorical effluent limitation guidelines on which the TBELs are based. Applicable TBELs thus serve as the minimum control level below which the buyer’s treatment levels cannot fall. This section discusses the overarching principles of how to express all applicable effluent limitations in permits for dischargers participating in water quality trades.

Credit Buyers

Permits for credit buyers should include both the baseline, which is the WQBEL that defines the level of discharge the buyer would have to meet through treatment **when not** trading, and a minimum control level that must be achieved through treatment **when** trading. The

Water Quality Trading Scenarios



permit should also include the amount of pollutant load to be offset (minimum control level – baseline) through credit purchases when trading. Most often, the applicable TBEL will serve as the minimum control level. A permitting authority can choose to impose a more stringent minimum control level than the TBEL to prevent localized exceedances of water quality standards near the point of discharge but not one that is less stringent than the TBEL. In a NPDES permit fact sheet, the effluent limitations for a credit buyer could be described as follows:

- The Discharger must meet, through treatment or trading, a mass-based effluent limitation for Pollutant A of <insert baseline>. If this effluent limitation is met through trading, the Discharger must purchase credits from authorized Sellers in an amount sufficient to compensate for the discharge of Pollutant A from Outfall 001 in excess of <insert baseline>, but at no time shall the maximum mass discharge of Pollutant A during <insert averaging period> exceed the minimum control level of <insert minimum control level>. Thus, the maximum mass discharge of Pollutant A to be offset through credit purchases is <insert minimum control level – baseline>.

Credit Sellers

When a potential credit seller is able to reduce its discharge below its most stringent applicable effluent limitation (i.e., its baseline), it may generate credits to sell. The quantity of credits that any given seller actually will be able to sell depends on the market for credits, agreements made with buyers, and any treatment requirements placed on potential buyers (i.e., the buyers’ minimum control levels). Because of these factors, it is possible that a discharger will not be able to sell all the credits it generates.

A credit seller’s permit will include both the most stringent effluent limitation that would apply without trading (e.g., baseline) and a trading limit. The seller can choose to what level it will control its pollutant discharge (using technology or best management practices (BMPs) it will implement) and this level becomes its trading limit. The baseline and trading limit could be described in the permit fact sheet as follows:

- Through treatment, the Discharger must meet a mass-based effluent limitation for Pollutant A of <insert baseline>. The Discharger is authorized to further treat its discharge, remove additional loading of Pollutant A, and generate and sell credits to an authorized credit Buyer or Buyers. If the Discharger sells such credits, the <insert averaging period, e.g., average monthly> effluent limitation <insert baseline> no longer applies and the trading limit for Pollutant A at Outfall 001 shall apply instead as follows: Trading Limitation = <insert baseline> – Quantity of Pounds Sold.

The permit must include monitoring and reporting requirements for Pollutant A sufficient to demonstrate that the seller actually has generated the credits it sells and, therefore, is meeting its trading limit.

Aggregate or Individual Limitations

It may be appropriate for permit writers to include aggregate WQBELs that apply to the group of point sources covered under a general or watershed permit. An aggregate effluent limitation typically represents the sum of the pollutant WLAs for all permittees covered by the permit. This allows maximum flexibility for trades among dischargers within the

Flowing River Example: Effluent Limitations

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Newly approved TMDL for Total Phosphorus for Flowing River

Exchange Participants:

Chuck's Potash Company

Current Load: 2,000 lbs (total per season)

New QBEL (based on WLA): 8,000 lbs (total per season)

New Treatment Capabilities: Treatment to 4,000 lbs (total per season)

Excess Pounds Reduced: 4,000 lbs (total per season)

Green and Go Fertilizers

Existing Discharge: 2,500 lbs (total per season)

New QBEL (based on WLA): 2,000 lbs (total per season)

Treatment Capabilities: Treatment to 2,500 lbs (total per season)

Pounds Needed: 500 lbs (total per season)

Shag Rug, Inc.

TBEL: 1,800 lbs (total per season)

New QBEL (based on WLA): 1,000 lbs (total per season)

Treatment Capabilities: Treatment to 1,800 lbs (total per season)

Pounds Needed: 800 lbs (total per season)

Troyville POTW

TBEL: 10,000 lbs (total per season)

New QBEL (based on WLA): 8,000 lbs (total per season)

New Treatment Capabilities: Treatment to 4,000 lbs (total per season)

Excess Pounds Reduced: 4,000 lbs (total per season)

Alpha Limited

Existing Discharge: 1,200 lbs (total per season)

New QBEL (based on WLA): 500 lbs (total per season)

Treatment Capabilities: Treatment to 1,200 lbs (total per season)

Pounds Needed: 700 lbs (total per season)

Flowing River Example: Effluent Limitations *(continued)*

Location: All facilities are less than a mile apart from each other along the Flowing River.

Applicable Trade Ratios: None.

To facilitate trading amongst the dischargers, the Flowing River Phosphorus Credit Exchange (Exchange) is designed to facilitate the exchange of credits between point source credit generators and purchasers. The Exchange has developed a trade agreement that outlines how point sources can generate and purchase credits, how to calculate trade ratios, as well as individual responsibilities for meeting effluent limitations. Trades occur once per year at the end of the TMDL *season* (June 1–September 30).

Of the potential participants in the Exchange, only the municipal wastewater treatment facility’s (Troyville POTW) and carpet manufacturer’s (Shag Rug, Inc.) existing permits include TBELs. Both are meeting the TBELs. The state has developed a general watershed-based permit for phosphorus point source dischargers along the Flowing River. The permit authorizes trading and includes the seasonal mass loading WQBELs that are based directly on the WLA requirements of the TMDL.

To comply with its seasonal WQBEL, a permittee may either meet the limitation at the point of discharge through treatment or other pollutant reductions at the facility or, after meeting its minimum control level (i.e., current discharge before the TMDL or applicable TBEL), pay into the Exchange to purchase necessary credits. The facility must treat its discharge to meet its minimum control level to purchase credits from the Exchange.

To be eligible to sell credits to the Exchange, a facility must first treat the discharge to meet its most stringent effluent limitation, which, in this case, is the WQBEL that implements the WLA. In addition, the state has established trading limits for all dischargers entering the Exchange as sellers, and these limitations must be met for the duration of the permit cycle.

Permit Language:

a. Effluent Limitations

1. Seasonal total mass loading effluent limitations applicable to each permittee covered under this permit are set forth in Table 1, which is incorporated herein in its entirety, as part of this general permit.
2. If the permittee participates in the Flowing River Phosphorus Credit Exchange, the permittee’s total annual mass discharge of total phosphorus shall not exceed the Seasonal Mass Loading Limitation (With Trading) outlined in Table 1.
3. If the permittee does not participate in the Flowing River Phosphorus Credit Exchange, the permittee’s total annual mass discharge of total phosphorus shall not exceed the Seasonal Mass Loading WQBEL (Without Trading).
4. A permittee shall be out of compliance with the seasonal discharge limitations of the general permit and subject to enforcement provisions if the facility’s seasonal mass loading of total phosphorus exceeds the applicable discharge limitations outlined in (a) (1) and (2) above.
5. Credits may be generated and used only between June 1–September 30.

Flowing River Example: Effluent Limitations *(continued)*

Table 1. Seasonal mass loading effluent limitations for TP

| Discharger | Units | June 1–September 30 | |
|--------------------------|-------|---|---|
| | | Seasonal mass loading WQBEL (without trading) | Seasonal mass loading limitation (with trading) |
| Chuck’s Potash Company | lbs | 8,000 (Baseline/WQBEL) | 1 |
| Green and Go Fertilizers | lbs | 2,000 (Baseline/WQBEL) | 2,500 (Minimum Control Level/ Existing Discharge) |
| Shag Rug, Inc. | lbs | 1,000 (Baseline/WQBEL) | 1,800 (Minimum Control Level/TBEL) |
| Troyville POTW | lbs | 8,000 (Baseline/WQBEL) | 1 |
| Alpha Limited | lbs | 500 (Baseline/WQBEL) | 1,200 (Minimum Control Level/ Existing Discharge) |

¹ Trading limit = (WQBEL – pollutant loading reduction necessary to generate quantity of credits sold)

watershed but should be considered only if localized exceedances of water quality standards are not a concern. An aggregate limitation allows individual dischargers to discharge or trade among themselves to any degree as long as the aggregate limitation is met. An aggregate effluent limit may be most appropriate in a trading scenario involving many individual dischargers within a watershed having a large-scale load reduction driver such as a TMDL for the entire waterbody or a percent load reduction requirements for the watershed as a whole. This is functionally equivalent to having a series of individual WQBELs and no trading limits.

EPA does not endorse setting a multisource aggregate limit without also including in the permit individual limits for each source covered. If the group of facilities does not meet its aggregate limit and an individual source does not meet its limit on its own and does not trade to meet it, enforcement action may be taken against this individual source. This approach keeps co-permittees under the general or watershed permit that have met their requirements free from liability when other co-permittees are responsible for the group discharging above the aggregate limit.

Neuse River Basin, North Carolina

The Neuse River Compliance Association (NRCA) general permit has an aggregate total nitrogen (TN) allocation, and each member of the association has an individual allocation. If the NRCA meets the aggregate limit for the year, the NRCA and each permittee are in compliance. If the aggregate limit is exceeded, the NRCA is out of compliance, and any member that exceeds its individual TN limit is also out of compliance and subject to enforcement action. For more information about this trading program, see Appendix A.

Pollutant Form, Units of Measure, and Timing Considerations

The permit should explicitly identify the **pollutant or pollutants being traded**. The permitting authority should ensure that the trading program or agreement and the calculated WQBELs are consistent in terms of the form of the pollutant, units of measure, and timing.

For example, if the pollutant specified in the WQBEL is nitrate-nitrogen, then credits generated under the trade agreement should be for nitrate-nitrogen and not for total Kjeldahl nitrogen (TKN) or some other form. If, on the other hand, the WQBEL is for TN, buyers and sellers should trade TN credits. In this case, a discharger may be required to measure TN. If there are concerns about localized impacts and WQBELs are also specified for a particular form or forms of nitrogen, the discharger may be required to monitor TKN, nitrite, and nitrate (all expressed as N) and then calculate its TN discharge.

Also an **equivalency ratio** may be needed when two sources are trading pollutants such as TN or TP but are actually discharging different forms of nitrogen or phosphorus (e.g., one discharger’s phosphorus discharge is made up primarily of biologically available phosphorus, while its trading partner’s discharge is primarily composed of bound phosphorus). An equivalency ratio may also be needed in cross-pollutant trading of oxygen demanding pollutants (e.g., phosphorus and biochemical oxygen demand (BOD)). In this case, the equivalency ratio would equal the ratio between the two pollutants’ impacts on oxygen demand. The trading program should account for any necessary equivalency ratios with regard to pollutant form or type; the permit writer needs to be aware of the pollutant form or type addressed in the trade agreement to ensure that the permit is consistent.

In addition, consistent **reconciliation periods** are essential in trading between point sources. The credit purchaser’s permit limits for the traded pollutant and the credit seller’s permit limits should have the same units and averaging period. Because both sets of limits are designed to address the same water quality problem, both should use the averaging period and units that make the most sense to address that problem. Consistent units and averaging periods will also simplify reconciliation of credit sales and purchases.

Flowing River Example: Pollutant Form, Units of Measure, and Timing

■ *What You Need to Know...*

Pollutant: Total Phosphorus

Driver: Newly Approved TMDL for Total Phosphorus for the Flowing River Watershed

Point Source Credit Exchange: *Flowing River Watershed Phosphorus Credit Exchange (administered by the state)*

Participating Facilities: *Chuck’s Potash Company, Green and Go Fertilizers, Shag Rug, Inc., Troyville POTW, Alpha Limited*

Location: All facilities are less than a mile apart from each other along the Flowing River.

Applicable Trade Ratios: None.



Flowing River Example: Pollutant Form, Units of Measure, and Timing *(continued)*

Pollutant Form

The TMDL indicates a need for all trading partners to control phosphorus discharges. To meet the new WQBELs for phosphorus, several members of the Exchange will install new treatment technology to reduce loads beyond the 30 percent required by the TMDL and wish to sell the excess reductions in the form of credits to the Exchange. Other members are unable to meet the new WQBELs that will be in the overlay permit and are choosing to purchase phosphorus credits from the Exchange. However, the solubility of the phosphorus impacts the amount available biologically in the waterbody. The more soluble the phosphorus form, the more readily it can impact the waterbody. Therefore, trades between partners must account for the different solubility of various facilities' discharges.

All members of the Exchange have monitored their effluent to determine the solubility of the phosphorus discharged. The monitoring data showed that the solubility of phosphorus discharges were equitable among the dischargers in the Exchange; therefore, no equivalency ratio is necessary.

Units of Measure

The phosphorus WQBELs based on the TMDL WLA are expressed in lbs as seasonal mass loadings to correspond with the units and averaging period in the TMDL. The phosphorus limits in most of the Exchange facilities' existing permits are also expressed in lbs as seasonal mass loadings. The trade agreement also specifies lbs as a seasonal mass loading. Annual trades will be based on seasonal mass loading reductions demonstrated through monitoring.

Timing of Credits

Credits are available beginning at the time of permit issuance. This allows 12 months before permit issuance for the Exchange to gather monitoring data to verify that the seller's technologies are achieving the expected treatment efficiency and will generate credits as expected after accounting for established ratios. These data are necessary to better understand how loading and reduction may vary over time. The general permit reflects these conditions. Trades will occur annually to correspond with seasonal mass-loading effluent limitations. The sellers will be able to continue to generate credits as long as the controls are properly operated and maintained, the facilities are able to demonstrate reductions, and the facilities do not become subject to more stringent requirements that would reduce or eliminate the credits (i.e., newly promulgated effluent guidelines or other more stringent technology-based controls, additional WQBELs to avoid localized exceedances of water quality standards). The ability of the sellers to continue to generate credits will be assessed during the renewal of the individual permits every 5 years.

Anti-backsliding, Antidegradation, and New Discharges Special Considerations

The Trading Policy discusses anti-backsliding and antidegradation and how these provisions can be met through trading.

Anti-backsliding

The term *anti-backsliding* refers to a statutory provision (CWA section 402(o)) that, in general, prohibits the renewal, reissuance, or modification of an existing NPDES permit that contains

WQBELs, permit conditions, or standards that are less stringent than those established in the previous permit (USEPA 1996b). The CWA establishes exceptions to this general anti-backsliding prohibition. EPA has consistently interpreted section 402(o)(1) to allow for less-stringent effluent limitations if either an exception under section 402(o)(2) or, for WQBELs, the requirements of section 303(d)(4) are met (USEPA 1996b). Section 402(o)(2) and 40 CFR 122.44(l) provide exceptions for circumstances such as material and substantial alterations to the facility, new information, events beyond the permittee’s control, and permit modifications under other sections of the CWA. Section 303(d)(4), which applies only to WQBELs, allows a less-stringent WQBEL in a reissued permit when the facility is discharging to a waterbody attaining water quality standards as long as the waterbody continues to attain water quality standards even after the WQBEL is relaxed. In addition, revising the limitation must be consistent with the state’s antidegradation policy. If the discharge is to a waterbody that is not attaining water quality standards, a less-stringent WQBEL is allowed only when the cumulative effect of all revised effluent limitations results in progress towards attainment of water quality standards. For a detailed discussion of the anti-backsliding exceptions, see EPA’s *NPDES Permit Writers’ Manual* (EPA-833-B-96-003). EPA’s Trading Policy states:

EPA believes that the anti-backsliding provisions of Section 303(d)(4) of the CWA will generally be satisfied where a point source increases its discharge through the use of credits in accordance with alternate or variable water quality based effluent limitations contained in an NPDES permit, in a manner consistent with provisions for trading under a TMDL, or consistent with the provisions for pre-TMDL trading included in a watershed plan.

A permit writer should simply explain in the fact sheet of the permit how the limitations in the permit, after accounting for any trading provisions, are at least as stringent as the limits in the previous permit or, alternatively, how anti-backsliding provisions of the CWA are satisfied.

Antidegradation

As repeated throughout this document, NPDES permits may not facilitate trades that would result in nonattainment of an applicable water quality standard, including the applicable antidegradation provisions of water quality standards. Permitting authorities should ensure that WQBELs developed to facilitate trade agreements accord with antidegradation provisions and that antidegradation reviews are performed when required. Nothing in the Trading Policy per se changes how states apply their antidegradation policies, though states may modify their antidegradation policies to recognize trading.

The Trading Policy states:

*EPA does not believe that trades and trading programs will result in “lower water quality” . . . or that antidegradation review would be required under EPA’s regulations when the trades or trading programs achieve a **no net increase** of the pollutant traded and do not result in any impairment of designated uses.*

Special considerations for antidegradation relative to water quality trading depend on the tier of protection applied to the waterbody as described below.

Tier 1 is the minimum level of protection under antidegradation policies. For Tier 1 waters, the antidegradation policy mandates protection of existing instream uses. Because EPA neither supports trading activities nor allows issuance of permits that violate applicable water quality standards, which should protect existing uses at a minimum, any supported trading activities incorporated into a NPDES permit should not violate antidegradation policies applicable to Tier 1 waters.

Tier 2 protects waters where the existing water quality is higher than required to support aquatic life and recreational uses. Water quality in Tier 2 waters may be lowered (only to the level that would continue to support existing and designated uses) but only if an antidegradation review finds that (1) it is necessary to lower water quality to accommodate important social or economic development, (2) all intergovernmental and public participation provisions have been satisfied, and (3) the highest statutory and regulatory requirements for point sources and BMPs for nonpoint sources have been achieved. The Trading Policy supports trading to maintain high water quality when trading is used to compensate for new or increased discharges. Thus, the Trading Policy supports reductions of existing pollutant loadings to compensate for the new or increased load so that the result is *no lowering of water quality*. A state, in applying its antidegradation policy, may decide to authorize a new or increased discharge to high-quality water and may decide to use trading to completely or partially compensate for that increased load. If the increased load to Tier 2 waters is only partially compensated for by trading, an antidegradation review would be required to address the increased load.

Tier 3 protects the quality of outstanding national resource waters and waters of exceptional recreational or ecological significance. In general, antidegradation policies do not allow any increase in loading to Tier 3 waters that would result in lower water quality. EPA supports trading in Tier 3 waters to maintain water quality.

Monitoring

Permitting authorities may want to consider developing monitoring and reporting requirements to characterize waste streams and receiving waters, evaluate wastewater treatment efficiency, and determine compliance with permit conditions in trade agreements. Monitoring and reporting conditions of a NPDES permit may contain specific requirements for sampling location, sample collection method, monitoring frequencies, analytical methods, recordkeeping, and reporting. If the permit conditions include compliance with provisions in a trade agreement, then the permitting authority should include monitoring, record-keeping and reporting requirements that facilitate compliance evaluations and, where necessary, enforcement actions related to the trading requirements. Discharge monitoring requirements should be consistent with the provisions of the trade agreement in terms of pollutants and forms of pollutants monitored, reporting units, and timing. The permit provisions should ensure that the results of discharge monitoring will be useful to the permittees, the permitting authority, and the general public in determining whether the provisions of the trade agreement are being met.

Water Quality Trading Scenarios



Sample Collection and Analysis

The same discharge sampling location used for compliance in any existing NPDES permits should be used for determining compliance with effluent limitations developed for traded parameters. Samples collected as part of a self-monitoring program required by a NPDES permit must be performed in accordance with EPA-approved analytical methods specified in 40 CFR Part 136 (*Guidelines for Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act*) where Part 136 contains methods for the pollutant of concern. Where no Part 136 methods are available, the permit writer should specify which method should be used for compliance monitoring.

Parties Responsible for Monitoring

The trade agreement specifies the types and frequency of monitoring needed as well as the parties responsible for monitoring. The individual facilities are ultimately responsible to ensure that effluent monitoring is completed and reported to the permitting authority. Any enforcement actions for failure to monitor and report will be against the individual facilities. The permitting authority should ensure that sufficient monitoring is required to allow permittees, agency compliance personnel, and the public to gauge whether dischargers are meeting their individual effluent limitations and requirements under the trade agreement.

Discharge monitoring under a multiple facility permit would be required of all individual dischargers and should be listed in the permit. If the permit is an overlay permit used to incorporate water quality trading for specific pollutants, the permitting authority may establish certain monitoring requirements, such as monitoring location, by reference to the facility's individual NPDES permit for consistency. Alternatively, the permit could specifically list the monitoring location and requirements for each permittee or co-permittee.

The permitting authority may consider establishing more frequent monitoring for facilities with higher design flows than those with lower design flows. Monitoring and reporting requirements in a multiple facility permit, such as a watershed-based permit, would be a combination of individual and watershed-wide requirements as described below.

Ambient Monitoring

Ambient monitoring is one way to show whether a trade agreement meets or improves water quality. In addition to traditional discharge monitoring requirements, ambient water quality monitoring may be appropriate at strategic locations to ensure that the trade is not creating localized exceedances of water quality standards and to document the performance of the overall trading program. Permits with mixing zones may include monitoring requirements as appropriate to ensure that water quality criteria are not exceeded at the edge of the applicable mixing zone.

General or watershed-based permits may establish a comprehensive, watershed monitoring program. For example, to fulfill monitoring requirements that are applied to multiple dischargers, permittees could establish a monitoring consortium to collect ambient water quality data that supplements end-of-pipe monitoring data required by the permit. Through this group-wide monitoring consortium, permittees could generate data to use in watershed assessments.

Flowing River Example: Monitoring

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Newly Approved TMDL for Total Phosphorus for the Flowing River Watershed

Point Source Credit Exchange: *Flowing River Watershed Phosphorus Credit Exchange (administered by the state)*

Participating Facilities: *Chuck's Potash Company, Green and Go Fertilizers, Shag Rug, Inc., Troyville POTW, Alpha Limited*

Location: All facilities are less than a mile apart from each other along the Flowing River.

The facilities discharging to Flowing River have existing TP monitoring requirements. The existing permits require monthly monitoring for TP. The overlay permit will require monitoring at the same locations as established in the existing permits. In addition, each discharger will be required to monitor for phosphorus weekly during June through September. For the permitting authority to gauge compliance, the permit writer will develop permit language that requires each discharger to submit monthly discharge monitoring reports (DMRs) to the permitting authority by the 15th of the month following monitoring. Ambient receiving water monitoring requirements are included in the existing NPDES permits and are adequate to ensure that localized exceedances of water quality standards do not develop as a result of trades.

Permit Language:

1. Each permittee shall monitor effluent total phosphorus a minimum of one time per week at existing discharge monitoring locations established in each facility's existing NPDES permit during the months of June through September. Each permittee shall determine the average monthly mass loading based on actual monthly average flow. Flow monitoring shall be continuous.
2. During the remaining, off-season months, each permittee must monitor effluent total phosphorus at least one time per month in compliance with existing individual NPDES permit requirements and determine mass loading based on actual effluent flow. Each permittee shall monitor flow continuously.

Monitoring to Document Trades

The permitting authority should be aware of any monitoring responsibilities established in the trading program or through the credit exchange and should ensure that the permit conditions do not contradict these requirements. Where the trading program provides that the point source conduct additional monitoring to document trades, the permit should incorporate or reference those requirements. Where the trading program provides that a third-party conduct monitoring, the permit should also reference those requirements and clarify the permittee's responsibilities, if any, for reporting or conducting these activities itself should the third-party fail to fulfill its responsibilities.

Reporting Requirements

Reporting requirements should be established to support the permitting authority's evaluation of water quality trading programs. For example, in addition to reporting discharge monitoring results, permitting authorities might require a permittee to report the number of credits purchased. Permitting authorities might also require an annual monitoring report specific to the pollutants involved in the trade, to provide information on annual loading in accordance with the requirements of the trading program. Permits incorporating water quality trades should require reporting at a frequency appropriate to determine compliance with the trading provisions. Permitting authorities should consider any requirements of the trading programs related to reporting and ensure the permits are consistent with these requirements. Permits may require reporting of monitoring results at a frequency established through the permit on a case-by-case basis, but in no case may that frequency be less than once per year.

Trading programs may establish other reporting and tracking requirements as well. For example, it is essential to have a mechanism for tracking trades. An additional form could be required such as a credit certificate form (see [Appendix C](#)). The permitting authority can hold point sources liable if they violate any trading provision included in the permit or any trade agreement incorporated by reference into the permit, and point sources are also liable if they do not meet their permit limits.

Permitting authorities should consider establishing discharger trade reporting requirements to monitor trading activities and any alternative compliance activities implemented if a facility fails to generate credits as expected (see [Special Conditions](#)). In addition, credit exchanges should consider holding surplus credits in reserve to be used to compensate for point source pollutant loads if a failed trade and the permitting authority may want the credit exchange to report the generation of these reserve credits as well.

Data Reporting to EPA

EPA administers two systems to store NPDES permit data and track compliance, the Permit Compliance System (PCS) and the new Integrated Compliance Information System (ICIS). PCS is the old, computerized management information system that contains data on NPDES permit-holding facilities to track the permit, compliance, and enforcement status of these facilities.

The new system, ICIS, was deployed in June 2006 to approximately 20 states. ICIS contains integrated enforcement and compliance information across most of EPA's programs including all federal administrative and judicial enforcement actions. In addition, ICIS has the capability to track other activities occurring in an EPA Region that support enforcement and compliance programs. These include Incident Tracking, Compliance Assistance, and Compliance Monitoring. In the future, ICIS will be deployed to all states, and PCS will no longer be used.

Neither PCS nor ICIS is structured to actually track trades.

PCS is designed to compare actual discharge monitoring data against required effluent limitations to determine a facility's compliance with its NPDES permit. To determine compliance under a trading scenario, it is necessary for the NPDES permitting authority to compare



Flowing River Example: Reporting

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Newly Approved TMDL for Total Phosphorus for the Flowing River Watershed

Point Source Credit Exchange: *Flowing River Watershed Phosphorus Credit Exchange (administered by the state)*

Participating Facilities: *Chuck's Potash Company, Green and Go Fertilizers, Shag Rug, Inc., Troyville POTW, Alpha Limited*

Location: All facilities are less than a mile apart from each other along the Flowing River.

An overlay permit is being developed for permittees in the Flowing River watershed to facilitate trading for permittees that wish to trade through the Flowing River Phosphorus Credit Exchange (Exchange). In addition to their existing, individual NPDES permits, each of the trading partners have applied for coverage under the overlay permit. The overlay permit requires, in addition to monitoring reports to the permitting authority, regular reporting of any changes to the Exchange's trade agreement and reports for tracking trades. This information can be compiled by each individual permittee or by the Exchange but must be reported to the permitting authority.

Because the overlay permit will contain seasonal, mass-loading effluent limitations for phosphorus for one particular season of the year, annual trade transactions will be necessary to maintain compliance. The trade agreement between the permittees and the Exchange indicates that trades will be tracked in an electronic trade tracking system. Credits must be used in the same period they are generated, and trading notification forms must be submitted to the regulatory agency by October 15.

Permit Language:

No trade is valid unless it is recorded in the Flowing River Phosphorus Credit Exchange electronic trade tracking system or equivalent system that records all trades and generates trading notification forms and a summary of all trades valid between June 1 and September 30 of each year, in substantially the same format as forms approved by the state. The record-keeping system must be capable of ensuring that a particular credit is not sold to more than one trading participant. The trading notification forms and trading summary may be compiled by the Exchange, but each permittee is responsible for the submittal of all documentation and reports. Trading notification forms for each trade must be submitted to the <Permitting Authority> by October 15.

actual discharge monitoring data and the quantity of credits purchased or pounds sold against required effluent limitations. For credit sellers, compliance is tracked against the WQBEL that serves as the facility's baseline. For credit buyers, compliance is actually tracked against two effluent limitations—the minimum control level and the baseline. The challenge in using PCS to determine compliance under a trading scenario is that the system does not automatically make adjustments to the reported actual discharge—it will not add or subtract the load traded. Therefore, this type of adjustment must be done before entering information into PCS so that the system has only one reported number to compare against an effluent limitation.

To determine compliance for a credit seller, the NPDES permitting authority will need to know that the sum of a credit seller’s actual discharge and the number of pounds sold is less than or equal to the most stringent effluent limitation (i.e., the baseline). Therefore, point source credit sellers could report the sum of the facility’s actual discharge and the number of pounds sold, and that amount would be entered into PCS. PCS would then compare the sum of the actual discharge and the number of pounds sold against the facility’s baseline; the sum should be less than or equal to the facility’s baseline to indicate that the facility is in compliance.

Point source credit buyers not only have a baseline, but also a minimum control level (the facility’s TBEL or current discharge, whichever is more stringent). To determine compliance for a credit buyer, the NPDES permitting authority will need to know that (1) the facility’s actual discharge is less than or equal to its minimum control level, and (2) that the number of credits purchased result in the facility achieving its baseline. Therefore, point source credit buyers could report two types of information: (1) the facility’s actual discharge, and (2) the difference between the actual discharge and the quantity of credits purchased. Both numbers would be entered into PCS to determine compliance. PCS would compare the actual discharge against the minimum control level to determine permit compliance and eligibility as a credit buyer. PCS would also compare the difference between the actual discharge and the quantity of credits purchased against the facility’s baseline; the difference should be less than or equal to the WQBEL to indicate that the facility has purchased enough credits to meet its baseline and remain in compliance with its WQBEL. PCS can accommodate two different effluent limits for the same parameter; therefore, it has the capability to determine compliance with both the minimum control level and the baseline for a credit buyer.

ICIS also allows the NPDES permitting authority to report two limits; therefore, this system can also accommodate both the baseline and the minimum control level for credit buyers. New DMR forms will also have two lines to report both the baseline and the minimum control level. Like PCS, ICIS does not actually adjust actual discharges with the load traded. Under the current design, ICIS will allow a facility with an existing NPDES permit to also have a trading partner entered into the system. Once a trading partner is entered for a facility, ICIS will allow the entry of an adjusted value—this is the reported actual discharge adjusted by the number of credits bought or sold. If an adjusted value is entered, this value is used to determine permit violations and percent exceedances (USEPA 2006).

In addition to challenges related to limits and the type of information to report, NPDES permits with trading provisions might also raise issues related to reporting periods and automated compliance tracking. PCS will not support a reporting extension beyond 30 days. This type of reporting extension might be necessary in some instances to allow adequate time for the administrative activities necessary for trading partners to coordinate and reconcile trades. ICIS, however, will support a 45-day reporting period. In rare instances when a permitting authority uses annual limits, both PCS and ICIS will allow for one limit to be monthly and one to be annual. However, the permitting authority will have to manually flag annual limit effluent violations for reportable noncompliance (RNC) and significant noncompliance (SNC) to track compliance.

Special Conditions

Special conditions are developed to supplement effluent limitations guidelines and may include requirements such as BMPs, additional monitoring activities, ambient stream surveys, and toxicity reduction evaluations (TREs). Special conditions also include permit modification and reopener conditions and can be used to address water quality trading or incorporate compliance schedules (if authorized by the permitting authority). Special conditions of a NPDES permit will be very important in incorporating the terms of a trade agreement. Even where the specific terms of the agreement are not directly incorporated into the permit, the special conditions will be used to refer to, and require compliance with, the trade agreement housed in a separate document.

The special conditions included in a NPDES permit that incorporates trading will depend on provisions of the trade agreement and the effluent limitations and monitoring and reporting requirements established in the permit. However, the permitting authority should consider incorporating special conditions that support the trading conditions. For example, the special conditions of the permit may specify how and when trades may be conducted among permittees or how an exceedance of an aggregate loading cap will be enforced among the permittees responsible for exceeding their individual loading limits.

Special conditions may also be used to establish provisional requirements that apply if the credits on which the trading limits are based are unavailable. Special conditions addressing group and individual liability, provisional requirements that apply when credits are unavailable or when an individual or collective limit is exceeded, and outlining the specific requirements for establishing trade agreements among permittees can be important in issuing acceptable permits that will not require modification each time circumstances change for one of the dischargers covered under the permit.

In addition, the special conditions section of the permit could include a compliance schedule. Permit compliance schedules for WQBELs are allowed only when state water quality standards or state regulations implementing such standards provide authority for using compliance schedules as well as when those limits are derived from water quality standards that were newly adopted or substantively revised after July 1, 1977. Most state water quality standards or implementing regulations authorize using compliance schedules. If compliance schedule authority is available, the permit writer could place a compliance schedule in the permit special conditions that would give the discharger time to comply with provisions related to WQBELs and trading when those provisions are intended to be phased in over time.

Water Quality Trading Scenarios



Flowing River Example: Special Conditions

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Newly Approved TMDL for Total Phosphorus for the Flowing River Watershed

Point Source Credit Exchange: *Flowing River Watershed Phosphorus Credit Exchange (administered by the state)*

Participating Facilities: *Chuck's Potash Company, Green and Go Fertilizers, Shag Rug, Inc., Troyville POTW, Alpha Limited*

Location: All facilities are less than a mile apart from each other along the Flowing River.

The NPDES permit writer has reviewed the signed trade agreement for TP trading between the point sources and the Flowing River Watershed Phosphorus Credit Exchange. The agreement describes how each discharger will meet its new WQBEL through trading with the Exchange. The NPDES permit writer has developed the appropriate effluent limitations, monitoring, and reporting requirements for the each discharger. The special conditions in the NPDES permit focus on general authority, credit definition, notification of amendment to the trade agreement, notification of unavailability of credits, permit reopeners and modification provisions, and enforcement liability.

Permit Language:

General Authority

The permittee is authorized to participate in water quality trading with the Flowing River Watershed Phosphorus Credit Exchange, as specified in the trade agreement, for the purposes of complying with the phosphorus effluent limitations and the TMDL-related requirements of this permit (Table 1). The authority to use trading for compliance with these limits is derived from **<insert state law where applicable>** and section 402 of the federal Clean Water Act 33 United States Code (U.S.C.) section 1342. EPA's policies on Water Quality Trading (1/13/03) and Watershed-Based NPDES Permitting (1/7/03) endorse water quality credit trading. Additionally the Flowing River Phosphorus TMDL authorizes water quality trading as a means of achieving the allocations established by the TMDL.

Credit Definition

All credits used to comply with the effluent limitations of this permit will be measured in pounds of total phosphorous per day on a monthly average basis. One trading credit will be defined as one (1) unit of pollutant reduction (pound of total phosphorus) to Flowing River. All valid credits are tradable. The permittee may purchase credits from or sell credits to the Exchange so long as the treatment technologies used to generate credits are documented as providing pollutant reductions beyond the wasteload allocations established for the credit exchange members in the Flowing River Phosphorus TMDL.

Notification of Amendment to the Trade Agreement

The permittee is required to notify the permitting authority in writing within 7 days of the Flowing River Watershed Phosphorus Credit Exchange Trade Agreement being amended, modified, or

Flowing River Example: Special Conditions *(continued)*

revoked. This notification must include the details of any amendment or modification in addition to the justification for the change(s).

Notification of Unavailability of Credits

The permittee is required to notify the permitting authority in writing within 7 days of becoming aware that credits used or intended for use by the permittee to comply with the terms of this permit are unavailable or determined to be invalid. This notification must include an explanation of how the permittee will ensure compliance with the WQBELs established in this permit, either through implementation of on-site controls or by conducting an approved emergency phosphorus offset project approved by the NPDES permit writer.

Permit Reopeners, Modification Provisions

The permitting authority may, for any reason provided by law, summary proceedings or otherwise, revoke or suspend this permit or modify it to establish any appropriate conditions, schedules of compliance, or other provisions which may be necessary to protect human health or the environment or to implement the Flowing River phosphorus TMDL. The permitting authority may also reopen and modify the permit to suspend the ability to trade credits to comply with the total phosphorus effluent limitations in Table 1-1.

Enforcement Liability

The permittee is liable for meeting its most stringent effluent limitation. No liability clauses contained in other legal documents (e.g., trade agreements, contracts) established between the permittee and other authorized buyers and sellers are enforceable under this permit.

Water Quality Trading Scenario: Point Source–Nonpoint Source Trading

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Water Quality Trading Scenario: Point Source–Nonpoint Source Trading

Significant water quality impacts may come from sources other than regulated point sources. The permitting authority, along with other stakeholders, may agree that the best way to meet water quality standards would be to involve the nonpoint sources in the watershed. Because nonpoint sources are not regulated by the Clean Water Act (CWA), a trading program that allows nonpoint sources to generate and sell credits may provide an economic incentive for these sources to implement new or additional best management practices (BMPs) that reduce pollutant loadings to receiving waters.

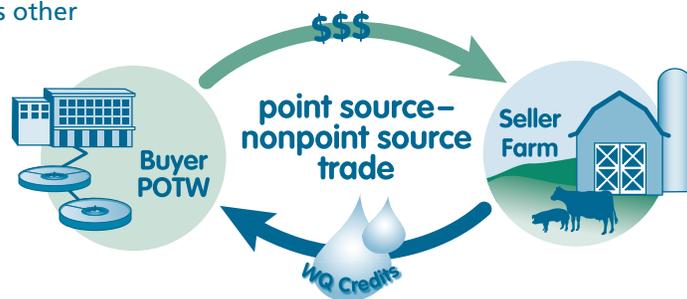


Figure 1. Point source–nonpoint source trade.

Point source–nonpoint source trades necessitate a trade agreement between one or more point sources and one or more nonpoint sources (see Figure 1). The nonpoint source(s) reduce pollutant loads below an established baseline to generate credits, which the point source may purchase. Point source–nonpoint source trades would be reflected in an individual National Pollutant Discharge Elimination System (NPDES) permit for the point source either by referencing or incorporating the terms of the trade agreement. Through trading, the point source can meet water quality-based effluent limitations (WQBELs) at a lower cost and, provided there is adequate accountability and verification, the nonpoint source will be compensated for contributing to the point source’s WQBELs.

A point source may purchase nonpoint source credits in one of two ways: (1) directly from nonpoint source(s) by coordinating with a nonpoint source or a program administered by an entity responsible for a group of nonpoint sources dischargers; or (2) from a nonpoint source credit exchange that contains pollutant reduction credits contributed by numerous nonpoint sources through implementation of approved BMPs. A permitting authority should be aware of technical challenges and uncertainty associated with nonpoint source credit generation, including how the trading program accounts for uncertainty in measuring nonpoint source pollutant loads and how equitable baselines are set for nonpoint source credit sellers.

This water quality trading scenario presents the challenges related to nonpoint source credit generation and then addresses issues specific to developing and issuing NPDES permits that implement point source–nonpoint source trades where the point source, or an entity representing a group of point sources, purchases credits directly from one or more nonpoint sources. Issues covered under this scenario include the following:

- Quantifying nonpoint source loads and credits
- Establishing baselines for nonpoint source sellers
- Accountability
- Trade agreements

Water Quality Trading Scenarios

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- Components of a NPDES permit
 - Permit cover page
 - Effluent limitations
 - Monitoring
 - Reporting requirements
 - Special conditions

A hypothetical example (shown in highlighted boxes) is presented throughout this scenario to illustrate how NPDES permit writers might work with credit buyers and sellers to assist in trading and ensure each facility’s NPDES permit contains the appropriate limits, requirements, and other conditions. Keep in mind that there are a range of options for incorporating trading provisions into a NPDES permit. The hypothetical example discussed throughout this scenario illustrates just one of the many options a NPDES permit writer might use.

Quantifying Nonpoint Source Loads and Credits

For most continuous point source discharges, measuring pollutant loads and the effectiveness of controls is simply a matter of measuring pollutant concentrations in effluent and converting concentration-based limits to mass-based limits using flow. Conversely, as noted in the U.S. Environmental Protection Agency’s (EPA) *Water Quality Trading Policy* (Trading Policy), the diffuse nature of nonpoint source pollutants along with variability in precipitation; land management practices; and the effect of soil type, slope, and cover on pollutant loadings to receiving waters creates a great degree of uncertainty in determining loading from nonpoint sources and measuring the effectiveness of BMPs. For example, pollutant loads in runoff from a crop field are dependent on crop type, soil type, slope, fertilizer use patterns, weather and the amount of time it takes for runoff to reach the receiving water. These factors could vary by season and from year to year; therefore, the pollutant load is highly variable and may be difficult to measure. The same factors contribute to difficulties in measuring the effectiveness of BMPs used to reduce nonpoint source pollutant loads.

Nonpoint sources typically employ BMPs to reduce pollutant loading to a receiving water. BMPs are schedules of activities, technologies, structural controls, changes in or prohibitions of practices, maintenance procedures, and other measures to prevent or mitigate pollutant runoff to waters. Examples of nonpoint source BMPs include riparian buffer plantings, wetland creation or restoration, sediment basins, filter strips, crop sequencing, and nutrient management. Nonpoint source pollutant load reductions can sometimes be measured directly, but trading programs typically use the best available performance information to estimate load reductions for a particular BMP and then discount these estimated values using uncertainty ratios to account for the technical challenges in determining BMP effectiveness.

Potential Issues

Lag Time

Permitting authorities should be aware of potential time lags between BMP installation and full pollutant reduction efficiency. BMPs that are not yet fully functional cannot generate

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the full number of expected credits. Credits generated by nonpoint sources through installation of BMPs may not be available immediately because of a time lag between installation of the BMP and its effectiveness in reducing loadings or otherwise improving water quality. In some cases, the credit generation could be prorated on the basis of the pollutant reduction the BMP is achieving during the current reconciliation period, even where the BMP has not reached its maximum expected pollutant reduction efficiency. The decisions required to determine when credits have been generated may have already been made in the program design. The permitting authority should be aware of these decisions made in trading program design.

If the trade agreement or other document external to the permit does not dictate how and when credits become available for purchase, the NPDES permit should address the time lag between BMP installation and full treatment efficiency (see [Reporting Requirements](#)).

Period of BMP Performance

The permitting authority should also determine whether and when a BMP’s credit-generating capacity expires. Credit generation by nonpoint sources might decrease or stop if the BMP becomes less effective due to a natural degeneration, a lack of maintenance, or changing conditions on-site. A BMP’s life expectancy depends on proper design, placement, and maintenance. Some BMPs have a discrete or short life or must be renewed. For example, nonpoint sources must renew crop sequencing each season.

Proper operation and maintenance are critical to ensuring the ongoing performance and attaining the expected life span of a BMP. Trading programs should include mechanisms to ensure that BMPs installed to generate credits are being operated and maintained according to procedures and guidelines established by Natural Resources Conservation Service (NRCS), EPA, or other agencies or product manufacturers.

Other BMPs have a longer life span but require ongoing maintenance and repair to maintain effectiveness. For example, a sediment catch basin requires periodic inspection to ensure structural integrity and regular cleaning to remove and properly dispose of collected sediments. In addition, activities or conditions may change on-site affecting the efficiency of installed BMPs. For example, a vegetated buffer strip designed to filter sediment from a 5-acre crop field may be overwhelmed and become ineffective if the operator decided to increase the field size to 8 acres.

The permitting authority should specify in the permit the approved BMPs and associated expected life spans established by the trading program. Continued credit generation may require periodic certification that a nonpoint source continues to implement a practice, that the nonpoint source is taking specified operation and maintenance actions, and that the BMP design and specification are still appropriate for the site. The trading program should account for the life span of a credit source and determine when credits are deemed permanently expired and thus unavailable for any future allocation. Permits implementing nonpoint source trading can contain or reference provisions to require certification of BMP performance and define when a BMP generating credits expires (see [Reporting Requirements](#) and [Special Conditions](#)).

Water Quality Trading Scenarios

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Lower Boise River, Idaho

The Lower Boise trading framework addresses the issue of certifying BMP performance by having the NPDES point sources purchasing credits sign a **Reduction Credit Certificate** at the end of each month certifying that the BMP is still in place and that it produced a specific reduction amount during the month that just occurred. The NPDES buyer certifies that they are aware of the penalties for false certification by signing the Reduction Credit Certificate, which then establishes the credit that they can then transfer into their own account and use to cover their discharge. EPA and Idaho Department of Environmental Quality (Idaho DEQ) conduct random audits of some BMPs to determine if the certification was valid. For more information on trading in Idaho, see Appendix A.

Uncertainty

EPA's Trading Policy recommends that states and tribes establish methods to account for greater uncertainties in estimates of nonpoint source loads and reductions (see Appendix B). There are three types of uncertainty related to nonpoint source BMPs:

- Measurement uncertainty, which addresses the level of confidence in the field testing of a nonpoint source BMP
- Implementation uncertainty, which addresses the level of confidence that a nonpoint source BMP is properly designed, installed, maintained, and operated
- Performance uncertainty, which addresses the risk of a BMP failing to produce the expected results

Options for Addressing Uncertainty

Uncertainty Ratios

The application of an uncertainty ratio helps ensure that actual loads resulting from a trade do not violate the water quality standards despite the inability to accurately measure them (Jones 2005). An uncertainty ratio should be applied to estimated nonpoint source load reductions to account for any potential inaccuracies in the methodology or assumptions used in the estimation. Uncertainty ratios are particularly important to account for potential inaccuracies in the estimation methodology when credits from nonpoint source BMPs are estimated or calculated.

Uncertainty, and therefore the uncertainty ratio, can be reduced by enhancing the level of confidence in BMP effectiveness values through employing one or more of the following three practices.

Monitoring BMP Effectiveness

Monitoring BMPs installed for generating credits is the most effective method for reducing uncertainty. Two types of monitoring are possible. In some instances, it is possible to conduct edge-of-field monitoring to determine BMP performance. Another type of monitoring is ambient monitoring. Placing monitoring gauges in the stream at strategic locations between the buyer and the seller would allow for gauging water quality impacts of BMPs. EPA's *Monitoring Guidance for Determining Effectiveness of Nonpoint Source Controls* (EPA/841-B-96-004) provides guidance on the design of water quality monitoring programs to assess both impacts from nonpoint sources and effectiveness of control practices and management measures.

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Modeling BMP Effectiveness

Modeling that uses local data to calculate nonpoint source pollutant loadings and BMP effectiveness is also an important tool. For instance, estimates of pollutant reductions (e.g., total phosphorus (TP) and sediment) might be based on soil erosion reductions using the standardized or revised Universal Soil Loss Equation (USLE). This method incorporates soil type, plant cover, rainfall, slope, and agricultural conservation practice factors to calculate the soil loss from an area. The soil loss information may then be translated to estimate loadings of sediment-bound phosphorus. An uncertainty ratio should be applied to modeled estimates. All modeling should be ground truthed by local monitoring data, which could lead to a reduction in uncertainty.

Estimating BMP Effectiveness

Where monitoring and modeling are impracticable, BMP effectiveness can be estimated through other means. For example, it might be possible to identify a set of tested BMPs with performance data that have been well established through field testing or under controlled conditions. These data may be used to estimate the reductions achieved at a nonpoint source that installs one or more of the tested BMPs. The trading program, with input from local soil and conservation experts, might identify a list of local BMPs that meet minimum design, construction, maintenance, and monitoring requirements. Preestablished performance data can be used to estimate loading reductions for local nonpoint sources. Potential uncertainty ratio reduction is an advantage of implementing local BMPs with high levels of measurement precision and accuracy.

South Nation River Watershed, Ontario, Canada

The trading program established formulae that are used to calculate the amount of phosphorus that is controlled annually from various agricultural practices. For example, the formula used to calculate the amount of phosphorus (P) controlled through proper manure storage is as follows:

$$\text{Kg of P per year controlled} = \# \text{ of animals} \times \text{animal phosphorus factor} \times \text{days} \times 0.04$$

where:

- # of animals = the number of animals contributing manure to the area,
- Animal phosphorus factor = U.S. Department of Agriculture’s (USDA) estimates of the amount of phosphorus excreted per animal,
- Days = the number of days that the animals are contributing manure to the area, and
- 0.04 represents the assumption that approximately 4 percent of the total amount of manure excreted would have been transported in runoff from improperly stored manure.

In addition to manure storage, formulae have also been established to calculate the amount of phosphorus controlled through use of clean water diversions, proper storage and handling of milkhouse washwater, preventing livestock access to watercourses, various cropping practices, and buffer strips (O’Grady and Wilson, no date).

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The Idaho Department of Environmental Quality’s Draft Pollutant Trading Guidance

Idaho DEQ’s November 2003 draft *Pollutant Trading Guidance* provides a list of approved agricultural BMPs that can be used to generate TP reduction credits for trading in the Lower Boise River watershed. The draft guidance document includes estimates of BMP effectiveness and uncertainty discounts for specific watersheds (the uncertainty discount is subtracted from the effectiveness estimate). The guidance also lists the procedures for determining the amount of credits and associated monitoring and maintenance requirements for each BMP. Table 1 lists selected BMPs approved by Idaho DEQ for use in nutrient trading in the Lower Boise River watershed. A separate list of watershed-specific BMPs, along with effectiveness estimates and uncertainty ratios, will be generated for each watershed that would like to develop a trading program consistent with the Idaho *Pollutant Trading Guidance*. See Appendix A for more information on [trading in Idaho](#).

Table 1. Selected BMPs approved for trading in the Lower Boise River watershed

| BMP | Life span | Effectiveness | Uncertainty |
|------------------------------|-----------|---------------|-------------|
| Sediment basins (farm scale) | 20 years | 75% | 10% |
| Constructed wetland | 15 years | 90% | 5% |
| Microirrigation | 10 years | 100% | 2% |
| Crop sequencing | 1 season | 90% | 10% |
| Filter strips | 1 season | 55% | 15% |

Establishing Baselines for Nonpoint Source Sellers

As stated in the *Essential Trading Information for Permit Writers* section, a nonpoint source should meet the specified baseline before entering the trading market as a credit seller. Baseline is defined as the pollutant control requirements that apply to a buyer and seller in the absence of trading. After a seller meets its baseline, it can generate credits.¹ A baseline for a nonpoint source can be derived from a load allocation (LA) established under a total maximum daily load (TMDL). Where an LA does not exist, EPA’s Trading Policy states that state and local requirements and/or existing practices should determine a nonpoint source’s baseline (see Figure 2). The trading program provisions could also specify some additional minimum level of control that nonpoint sources would have to achieve before they could generate credits. The baseline level of control should never be less than existing practice. There are difficulties associated with establishing baselines for nonpoint sources and, although permitting authorities may not have direct involvement in establishing these baselines, a permit writer should be aware of these issues and how they might affect the trading provisions in permits.

To be reliable, trading programs establishing baselines for nonpoint source sellers should use the maximum amount of verifiable information on loadings in a watershed, such as a TMDL or other watershed loading analysis. Where a TMDL establishes a reliable LA for nonpoint sources, an individual nonpoint source’s portion of the LA can be used to set its trading baseline.

¹ Some trading programs may require a seller to implement controls beyond the baseline before generating credits.

Where a TMDL or similar analysis is not available or does not represent the most accurate information on nonpoint source loading in the watershed, the trading program or state policy can establish a set of minimum BMPs that a nonpoint source must install to be eligible for trading. The pollutant load from the nonpoint source after installing these BMPs would be considered the baseline for estimating further reductions that could then be counted as credits. The permit should reference any state trading program or other document that contains the model used for estimating credits. It is important to note that nonpoint source baselines established using less-verifiable information on pollutant loading are likely to have less public support and, more relevant to permit writers, may be challenged as inconsistent with water quality standards.

| Nonpoint Source Seller Baseline for Trading | |
|---|---|
| NPS Seller With TMDL | NPS Seller Without TMDL |
| Load allocation | State and local requirements and/or existing practice |

Figure 2. Nonpoint source seller baseline for trading.

Nonpoint Source Baseline Derived from TMDL Load Allocations

An LA established under a TMDL defines the nonpoint source load reductions necessary to achieve water quality standards. EPA would not support a trading program that allows nonpoint sources to sell credits if the discharge is contributing to water quality impairment; therefore, nonpoint sources should meet their portion of the LA before generating credits to sell on the trading market.

TMDLs might specify an LA for an individual nonpoint source or for a category of nonpoint source dischargers in a watershed. If established for an individual nonpoint source (e.g., a single farm), the individual nonpoint source should use the LA as its baseline for generating credits. However, if the TMDL establishes an aggregate LA for a category of nonpoint sources (e.g., all farms in a watershed) or all nonpoint sources on a particular tributary, the watershed stakeholders, including the permitting authority or trading program, need to decide how to equitably distribute that aggregate LA among the individual nonpoint source dischargers in a scientifically valid manner. For example, if the LA is expressed as an overall load reduction percentage (e.g., 25 percent reduction in TN loading watershed-wide), the trading program might require each nonpoint source discharger to reduce its individual loading by that percentage before generating credits. Alternatively, where the LA is expressed as a total aggregate loading reduction (i.e., total pounds per day), the trading program would distribute the LA among the individual nonpoint sources to define the baseline for each nonpoint source. The trading program might use land cover, total production, proximity to the waterbody of concern, or some other variable to determine the appropriate distribution of the aggregate LA among individual nonpoint sources. The best method of distributing an aggregate LA among nonpoint

EPA’s Trading Policy states that where a TMDL is in place, the LA or other appropriate baseline serves as the threshold for nonpoint sources to generate credits. This does not mean that EPA requires all nonpoint sources in a watershed to meet an aggregate LA for a single nonpoint source to participate in trading. The Trading Policy’s intent is that each nonpoint source participating in trading under a TMDL make reductions consistent with the LA before they can generate credits (additional reductions) for sale. This approach ensures that progress is made toward water quality standards with each trade. States have flexibility to set other appropriate baselines and can, in fact, decide to require all nonpoint sources to meet the baseline before participating in trading.

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source dischargers will vary; watershed stakeholders should work together to determine the most appropriate method for establishing the nonpoint source baseline.

Once the LA is equitably distributed among nonpoint sources in the watershed, an individual nonpoint source should reduce its load by its portion of the LA before it generates credits. To verify the required load reduction and quantify the credits generated after the baseline is met requires quantification of the nonpoint source load, either through direct monitoring or estimation. For more information, see the section on *Quantifying Nonpoint Source Loads and Credits*, above.

Nonpoint Source Baseline Set at a Minimum Level of BMP Implementation

In watersheds where a TMDL has not been developed, the nonpoint source baseline is derived from state, tribal, and local requirements. The nonpoint source should meet this baseline before generating credits. A trading program can choose to require a more stringent level of BMP control before credits can be generated. In any case, the level of control required to generate credits should never be less than existing practice.

In any particular watershed, it is likely that different nonpoint sources will be at different levels or stages of BMP implementation. For example, in a watershed where animal feeding operations (AFOs) are the primary nonpoint source pollutant contributors, some AFOs might be actively working with the NRCS to implement comprehensive nutrient management plans that minimize nutrient and sediment runoff. Other AFOs might not have installed any BMPs either because they do not participate in any NRCS programs or because they are in the early stages of planning and implementation. These nonpoint source facilities might contribute a much greater pollutant load than those who have proactively reduced nonpoint source pollutants. A trading program can choose to require nonpoint sources to implement a minimum level of BMPs before trading to provide some level of equity among nonpoint source credit generators in the watershed. In addition, implementing a minimum level of BMPs demonstrates a commitment on the part of the credit generators participating in the trading program.

Trading programs should consider baseline equity issues among nonpoint source participants. EPA encourages states or trading programs to set a minimum level of BMP requirements for nonpoint sources before they can generate credits.

Lower Boise River, Idaho

In Idaho, DEQ designates the nonpoint source baseline year (currently 1996 for the Lower Boise, but this may be amended on the basis of technical outcome of a pending TMDL) for each trading marketplace in the state. Each nonpoint source then calculates the baseline load for the baseline year and uses it to determine the eligibility of reductions to serve as credits for trading. In other words, in the Lower Boise River watershed, if a nonpoint source installed a BMP in 1999, the farm would have already created eligible credits. However, pollutant reductions from a BMP installed in 1994 would not be eligible. Nonpoint sources in Idaho are required to use the BMP List’s estimating equation for particular BMPs (which incorporates the USDA Surface Irrigation Soil Loss (SISL) equation) to calculate baseline loads. For more information about this trading program, see Appendix A.

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Where the nonpoint source baseline is set at a minimum level of BMP implementation, credits can be generated after meeting the minimum level of control. Quantifying the credits generated will generally require quantification of the nonpoint source load after implementing the minimum required BMPs, either through direct monitoring or estimation. For more information, see the section on *Quantifying Nonpoint Source Loads and Credits*, above. In certain instances, it is impossible or impracticable to quantify a baseline by measuring or estimating the nonpoint source pollutant load. In these cases, a trading program could allow nonpoint sources to generate credits for estimated reductions from BMPs. For example, if sufficient data are available to establish that a particular BMP, installed under specified conditions, will achieve a loading reduction of X lbs/day, the nonpoint source might be allowed to generate credits equivalent to X lbs/day without actually having quantified the pollutant load before installing the BMP. Trading programs should use this approach only where sufficient data on the efficacy of the BMPs are available to develop a reliable estimate of the expected reductions. The baseline pollutant load should always be quantified where possible.

Red Cedar River, Wisconsin

TP reduction credits associated with a BMP were estimated using TP loading models to estimate reductions from well-established and well-understood practices. Soil testing of each field was done to calculate the TP delivery to the stream from the field where the BMP was used (Breetz et al. 2004). For more information about this trading program, see Appendix A.

Determining Maximum Feasible Nonpoint Source Load Reductions

It is not feasible for a nonpoint source to control 100 percent of its pollutant runoff to a waterbody. Therefore, it is important that some analysis be done to estimate the maximum amount of pollutant runoff that can be controlled from the nonpoint sources in a watershed. The difference between this estimate and the nonpoint source’s baseline equals the maximum nonpoint source load reductions available for trading.² This is a way to ensure that credits being purchased result in actual reductions. This increases the surety that the trading program can meet its goal of achieving water quality standards.

A trading program can directly calculate the maximum tradable nonpoint source load reduction for a watershed. A watershed’s maximum tradable nonpoint source load reduction can be calculated by first determining the maximum feasible implementation of BMPs; second, estimating the reduction from that level of BMP implementation on the basis of watershed modeling, published BMP efficiency information, or best professional judgment (BPJ); and finally, taking the difference between the maximum loadings reduction and the aggregate baseline for all sellers. In addition, this calculation could be done for an individual farm.

² The maximum tradable nonpoint source load reduction is not equal to the maximum number of credits available for trading in a watershed because of the impact of trading ratios. Because trading ratios can vary depending on many factors (as described in the *Developing Trade Ratios* section), determining the maximum number of credits is not as useful as determining the maximum tradable nonpoint source load reduction for the purpose of ensuring that every trade results in a reduction of total load to the waterbody.

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The trading program may want to include a mechanism for ensuring that this maximum tradable nonpoint source load reduction is not exceeded. This could be done, for example, by specifying the maximum tradable nonpoint source load reductions in the program documentation and then tracking credit sales, and therefore load reductions, by nonpoint sources to ensure that this maximum is not exceeded.

Pennsylvania’s Tradable Loads for Addressing the Chesapeake Bay’s Tributary Strategies

In 2003, EPA developed a document titled *The Technical Support Document for the Identification of Chesapeake Bay Designated Uses and Attainability* to help states develop and adopt refined water quality standards to address nutrient- and sediment-based pollution in the Chesapeake Bay and its tidal tributaries. As part of this analysis, the Chesapeake Bay Program developed four nutrient reduction scenarios based on different levels of BMP and control technology implementation by 2010. The levels ranged from current implementation to “everything, everywhere, by everybody” (E3) which approximates the maximum nutrient and sediment load reductions available in the watershed. To create the most objective and uniform maximum implementation level possible, the E3 scenario was developed without considering site-specific constraints and program participation levels. If these factors were considered, certain aspects of the E3 scenario may not be feasible. Nutrient and sediment loads resulting from each nutrient reduction scenario were estimated using the Chesapeake Bay Program’s Phase 4.3 Watershed Model. For example, the estimated loadings for the E3 scenario for Pennsylvania agriculture were 21,153,000 lbs TN/yr and 1,896,000 lbs TP/yr. (More information on the development of the E3 scenario is available in Appendix A of the *Technical Support Document* available at: www.chesapeakebay.net/uaasupport.htm)

Recognizing that model estimates based on the E3 scenario likely overestimated the maximum feasible nutrient and sediment load reductions, Pennsylvania made adjustments to the estimates to better represent a feasible effort. One adjustment was reducing by 10 percent the level of nonpoint source reductions estimated in the E3 scenario. The selection of a 10 percent reduction is subjective, since estimates of the feasible level of implementation for nonpoint source BMP implementation vary widely. Additionally, Pennsylvania estimated the reductions for those BMPs in Pennsylvania’s Tributary Strategy that were not included in the E3 scenario. These additional reductions were included in the revised E3 scenario. The estimated loadings for the revised scenario for agriculture were 21,819,000 lbs TN/yr and 1,726,000 lbs TP/yr. After adjusting the E3 scenario estimates, Pennsylvania estimated the maximum allowable credits as the difference between the load estimates from the revised E3 scenario and the Pennsylvania Tributary Strategy loadings goal. The Tributary Strategy loads for agriculture were 27,580,000 lbs TN/yr and 2,123,000 lbs TP/yr yielding final tradable loads of 5,760,000 lbs TN/yr and 397,000 lbs TP/yr. The scenario values and the tradable load values will change as new BMPs are developed or the efficiencies of existing BMPs are revised.

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Accountability

Mechanisms Under the NPDES Program

EPA’s Trading Policy notes that “States and tribes should establish clear enforceable mechanisms consistent with NPDES regulations that ensure legal accountability for the generation of credits that are traded.”

Such enforceable mechanisms might include, among other things, requirements for water quality or effluent monitoring, credit purchase and sale accounting, and assessment of BMP effectiveness. These mechanisms might be contained in state regulations, the project trade agreement, or both. By incorporating such accountability provisions of the trade agreement (or the entire trade agreement) into a NPDES permit, the state or tribe makes the point source legally responsible for their performance.

EPA’s Trading Policy also states that “In the event of default by another source generating credits, an NPDES permittee using those credits is responsible for complying with the effluent limitations that would apply if the trade had not occurred.”

To account for the possibility of a failed trade (e.g., insufficient generation of necessary credits by the seller), EPA recommends that the permit (and any accompanying trade agreement) clearly describe the respective responsibilities and legal liability (if any) of the buyer and the seller (see Special Conditions).

Mechanisms Outside the NPDES Program

To further clarify and protect their interests, the trading parties may choose to enter into a contract or other agreement separate from any applicable NPDES permit. Such a contract or agreement could, where appropriate, address a variety of financial or legal considerations and contingencies among the trading parties, including what happens in the case of default by any party. For example, the point source buyer might use such a contract to memorialize an agreement that the credits it needs are available, and the nonpoint source seller might use such a contract to guarantee payment for its services.

Great Miami River Watershed, Ohio

After a soil and water conservation district’s proposal is approved, the Miami Conservancy District (MCD, the broker of the program) enters into a contract with the successful soil and water conservation district for project implementation. The soil and water conservation district then enters into a project agreement with the nonpoint source responsible for implementing the BMPs. MCD tracks the credits generated and allocates them to the buyers. A separate Load Reduction Workgroup will evaluate the accuracy of reduction estimates every two years. For more information on this program, see Appendix A.

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Trade Agreements

Typically, the terms that govern a trading program will be developed outside the NPDES permit process and can be incorporated or reflected in the permit (see [Appendix C](#)). The Trading Policy describes several mechanisms for implementing trading through NPDES permits (see [Appendix B](#)). NPDES permits authorizing water quality trading should reference any existing trade agreement in the permit fact sheet. The permit writer may also incorporate specific provisions of the agreement as appropriate (e.g., shared responsibilities for conducting ambient monitoring) into the permit.

All trade agreements referenced in NPDES fact sheets and permits should meet certain minimum standards to help ensure the trades authorized by the permit are consistent with water quality standards. At a minimum, the trade agreement should be a written agreement, signed and dated by authorized representatives of all trading partners. Verbal trade agreements should not be referenced in NPDES permits. The written trade agreement should contain sufficient detail to allow the permitting authority to determine with some degree of certainty that the terms of the agreement will result in loading reductions and generation of sufficient credits to satisfy water quality requirements. If there is no formal, outside trade agreement, trading can still occur; however, the permit writer will need to more explicitly describe the trading program in the fact sheet and authorize specific aspects of the trading program as permit conditions. Trading partners can specify the details pertaining to the negotiated terms of the trade (e.g., credit price, payment schedule, consequences for failure to fulfill negotiated terms) in a separate, written and signed contract.

Wells River Example: Trade Agreements

■ *What You Need to Know...*

Pollutant: Total Phosphorus

Driver: Approved TMDL for Total Phosphorus for Wells River

Credit Seller: *Patterson Soybean and Corn Farm (3,000 acres)*

- **Estimated Phosphorus Load from Farm with No BMPs:**
6,000 lbs/yr (2 lbs/ac/yr of TP × 3,000 acres)
- **Estimated Phosphorus Load Reduction from Current BMPs (500 Acres under Conservation Tillage):** 850 lbs/yr (assumes 85 percent removal rate, or 1.7 lbs/ac removed for every 2 lbs/ac of loading; 1.7 lbs/ac × 500 acres = 850 lbs of TP/yr)
- **Current TP Load:** 5,150 lbs/yr (6,000 lbs/yr – 850 lbs/yr = 5,150 lbs/yr)

Load Allocation (baseline): 15 percent load reduction from current TP load or load reduction of 772.5 lbs/yr (0.15 × 5,150 lbs/yr = 772.5 lbs/yr reduction).

- **Estimated Total Load Reduction from Planned BMPs:** 3703.5 lbs/yr
 - Nutrient Management Planning (assumed effectiveness of 35 percent reduction from current load = 1,802.5 lbs/yr)

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Wells River Example: Trade Agreements *(continued)*

- 90 foot riparian buffer zone along 20 stream miles (assumed 80 percent load reduction from treated area of 1,188 acres with a loading of 2 lbs/ac; treated area is equal to riparian buffer length and width, plus 400 ft of land adjacent to buffer = 20 stream miles of 90 ft riparian buffer, in addition to 400 ft of adjacent land = 1,188 acres; 1,188 acres × 2 lbs/ac of TP = 2,376 lbs/yr of TP loading; $0.80 \times 2,376 \text{ lbs/yr} = 1,901 \text{ lbs/yr}$ of TP load reduction from riparian buffer treated area)

- **Load Eligible for Trading after Meeting Load Allocation as Baseline:** 2,931 lbs/yr (3,703.5 lbs/yr – 772.5 lbs/yr = 2,931 lbs/yr; 2,931 lbs/yr average monthly = 8 lbs/day)

Credit Buyer: *Springtown POTW^a*

- **Existing TBEL^b:** 500 lbs/day (average monthly)
- **Current Loading:** 500 lbs/day (average monthly)
- **New WQBEL (based on WLA^c):** 475 lbs/day (average monthly)
- **WWTP^d Treatment Capabilities:** Treatment to 500 lbs/day (average monthly)
- **Load Reduction necessary to remain in compliance with WQBEL:** 25 lbs/day (average monthly)

Notes: ^a POTW = publicly owned treatment works; ^b TBEL = technology-based effluent limitations; ^c WLA = wasteload allocation; ^d WWTP = wastewater treatment plant

Location: Patterson Soybean and Corn Farm (credit seller) is located approximately one mile upstream from Springtown POTW (credit buyer) along the Wells River.

Applicable Trade Ratios:

- **Uncertainty Ratio:** 2:1
- **Location Ratio:** Unnecessary because both sources discharge directly into Wells River
- **Delivery Ratio:** Unnecessary because of close proximity of facilities
- **Equivalency Ratio:** 2:1 because of the different solubility of phosphorus between the point and nonpoint sources

The Springtown POTW is scheduled to renew its permit in 2 years. Its new permit will contain a new, more stringent WQBEL for TP that reflects its TMDL WLA. To meet the necessary load reduction, the Springtown POTW will have to purchase TP credits from a number of local nonpoint sources and enter into several trade agreements. The trade agreement with the Patterson Soybean and Corn Farm is one of four trade agreements that the Springtown POTW has with local nonpoint sources (other farms trading are Maybelle’s Farm, U-Pick’Em Vegetable Farm, and Larry’s Vegetable Coop.)

The basic terms of the trade agreement as they pertain to Patterson Soybean and Corn Farm are as follows:

- Patterson Soybean and Corn Farm will implement BMPs that will result in an estimated TP load reduction of 3,703.5 lbs/year; approximately 2,931 lbs/yr will be available for trading after meeting the 15 percent load reduction baseline.

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Wells River Example: Trade Agreements *(continued)*

- Patterson Soybean and Corn Farm guarantees this TP load reduction for a period of 5 years to coincide with Springtown POTW’s NPDES permit term.
- Springtown POTW will require 25 lbs/day of TP reduction to meet its WQBEL (its WLA).
- Springtown POTW will purchase all of Patterson Soybean and Corn Farm’s load reduction eligible for trading of 8 lbs/day (average monthly). However, on the basis of the 2:1 uncertainty ratio applied to all nonpoint source TP credits and the 2:1 equivalency ratio to account for differences in solubility, Springtown POTW’s purchase of 8 lbs/day from Patterson Soybean and Corn Farm is equal to only 2 TP credits toward its required load reduction of 25 credits/day to meet its WQBEL.
- Patterson Soybean and Corn Farm will begin BMP implementation 12 months before the effective date of Springtown POTW’s renewed NPDES permit to ensure that BMPs are achieving estimated pollutant load reductions and are generating full credits.
- Springtown POTW will enter into a memorandum of understanding with the Wells County Soil and Water Conservation District (SWCD) to perform monthly monitoring and inspections at Patterson Soybean and Corn Farm to ensure that estimated TP load reductions are achieved through BMP implementation. If the Wells County SWCD fails to perform this function, Springtown POTW will conduct the monthly monitoring and inspections and submit the necessary monitoring and inspection reports.
- Failure to fulfill the terms of this trade agreement will result in Patterson Soybean and Corn Farm’s ineligibility to participate in future trading activities with any permitted point sources in the state for a period of 5 years from the time of the breach of the trade agreement terms.

The NPDES permit writer for the facilities receives a written copy of the trade agreement that is signed and dated by authorized representatives of Springtown POTW and Patterson Soybean and Corn Farm. The permit writer reviews the written trade agreement to verify that the information related to baselines and estimated pollutant load reductions are accurate and do not conflict with any of Springtown POTW’s existing NPDES permit requirements. During the permit renewal process, the NPDES permit writer will incorporate provisions authorizing the purchase of TP credits from nonpoint sources that enter into trade agreements with approved terms. At that time the permit writer will also modify Springtown POTW’s effluent limitations, monitoring, reporting, and special conditions requirements to authorize the purchase of nonpoint source TP credits to achieve compliance with the facility’s WQBEL. The permit writer will reference each written and signed trade agreement in the Springtown POTW NPDES permit fact sheet and attach a copy of each trade agreement as part of the permit’s administrative record.

In a separate contract, Springtown POTW and Patterson Soybean and Corn Farm articulate the financial and liability conditions that they have agreed upon. Springtown will develop contracts with each farm it trades with. The terms of the separate contracts, which the permit writer does not ask to see because it has no bearing on the NPDES permit requirements for the Springtown POTW, are as follows:

- Springtown POTW will pay Patterson Soybean and Corn Farm \$16 per credit of TP reduced on a monthly basis, after the Wells County SWCD has verified the TP load reductions.

Springtown POTW will follow the same process with the other farms to generate a total of 25 credits.

Water Quality Trading Scenarios

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Components of a NPDES Permit

NPDES permits that authorize water quality trading are no different than typical NPDES permits in many respects—they require the same structure, analyses, and justification. All permits have five basic components: (1) cover page; (2) effluent limitations; (3) monitoring and reporting requirements; (4) special conditions; and 5) standard conditions. Standard conditions are the same for all NPDES permits and will not be addressed in this Toolkit. In addition, consistent with title 40 of the *Code of Federal Regulations* (CFR) section 124.6, all permits are subject to public notice and comment. This process provides all interested parties an opportunity to comment on the trading provisions in the permit.

Each NPDES permit is accompanied by a permit fact sheet. The information in these fact sheets is not enforceable. The purpose of the fact sheet is to explain the requirements in the permit to the public. Thus, at a minimum, the fact sheet should explain any trading provisions in the permit. There is a wide variety of options for including trading information in the fact sheet that ranges from explaining the minimum control level (buyer) or trading limit (seller) to including the entire trading program.

There are a variety of issues, however, that might require special consideration when developing a permit incorporating water quality trading with nonpoint sources. Appendix E provides the permit writer with a list of fundamental questions that should be addressed during the permit development process.

Permit Cover Page

The cover page of a NPDES permit typically contains the name and location of the permittee(s), a statement authorizing the discharge, the specific locations for which a discharge is authorized (including the name of the receiving water), and the effective period of the permit (not to exceed 5 years). In addition, the cover page may list the pollutants regulated by the permit. For instance, the cover page of an overlay permit for TP may state that the overlay permit addresses only TP and that other parameters are addressed in each facility's individual permit.

The cover page also could specifically authorize trading between the permitted point source and the nonpoint source(s) generating credits. However, whereas the cover page for a permit that includes trading between point sources would include the specific authorized discharge locations for each point source, because a nonpoint source is a diffuse pollutant source (e.g., farms, ski areas, golf courses), a permit that implements a trade with a nonpoint source trading partner might not reference a specific discharge location for the nonpoint source involved in the trade. The cover page could, however, simply name the nonpoint source either by category (e.g., farms, golf courses) or by the name of the specific nonpoint source (e.g., Rock Creek Dairy, Rolling Hills Country Club) and provide a general description of nonpoint source location (e.g., Hudson River at West Point).

The cover page also should address the regulation, legal authority, policy statements, planning documents and the trade agreement that support trading between point and nonpoint

Water Quality Trading Scenarios

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sources in the Authority section of the cover page. If the state has issued regulations or policy documents authorizing water quality trading, the permit writer should reference these. For example, if trading is considered a water-quality management tool in the state’s Water Quality Management Plan, this may establish authority for integrating trading into NPDES permits and can be referenced on the cover page (Jones 2005).

Effluent Limitations

Effluent limitations are the primary mechanism for controlling the discharge of pollutants from point sources into receiving waters. When developing a permit, the permitting authority focuses much of its effort on deriving appropriate effluent limitations. As in all NPDES permits, permits that include trading must include any applicable TBELs, or the equivalent and, where necessary, WQBELs, that are derived from and comply with all applicable technology and water quality standards. Furthermore, limits must be enforceable, and the process for deriving the limits should be scientifically valid and transparent.

EPA’s 2003 Trading Policy does not support trading to meet TBELs unless trading is specifically authorized in the categorical effluent limitation guidelines on which the TBELs are based. Applicable TBELs thus serve as the minimum control level below which the buyer’s treatment levels cannot fall. This section discusses the overarching principles of how to express all applicable effluent limitations in permits for dischargers participating in water quality trades.

Credit Buyers

Permits for credit buyers should include both the baseline, which is the WQBEL that defines the level of discharge the buyer would have to meet through treatment **when not** trading, and a minimum control level that must be achieved through treatment **when** trading. The permit should also include the amount of pollutant load to be offset (minimum control level – baseline) through credit purchases when trading. Most often, the applicable TBEL will serve as the minimum control level. A permitting authority can choose to impose a more stringent minimum control level than the TBEL to prevent localized exceedances of water quality standards near the point of discharge, but not one that is less stringent than the TBEL. In a NPDES permit or fact sheet, the effluent limitations for a credit buyer could be described as follows:

- The Discharger must meet, through treatment or trading, a mass-based effluent limitation for Pollutant A of <insert baseline>. If this effluent limitation is met through trading, the Discharger must purchase credits from authorized Sellers in an amount sufficient to compensate for the discharge of Pollutant A from Outfall 001 in excess of <insert baseline>, but at no time shall the maximum mass discharge of Pollutant A during <insert averaging period> exceed the minimum control level of <insert minimum control level>. Thus, the maximum mass discharge of Pollutant A to be offset through credit purchases is <insert minimum control level – baseline>.



Wells River Example: Effluent Limitations

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Approved TMDL for Total Phosphorus for Wells River

Credit Seller: *Patterson Soybean and Corn Farm (3,000 acres)*

- **Estimated Phosphorus Load from Farm with No BMPs:**
6,000 lbs/yr (2 lbs/ac/yr of TP × 3,000 acres)
- **Estimated Phosphorus Load Reduction from Current BMPs (500 Acres Under Conservation Tillage):** 850 lbs/yr (assumes 85 percent removal rate, or 1.7 lbs/ac removed for every 2 lbs/ac of loading; 1.7 lbs/ac × 500 acres = 850 lbs of TP/yr)
- **Current TP Load:** 5,150 lbs/yr (6,000 lbs/yr – 850 lbs/yr = 5,150 lbs/yr)
- **Load Allocation (baseline):** 15 percent load reduction from current TP load or load reduction of 772.5 lbs/yr (0.15 × 5,150 lbs/yr = 772.5 lbs/yr reduction)
- **Estimated Total Load Reduction from Planned BMPs:** 3703.5 lbs/yr
- **Load Eligible for Trading after Meeting Load Allocation as Baseline:** 2,931 lbs/yr (3,703.5 lbs/yr – 772.5 lbs/yr = 2,931 lbs/yr; 2,931 lbs/yr = 8 lbs/day average monthly)

Credit Buyer: *Springtown POTW*

- **Existing TBEL:** 500 lbs/day (average monthly)
- **Current Loading:** 500 lbs/day (average monthly)
- **New WQBEL (based on WLA):** 475 lbs/day (average monthly)
- **WWTP Treatment Capabilities:** Treatment to 500 lbs/day (average monthly)
- Load reduction necessary to remain in compliance with WQBEL: 25 lbs/day (average monthly)

Location: Patterson Soybean and Corn Farm (credit seller) is approximately one mile upstream from Springtown POTW (credit buyer) along the Wells River.

Applicable Trade Ratios:

- **Uncertainty Ratio:** 2:1
- **Equivalency:** 2 :1

Springtown POTW needs to purchase credits from four different nonpoint sources to account for a reduction of 25 lbs/day (average monthly) to meet the new WLA. The permit will be renewed in 2 years, which allows time for the nonpoint source BMPs at Patterson’s Corn and Soybean Farm (and others) to be fully operational. Until that time, the existing TBEL continues to apply.

The permit writer for Springtown POTW will include limitations that will apply in the event of trading and limitations that will apply if no trading occurs—the WQBEL (baseline) and the minimum control level if trading occurs (existing TBEL).

Wells River Example: Effluent Limitations *(continued)*

Permit Language:

Table 2. Monthly average mass loading effluent limitations for TP

| Facility | Units | Existing TBEL | WQBEL | Effluent limitation with trading |
|-----------------|---------|---------------|----------------|----------------------------------|
| Springtown POTW | lbs/day | 500 | 475 (Baseline) | 500 (Minimum Control Level/TBEL) |

- A. Springtown POTW is authorized to discharge total phosphorus from Outfall 001 to the Wells River provided the discharge meets the limitations set forth herein. Provision X of this permit authorizes the permittee to purchase water quality trading credits for total phosphorus from nonpoint sources within the Wells River watershed that meet baseline requirements before trading.
- B. The discharge from Outfall 001 shall comply with the monthly mass loading of total phosphorus established by either a. or b.:
 - a. The WQBEL set forth in Table 2; or,
 - b. The Effluent Limitation with Trading set forth in Table 2 provided the permittee has secured total phosphorus credits from Patterson’s Corn and Soybean Farm and other non-point sources sufficient to offset any discharge in excess of the WQBEL set forth in Table 2. The number of total phosphorus credits required to be purchased shall be calculated as follows:

$$\text{Credits required} = (\text{Actual Discharge} - \text{WQBEL}) \times \text{Trade ratio}$$

Where:

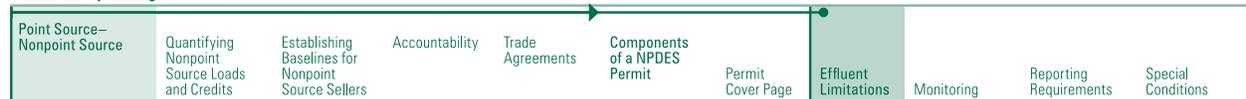
Actual discharge = the total phosphorus load, expressed in lbs/day as a monthly average,
 Trade ratios = 4:1 (uncertainty and equivalency)

- C. Credits purchased by the permittee may be applied only for the calendar month(s) during which they were generated by Patterson’s Corn and Soybean Farm or other nonpoint sources.

Pollutant Form, Units of Measure, and Timing Considerations

The permit should explicitly identify the **pollutant or pollutants being traded** for which trading is permitted. The permitting authority should ensure that the trading program or agreement and the calculated WQBELs are consistent in terms of the form of the pollutant, units of measure, and timing.

For example, if the pollutant specified in the WQBEL is nitrate-nitrogen, credits generated under the trade agreement should be for nitrate-nitrogen and not for total Kjeldahl nitrogen (TKN) or some other form. If, on the other hand, the WQBEL is for total nitrogen (TN), buyers and sellers should trade TN credits. In this case, a discharger may be required to measure TN.



If there are concerns about localized impacts, and WQBELs are also specified for a particular form or forms of nitrogen, the discharger may be required to monitor TKN, nitrite, and nitrate (all expressed as N) and then calculate its TN discharge.

Also an **equivalency ratio** may be needed when two sources are trading pollutants such as TN or TP but are actually discharging different forms of nitrogen or phosphorus (e.g., one discharger’s phosphorus discharge is made up primarily of soluble phosphorus while its trading partner’s discharger is primarily non-soluble phosphorus). An equivalency ratio may also be needed in cross-pollutant trading of oxygen demanding pollutants (e.g., phosphorus and biochemical oxygen demand (BOD)). In this case, the equivalency ratio would equal the ratio between the two pollutants’ impacts on oxygen demand. The trading program should account for any necessary equivalency ratios with regard to pollutant form or type; the permit writer simply needs to be aware of the pollutant form or type addressed in the trade agreement to ensure that the permit is consistent.

Wells River Example: Pollutant Form, Units of Measure, and Timing

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Approved TMDL for Total Phosphorus for Wells River

Credit Seller: *Patterson Soybean and Corn Farm (3,000 acres)*

Credit Buyer: *Springtown POTW*

Location: Patterson Soybean and Corn Farm (credit seller) is approximately one mile upstream from Springtown POTW (credit buyer) along the Wells River.

Applicable Trade Ratios:

- **Uncertainty Ratio:** 2:1
- **Equivalency Ratio:** 2:1

Pollutant Form

The TMDL indicates a need for Springtown POTW, the credit buyer, to control TP discharges. The facility will not be able to meet the new limit with current treatment capabilities. Springtown POTW has entered into a trading agreement with several upstream nonpoint sources (farms) that will be able to generate the credits it needs to meet its WQBEL based on the TMDL WLA. The TMDL includes LAs for the farms (credit sellers). Each seller operation will implement BMPs necessary to reduce phosphorus loads beyond the baseline requirements. With assistance from the permitting authority, an equivalency ratio of 2:1 was developed to account for the difference in solubility between the point source and the farms.

Units of Measure

The WQBELs based on the TMDL WLA are expressed in lbs/day as a monthly average to correspond with the units and averaging period in the TMDL. The limits in the POTW’s existing permit are also expressed in lbs/day as a monthly average. The TP load reductions assumed in the trading agreements



Wells River Example: Pollutant Form, Units of Measure, and Timing *(continued)*

for the agricultural BMPs will be calculated and expressed in lbs/day as a monthly average to determine the number of credits they can generate to sell to the POTW.

Timing of Credits

Credits are available beginning at the time of permit renewal. This allows 12 months for the farms' BMPs to be fully implemented and 12 months to gather monitoring data to verify that the BMPs are achieving the expected phosphorus control efficiency and will generate credits as expected. These data are necessary to better understand how loading and reduction may vary over time and to develop monthly credit generation data to correspond with monthly average effluent limitations. Trades will occur monthly to correspond with monthly average effluent limitations. The farms will be able to continue to generate credits as long as the nutrient management plans are properly implemented and updated as necessary, they are able to demonstrate reductions, and the nonpoint source baseline does not change in a way that would reduce or eliminate the credits. The ability of the farms to continue to generate credits will be assessed during the renewal of the POTW's permit every 5 years.

Anti-backsliding, Antidegradation, and New Discharges Special Considerations

EPA's Trading Policy discusses anti-backsliding and antidegradation and how these provisions can be met through trading.

Anti-backsliding

The term *anti-backsliding* refers to a statutory provision (CWA section 402(o)) that, in general, prohibits the renewal, reissuance, or modification of an existing NPDES permit that contains WQBELs, permit conditions, or standards that are less stringent than those established in the previous permit (USEPA 1996b). The CWA establishes exceptions to this general anti-backsliding prohibition. EPA has consistently interpreted section 402(o)(1) to allow for less-stringent effluent limitations if either an exception under section 402(o)(2) or, for WQBELs, the requirements of section 303(d)(4) are met (USEPA 1996b). Section 402(o)(2) and 40 CFR 122.44(l) provide exceptions for circumstances such as material and substantial alterations to the facility, new information, events beyond the permittee's control, and permit modifications under other sections of the CWA. Section 303(d)(4), which applies only to WQBELs, allows a less-stringent WQBEL in a reissued permit when the facility is discharging to a waterbody attaining water quality standards as long as the waterbody continues to attain water quality standards even after the WQBEL is relaxed. In addition, revising the limitation must be consistent with the state's antidegradation policy. If the discharge is to a waterbody that is not attaining water quality standards, a less-stringent WQBEL is allowed only when the cumulative effect of all revised effluent limitations results in progress toward attainment of water quality standards. For a detailed discussion of the anti-backsliding exceptions, see EPA's *NPDES Permit Writers' Manual* (EPA-833-B-96-003). EPA's Trading Policy states:

EPA believes that the anti-backsliding provisions of Section 303(d)(4) of the CWA will generally be satisfied where a point source increases its discharge



through the use of credits in accordance with alternate or variable water quality based effluent limitations contained in an NPDES permit, in a manner consistent with provisions for trading under a TMDL, or consistent with the provisions for pre-TMDL trading included in a watershed plan.

A permit writer should simply explain in the fact sheet of the permit how the limitations in the permit, after accounting for any trading provisions, are at least as stringent as the limits in the previous permit or, alternatively, how anti-backsliding provisions of the CWA are satisfied.

Antidegradation

As repeated throughout this document, NPDES permits may not facilitate trades that would result in nonattainment of an applicable water quality standard, including the applicable antidegradation provisions of water quality standards. Permitting authorities should ensure that WQBELs developed to facilitate trade agreements accord with antidegradation provisions and that antidegradation reviews are performed when required. Nothing in the Trading Policy per se changes how states apply their antidegradation policies, though states may modify their antidegradation policies to recognize trading.

The Trading Policy states:

*EPA does not believe that trades and trading programs will result in “lower water quality” . . . or that antidegradation review would be required under EPA’s regulations when the trades or trading programs achieve a **no net increase** of the pollutant traded and do not result in any impairment of designated uses.*

Special considerations for antidegradation relative to water quality trading depend on the tier of protection applied to the waterbody as described below.

Tier 1 is the minimum level of protection under antidegradation policies. For Tier 1 waters, the antidegradation policy mandates protection of existing instream uses. Because EPA neither supports trading activities nor allows issuance of permits that violate applicable water quality standards, which should protect existing uses at a minimum, any supported trading activities incorporated into a NPDES permit should not violate antidegradation policies applicable to Tier 1 waters.

Tier 2 protects waters where the existing water quality is higher than required to support aquatic life and recreational uses. Water quality in Tier 2 waters may be lowered (only to the level that would continue to support existing and designated uses) but only if an antidegradation review finds that (1) it is necessary to lower water quality to accommodate important social or economic development, (2) all intergovernmental and public participation provisions have been satisfied, and (3) the highest statutory and regulatory requirements for point sources and BMPs for nonpoint sources have been achieved. The Trading Policy supports trading to maintain high water quality when trading is used to compensate for new or increased discharges. Thus, the Trading Policy supports reductions of existing pollutant loadings to compensate for the new or increased load so that the result is *no lowering of water quality*.

Water Quality Trading Scenarios



A state, in applying its antidegradation policy, may decide to authorize a new or increased discharge to high-quality water, and may decide to use trading to completely or partially compensate for that increased load. If the increased load to Tier 2 waters is only partially compensated for by trading, an antidegradation review would be required to address the increased load.

Tier 3 protects the quality of outstanding national resource waters and waters of exceptional recreational or ecological significance. In general, antidegradation policies do not allow any increase in loading to Tier 3 waters that would result in lower water quality. EPA supports trading in Tier 3 waters to maintain water quality.

Monitoring

Permitting authorities may want to consider developing monitoring and reporting requirements to characterize waste streams and receiving waters, evaluate wastewater treatment efficiency, and determine compliance with permit conditions in the trade agreement. Monitoring and reporting conditions of a NPDES permit may contain specific requirements for sampling location, sample collection method, monitoring frequencies, analytical methods, recordkeeping, and reporting. If the permit conditions include compliance with provisions in a trade agreement, then the permitting authority should include monitoring, record-keeping and reporting requirements that facilitate compliance evaluations and, where necessary, enforcement actions related to the trading requirements. Discharge monitoring requirements should be consistent with the provisions of the trade agreement in terms of pollutants and forms of pollutants monitored, reporting units, and timing. The permit provisions should ensure that the results of discharge monitoring will be useful to the permittee, the permitting authority, and the general public in determining whether the provisions of the trade agreement are being met. Permits that authorize point source–nonpoint source trades also should address the unique considerations for monitoring and reporting that will facilitate evaluating the effectiveness of BMPs used to generate pollutant reduction credits.

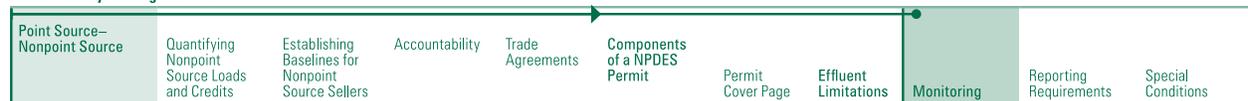
Sample Collection and Analysis

The same discharge sampling location used for compliance in any existing NPDES permits should be used for determining compliance with effluent limitations developed for traded parameters. Samples collected as part of a self-monitoring program required by a NPDES permit must be performed in accordance with EPA-approved analytical methods specified in 40 CFR Part 136 (*Guidelines for Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act*) where Part 136 contains methods for the pollutant of concern. Where no Part 136 methods are available, the permit writer should specify which method the point source should use for compliance monitoring.

Parties Responsible for Monitoring

In a permit that authorizes trading between a point source(s) and one or more nonpoint sources, the permittee(s) will be responsible for all of the monitoring activities that would normally be required in any NPDES permit. If the permit is an overlay permit covering multiple point sources and is used to incorporate water quality trading for specific pollutants, the permitting authority may establish monitoring requirements by reference to the facility’s

Water Quality Trading Scenarios



individual NPDES permit for consistency. Alternatively, the overlay permit could specifically list the monitoring location and requirements.

Ambient Monitoring

Ambient monitoring is one way to show whether a trade agreement meets or improves water quality. In addition to traditional discharge monitoring requirements, ambient water quality monitoring may be appropriate at strategic locations to ensure that the trade is not creating localized exceedances of water quality standards and to document the performance of the overall trading program. Permits with mixing zones may include monitoring requirements as appropriate to ensure that water quality criteria are not exceeded at the edge of the applicable mixing zone.

BMP Monitoring and Trade Tracking

To assure that nonpoint source BMPs are performing properly, the permitting authority should add permit conditions specifying that a BMP be monitored and inspected on a regular basis. The trading program itself might establish these responsibilities. In some cases, monitoring and inspections are conducted by point sources. In other cases, a third party may assume responsibility for BMP monitoring.

Under any of these scenarios, the permitting authority should be aware of the monitoring and reporting responsibilities established in the trading program and should ensure that permit conditions do not contradict these requirements. Where the trading program provides that the point source conduct nonpoint source BMP inspections and monitoring, the permit should incorporate or reference those requirements. Where the trading program provides that a third party conduct inspections and monitoring, the permit should also reference those requirements and clarify the permittee’s responsibilities, if any, for reporting or using the information and data gathered through the inspections and monitoring activities or conducting these activities itself should the third party fail to fulfill its responsibilities.

Where the trading program does not establish clear mechanisms and responsibilities for BMP monitoring, the permitting authority should require them of the permittee. In addition, the permitting authority might include a special condition in the permit that requires either the discharger or someone contracted by the dischargers to conduct routine inspections to verify that BMPs are being maintained and operated as required to retain pollutant reduction efficiency.

Permitting authorities should consider developing trade tracking forms and establishing discharger trade reporting requirements to monitor trading activities and any alternative compliance activities implemented if a BMP fails to perform as expected (see *Special Conditions*).

Water Quality Trading Scenarios



Wells River Example: Monitoring

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Approved TMDL for Total Phosphorus for Wells River

Credit Seller: *Patterson Soybean and Corn Farm (3,000 acres)*

Credit Buyer: *Springtown POTW*

Location: Patterson Soybean and Corn Farm (credit seller) is approximately one mile upstream from Springtown POTW (credit buyer) along the Wells River.

Applicable Trade Ratios:

- **Uncertainty Ratio:** 2:1
- **Equivalency Ratio:** 2:1

The facility’s existing permit includes TBELs that are based on state treatment standards for TP and monitoring requirements for sampling the effluent monthly for TP to determine compliance. A new permit has been developed for the POTW, which incorporates the new effluent limits (based on the approved TMDL) as well as the necessary provisions and effluent limits to authorize trading.

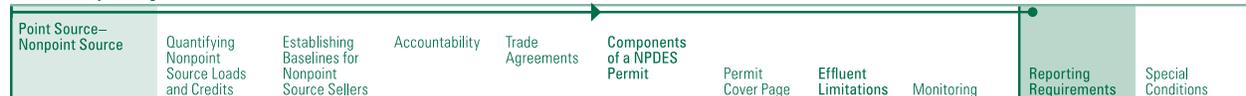
In the new permit, the POTW will be required to monitor for TP weekly and must submit monthly discharge monitoring reports (DMRs) year-round by the 15th of the second month following monitoring to the permitting authority to gauge compliance. Ambient receiving water monitoring requirements are included in the existing NPDES permits and are adequate to ensure that localized exceedances of water quality standards do not develop as a result of trades.

Permit Language:

- The permittee shall monitor effluent total phosphorus a minimum of one time per week. The permittee shall determine the average monthly mass loading based on actual monthly average flow. Flow monitoring shall be continuous.

Reporting Requirements

The permitting authority should establish reporting requirements to support the evaluation of water quality trading programs. For example, in addition to reporting discharge monitoring results, permitting authorities might require a permittee to report the number of credits purchased. Permitting authorities might also require an annual monitoring report specific to the pollutants involved in the trade, to provide information on annual loading in accordance with the requirements of the trading program. Permits incorporating water quality trades should require reporting at a frequency appropriate to determine compliance with the trading provisions. Permitting authorities should consider any requirements of the trading programs related to monitoring and reporting and ensure the permits are consistent with these requirements. Permits may require reporting of monitoring results at a frequency established through the permit on a case-by-case basis but in no case may that frequency be less than once per year.



Trading programs may establish other reporting and tracking requirements as well. For example, it is essential to have a mechanism for tracking trades. An additional form could be required such as a credit certificate form (see Appendix C). The permitting authority can hold point sources liable if they violate any trading provision included in the permit or any trade agreement incorporated by reference into the permit, and point sources are certainly liable if they do not meet their permit limits.

Permit writers also might want to require verification of project installation and performance specifications before the credits may be used, as in the example above. The permit could include provisions requiring the point source purchaser to provide the required verification.

Data Reporting to EPA

EPA administers two systems to store NPDES permit data and track compliance, the Permit Compliance System (PCS) and the new Integrated Compliance Information System (ICIS). PCS is the old, computerized management information system that contains data on NPDES permit-holding facilities to track the permit, compliance, and enforcement status of these facilities.

The new system, ICIS, was deployed in June 2006 to approximately 20 states. ICIS contains integrated enforcement and compliance information across most of EPA’s programs including all federal administrative and judicial enforcement actions. In addition, ICIS has the capability to track other activities occurring in an EPA Region that support enforcement and compliance programs. These include Incident Tracking, Compliance Assistance, and Compliance Monitoring. In the future, ICIS will be deployed to all states and PCS will no longer be used.

Neither PCS nor ICIS is structured to actually track trades.

PCS is designed to compare actual discharge monitoring data against required effluent limitations to determine a facility’s compliance with its NPDES permit. To determine compliance under a trading scenario, it is necessary for the NPDES permitting authority to compare actual discharge monitoring data and the quantity of credits purchased against required effluent limitations. For credit buyers, compliance is actually tracked against two effluent limitations—the minimum control level and the baseline. The challenge in using PCS to determine compliance under a trading scenario is that the system does not automatically make adjustments to the reported actual discharge—it will not subtract the quantity of credits purchased. Therefore, this type of adjustment must be done before entering information into PCS so that the system has only one reported number to compare against an effluent limitation.

Point source credit buyers have a baseline and a minimum control level (the facility’s TBEL or current discharge, whichever is most stringent). To determine compliance for a credit buyer, the NPDES permitting authority will need to know that (1) the facility’s actual discharge is less than or equal to its minimum control level, and (2) that the number of credits purchased results in the facility achieving its baseline. Therefore, point source credit buyers could report two types of information: (1) the facility’s actual discharge, and (2) the difference between the actual discharge and the quantity of credits purchased. Both numbers would be entered

Water Quality Trading Scenarios



Wells River Example: Reporting

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Approved TMDL for Total Phosphorus for Wells River

Credit Seller: *Patterson Soybean and Corn Farm (3,000 acres)*

Credit Buyer: *Springtown POTW*

Location: Patterson Soybean and Corn Farm (credit seller) is approximately one mile upstream from Springtown POTW (credit buyer) along the Wells River.

Applicable Trade Ratios:

- **Uncertainty Ratio:** 2:1
- **Equivalency Ratio:** 2:1

The renewed permit will require, in addition to monitoring reports, regular reporting of any changes to the trade agreement, and reports for tracking trades. The facility’s individual permit will contain monthly average effluent limitations for TP; therefore, monthly trade transactions will be necessary to maintain compliance. The trade agreement between the dischargers indicates that trades will be tracked by the POTW. The trade tracking system will generate trading notification forms and monthly trading summaries for the entire program. Credits must be used in the same month they are generated, and trading notification forms must be submitted to the regulatory agency by the 15th of the month following the trade.

Permit Language:

- No trade is valid unless it is recorded in the permittee’s electronic trade tracking system or equivalent system that records all trades and generates trading notification forms and a monthly summary of all trades valid for each calendar month, in substantially the same format as forms approved by the state. Trading notification forms for each monthly trade must be submitted to <the Permitting Authority> by the 15th day of the month following the trade.

into PCS to determine compliance. PCS would compare the actual discharge against the minimum control level to determine permit compliance and eligibility as a credit buyer. PCS would also compare the difference between the actual discharge and the quantity of credits purchased against the facility’s baseline; the difference should be less than or equal to the WQBEL to indicate that the facility has purchased enough credits to meet its baseline and remain in compliance with its WQBEL. PCS can accommodate two different effluent limits for the same parameter; therefore, it has the capability to determine compliance with both the minimum control level and the baseline for a credit buyer.

ICIS also allows the NPDES permitting authority to report two limits; therefore, this system can also accommodate both the baseline and the minimum control level for credit buyers. New DMR forms will also have two lines to report both the baseline and the minimum control level. Like PCS, ICIS does not actually adjust actual discharges with the number of credits

Water Quality Trading Scenarios



bought. Under the current design, ICIS will allow a facility with an existing NPDES permit to also have a trading partner entered into the system. Once a trading partner is entered for a facility, ICIS will allow the entry of an adjusted value for the buyer—this is the reported actual discharge adjusted by the number of credits bought. If an adjusted value is entered, this value is used to determine permit violations and percent exceedances (USEPA 2006).

In addition to challenges related to limits and the type of information to report, NPDES permits with trading provisions might also raise issues related to reporting periods and automated compliance tracking. PCS will not support a reporting extension beyond 30 days. This type of reporting extension might be necessary in some instances to allow adequate time for the administrative activities necessary for trading partners to coordinate and reconcile trades. ICIS, however, will support a 45-day reporting period. In rare instances when a permitting authority uses annual limits, both PCS and ICIS will allow for one limit to be monthly and one to be annual. However, the permitting authority will have to manually flag annual limit effluent violations for reportable noncompliance (RNC) and significant noncompliance (SNC) to track compliance.

Special Conditions

Special conditions are developed to supplement effluent limitations and may include additional monitoring activities, management practices, pollution prevention requirements, ambient stream surveys, compliance schedules (if authorized by the permitting authority), and toxicity reduction evaluations (TREs). Special conditions also include permit modification and reopener conditions, and can be used to address water quality trading. Special conditions of a NPDES permit will be very important in incorporating the terms of a trade agreement. Even where the specific terms of the agreement are not directly incorporated into the permit, the special conditions will be used to refer to, and require compliance with, the trade agreement housed in a separate document.

The special conditions included in a NPDES permit that incorporates trading will depend on provisions of the trade agreement and the effluent limitations and monitoring and reporting requirements established in the permit. However, the permitting authority should consider incorporating special conditions that support the trading conditions. For example, the special conditions of the permit may specify conditions for purchasing credits, additional monitoring and special reporting requirements, and special conditions for failed trades.

Specifying Conditions for Purchasing Credits

As discussed above, because of the uncertainty associated with credits generated on the basis of BMPs, permits that implement trades between point sources and nonpoint sources should clearly reference acceptable practices and approaches to credit generation. The permitting authority or the entity managing the trade might determine the appropriate BMPs outside of the permit development process; however, the suite of approved BMPs or other approved pollutant reduction approaches should be identified in the permit. The permitting authority might choose to include these conditions as part of the effluent limitations section of the permit, or as a special condition. While the permit cannot require a nonpoint source to use a particular BMP to generate credits, it can prohibit a point source from purchasing credits that were not generated through use of approved BMPs.

Water Quality Trading Scenarios



The special conditions that address point source–nonpoint source trading also should address the timing of when credits are available and when the credit source expires. As discussed above, continued credit generation will require periodic certification that a practice is still in place and that specified operation and maintenance actions are being taken. Permitting authorities might consider establishing monitoring and reporting requirements to ensure that BMPs generating credits are properly installed and maintained to continue generating credits. Such requirements are especially important if available credits are calculated and monitoring data are not required or available to verify pollutant reductions.

Special conditions also could be used to specify the reconciliation period for credits or when credits may be used relative to when they are generated. Effluent limitations will dictate the reconciliation period, as discussed above, but special conditions can clarify the reconciliation period and ensure that credits are not based on future reductions that cannot be verified, thus reducing the risk of noncompliance.

Special conditions addressing liability, provisional requirements that apply when credits are unavailable or when a limit is exceeded, and outlining the specific requirements for establishing trade agreements among dischargers can be important in issuing an acceptable permit that will not require modification each time circumstances change for one of the dischargers participating in the trading program covered under the permit.

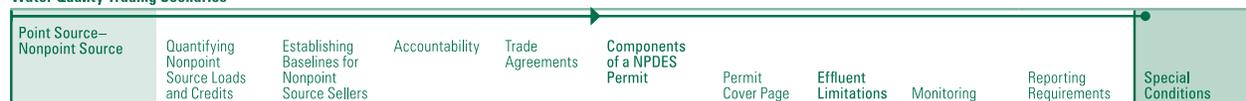
Lower Boise River, Idaho

The Lower Boise model uses pounds of TP as its unit of measurement and reconciles trade account balances monthly against the reported discharge amounts. The point source must sign and submit new **Reduction Credit Certificates** at the end of each month to establish the credit for that month that they can transfer to their own account using the Trade Notification Form. The credits can be used only to compensate for pollutant discharge for the same month in which they were created. The trades are monitored through the automated Trade Tracking System. For more information about this trading program, see Appendix A.

Additional Monitoring and Special Reporting

The permitting authority might articulate special monitoring requirements as special conditions, as described above. Additional monitoring might be required to assess the effectiveness of BMPs or to verify BMP installation, implementation, and maintenance. Any special conditions established to determine BMP effectiveness should specify who is responsible for conducting monitoring and inspections to verify BMP effectiveness and the accuracy of the trade ratios assumed in the permit. It is important for a permitting authority to track permit trading activities especially for point source–nonpoint source trades, and permitting authorities should consider establishing special conditions that facilitate tracking. For point source–nonpoint source trades, the permitting authority might require the point source to provide additional information on the nonpoint source(s) generating the credits reported in

Water Quality Trading Scenarios



the tracking report. For instance, the permit might require the permittee to provide tracking information, if not already specified in the permit, such as the following:

- Identification of nonpoint source (name, address, phone number)
- Type and location of BMP
- Monitoring method and frequency
- Monitoring results (actual measured quantities, or observations regarding installation and maintenance, at nonpoint source)
- Subtraction of a portion of the reported reduction amount (in pounds) to meet any retirement ratio requirement as specified in the trade agreement
- Conversion of reduction quantity to normalized measure of loading (multiply by trade ratio, including location or delivery ratio, equivalency ratio, and uncertainty ratio, where applicable)
- Time period for which credit is verified, per monitoring requirements for that BMP
- Certifying statement signed by the point source that the information provided is true, accurate and complete, and that the installation, maintenance, and monitoring of the BMP meets the requirements for that BMP as specified in the trade agreement (Idaho DEQ 2000)

This information could be provided to the permittee by another entity, such as a soil and water conservation district, through a mechanism such as a memorandum of understanding.

Special Conditions for Failed Trades

The success of a trade depends on credit sellers fulfilling trade obligations. Special conditions might be used to establish provisional requirements that apply if the credits needed are unavailable and a point source is unable to comply with its calculated WQBELs on its own. These special conditions would be included in a permit in addition to any enforcement provisions. The trading program should address what degree of risk the permittee bears from purchasing credits that are not delivered or are later proven invalid. The trade agreement may describe the respective responsibilities of the buyer and the seller in the case of a failed trade. In any case, the burden of compliance falls on the permittee. The permittee can address the risk of trade failure in a private contract with the seller. The permit might require the permittee to notify the permitting authority when a trade fails and how and when it will either secure credits from an alternate source or comply with the calculated WQBELs established in the permit. Monthly reconciliation minimizes risk by requiring certification from buyers and sellers on a monthly basis.

Finally, the permitting authority may establish a mechanism for holding surplus credits in reserve as a means of managing the uncertainty of nonpoint source trading. All such reserved credits would be generated in the same time period they are used or traded. Special conditions could establish the availability of credits held in reserve to the permittee and any conditions placed on the permittee if it desires to use reserved credits.

Water Quality Trading Scenarios



Accountability

Permits that cover one or more point sources buying credits from one or more nonpoint sources generating and selling credits should explicitly state that the permitted point sources are responsible for meeting effluent limitations derived from water quality standards regardless of whether the nonpoint source trading partners comply with the terms of a trade agreement.

Wells River Example: Special Conditions

■ What You Need to Know...

Pollutant: Total Phosphorus

Driver: Approved TMDL for Total Phosphorus for Wells River

Credit Seller: *Patterson Soybean and Corn Farm (3,000 acres)*

Credit Buyer: *Springtown POTW*

Location: Patterson Soybean and Corn Farm (credit seller) is approximately one mile upstream from Springtown POTW (credit buyer) along the Wells River.

Applicable Trade Ratios:

- **Uncertainty Ratio:** 2:1
- **Equivalency Ratio:** 2:1

The NPDES permit writer has reviewed the signed trade agreement for TP trading between the POTW and the farms. The agreement describes how the POTW will meet its new WQBEL through trading with Patterson Soybean and Corn Farm and three other farms in the watershed. The NPDES permit writer has developed the appropriate effluent limitations, monitoring, and reporting requirements for the POTW. The special conditions in the NPDES permit focus on general authority, credit definition, notification of amendment to the trade agreement, notification of unavailability of credits, permit reopeners and modification provisions, and enforcement liability.

Permit Language:

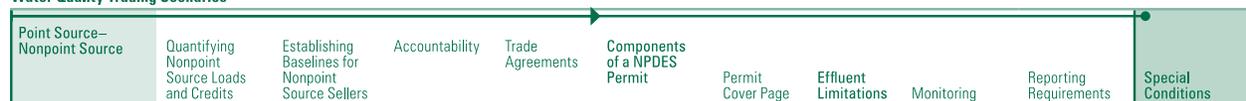
General Authority

The permittee is authorized to participate in water quality trading with Patterson Soybean and Corn Farm, Maybelle’s Farm, U-Pick’Em Vegetable Farm, and Larry’s Vegetable Coop as specified in the written signed trade agreements, for the purposes of complying with the phosphorus effluent limitations and the TMDL-related requirements of this permit (Table 2). The authority to use trading for compliance with these limits is derived from **<insert state law where applicable>** and section 402 of the federal Clean Water Act 33 United States Code (U.S.C.) section 1342. EPA’s policies on Water Quality Trading (1/13/03) and Watershed-Based NPDES Permitting (1/7/03) endorse water quality credit trading. Additionally the Wells River Phosphorus TMDL authorizes water quality trading as a means of achieving the allocations established by the TMDL.

Credit Definition

Credits will be measured in pounds of total phosphorous per day on a monthly average basis. One trading credit shall be defined as one (1) unit of pollutant reduction (pound of TP) to Wells River.

Water Quality Trading Scenarios



Wells River Example: Special Conditions *(continued)*

All pollutant load reductions purchased by the permittee will be in the form of equivalent TP credits that represent pollutant load reductions with the appropriate uncertainty and equivalency trading ratios applied as detailed in the trade agreement between the permittee and nonpoint source trading partners. All valid credits are tradable. The permittee may purchase credits from the farms so long as the BMPs utilized to generate credits are documented as providing pollutant reductions beyond the load allocation, established in the Wells River Phosphorus TMDL.

Permit Language (continued):

Notification of Amendment to the Trade Agreement

The permittee is required to notify the permitting authority in writing within 7 days of the trade agreement being amended, modified, or revoked. This notification must include the details of any amendment or modification in addition to the justification for the change(s).

Notification of Unavailability of Credits

The permittee is required to notify the permitting authority in writing within 7 days of becoming aware that credits used or intended for use by the permittee to comply with the terms of this permit are unavailable or determined to be invalid. This notification must include an explanation of how the permittee will ensure compliance with the WQBELs established in this permit, either through implementation of on-site controls or by conducting an approved emergency phosphorus offset project approved by the NPDES permit writer.

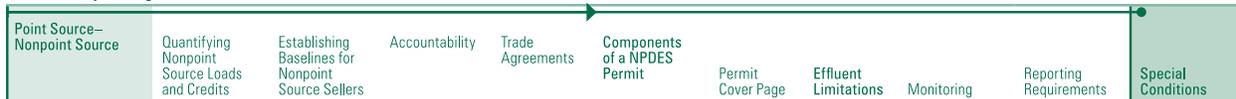
Permit Reopeners, Modification Provisions

The permitting authority may, for any reason provided by law, summary proceedings or otherwise, revoke or suspend this permit or modify it to establish any appropriate conditions, schedules of compliance, or other provisions which may be necessary to protect human health or the environment or to implement the Wells River Phosphorus TMDL. The permitting authority may also reopen and modify the permit to suspend the ability to trade credits to comply with the TP effluent limitations in Table 2.

Enforcement Liability

The permittee is liable for meeting its most stringent effluent limitation. No liability clauses contained in other legal documents (e.g., trade agreements, contracts) established between the permittee and other authorized buyers and sellers are enforceable under this permit.

Water Quality Trading Scenarios



Water Quality Trading Scenario: Nonpoint Source Credit Exchange

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Water Quality Trading Scenario: Nonpoint Source Credit Exchange

Significant water quality impacts may come from sources other than regulated point sources. The permitting authority, along with other stakeholders, may agree that the best way to meet water quality standards would be to involve the nonpoint sources in the watershed. Because nonpoint sources are not regulated by the Clean Water Act (CWA), a trading program that allows nonpoint sources to generate and sell credits may provide an economic incentive for these sources to implement new or additional best management practices (BMPs) that reduce pollutant loadings to receiving waters.

Single point source–nonpoint source trades necessitate a trade agreement between a point source and one or more nonpoint sources. The nonpoint source(s) reduce pollutant loads below an established baseline to generate credits, which the point source may purchase. Single point source–nonpoint source trades would be reflected in an individual National Pollutant Discharge Elimination System (NPDES) permit for the point source either by referencing or incorporating the terms of the trade agreement. Through trading, the point source can meet water quality-based requirements at a lower cost and, provided there is adequate accountability and verification, the nonpoint source will be compensated for contributing to the point source’s water quality-based requirements. A point source may purchase nonpoint source credits in one of two ways: (1) directly from nonpoint source(s) by coordinating with a nonpoint source or a program administered by an entity responsible for a group of nonpoint source dischargers; or (2) from a nonpoint source credit exchange that contains pollutant reduction credits contributed by approved nonpoint source BMPs. There are two general types of exchanges: (1) a broker-facilitated exchange where the broker brings parties together for trades and (2) a central exchange where the point sources are not required to deal directly with nonpoint sources.

This water quality trading scenario focuses specifically on the second type of exchange and presents the challenges related to nonpoint source credit generation and then addresses issues specific to developing and issuing NPDES permits that implement point source–nonpoint source trades where the point source, or an entity representing a group of point sources, purchases credits from a nonpoint source credit exchange. Issues covered under this scenario include the following:

- The function of a nonpoint source credit exchange
- Quantifying nonpoint source loads and credits
- Establishing baselines for nonpoint source sellers
- Accountability
- Trade agreements
- Components of a NPDES permit
 - Permit cover page
 - Effluent limits
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 - Reporting requirements
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Water Quality Trading Scenarios

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A hypothetical example (shown in highlighted boxes) is presented throughout this scenario to illustrate how NPDES permit writers might work with credit buyers and sellers to assist in trading and ensure each facility’s NPDES permit contains the appropriate limits, requirements, and other conditions. Keep in mind that there are a range of options for incorporating trading provisions into a NPDES permit. The hypothetical example discussed throughout this scenario illustrates just one of the many options a NPDES permit writer might use.

The Function of a Nonpoint Source Credit Exchange

A nonpoint source credit exchange is a centralized pool of credits established by a third-party who buys credits from nonpoint sources to sell to point sources (Figure 1). The purpose of a nonpoint source credit exchange is to allow point sources to purchase nonpoint source pollutant reduction credits through a credit exchange managed by a third party, whether government, private, or nonprofit. This is different than point source–nonpoint source trading, however, in that the point sources are not directly trading with nonpoint sources. Rather, nonpoint sources generate pollutant load reductions and sell these pollutant load reductions as credits to the credit exchange. Point sources may then purchase credits from the credit exchange rather than independently identifying and purchasing credits directly from nonpoint sources.

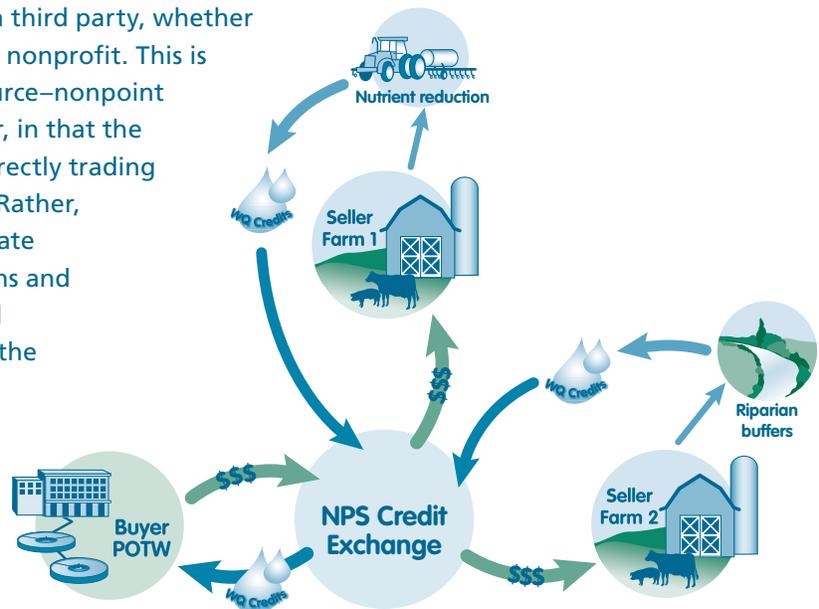


Figure 1. Nonpoint source credit exchange.

A variety of entities can establish and administer credit exchanges, including state agencies, local governments, nonprofit nongovernmental entities, soil and water conservation districts, private entities or other third parties. Management responsibilities for the credit exchange will vary according to the watershed and needs of the trading partners. Nonpoint source credit exchanges perform many of the functions that a point source and nonpoint source would otherwise have to perform (e.g., trade negotiations) as potential trading partners. In addition to negotiating the trades, the credit exchange can provide continuity by establishing standards for trading, defining credits eligible for trading, setting credit prices, verifying the operation and maintenance of BMPs, and tracking important trade information for all participants. A nonpoint source credit exchange might perform some or all of these functions, thereby influencing the roles of the trading partners accordingly. The more responsibility that rests with the exchange, the more streamlined the process of negotiating a trade

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agreement may be for the point source and the permitting authority. The role the exchange takes on could greatly reduce the transaction costs of trading. Given that the nonpoint source credit exchange might perform some of these functions, the responsibilities of the permitting authority and the point source trading partner pertaining to trade negotiation might be streamlined during the permit development process.

Accounting for Delivery and Location Ratios in a Nonpoint Source Credit Exchange

Because the nonpoint source credit exchange is an intermediary between the credit generators and the credit users, **delivery** and **location ratios** must be accounted for by the nonpoint source credit exchange. If the credit exchange is tracking individual credits, in other words, if it *knows* which nonpoint source generated the credits that are being sold to a particular point source, a delivery ratio could be established that applies to that trade. Where all dischargers are discharging directly to the waterbody of concern, this method of equalizing water quality impacts of pollutant loads from various sources might be necessary.

Where the dischargers are upstream of the waterbody of concern, it might be more efficient for the credit exchange to apply location ratios to all the credit purchases and sales that it makes. Because the amount of reduction produced at the source is greater than the amount of reduction that reaches the downstream waterbody of concern, a location ratio specific to that source is applied to convert the source’s reduction to credits available at the waterbody of concern. After location ratios are applied, the credit exchange will be purchasing and selling standardized credits for the waterbody of concern. For example, if a nonpoint source credit generator has a 5:1 location ratio with a downstream waterbody of concern (i.e., for every 5 units of pollutant discharged from the nonpoint source, one unit of pollutant reaches the waterbody of concern), the credit exchange would purchase 5 units of pollutant reduction from that nonpoint source for every credit that becomes available for sale from the exchange. Likewise, if a point source credit user has a 3:1 ratio with the waterbody of concern, each credit purchased by that point source would count for 3 units of *end of pipe* pollutant reduction.

A permitting authority should be aware of technical challenges associated with nonpoint source credit generation, including how the trading program accounts for uncertainty in measuring nonpoint source pollutant loads and how equitable baselines are set for nonpoint source credit sellers, when developing NPDES permits that implement point source–nonpoint source trades. One benefit of using a nonpoint source credit exchange is that the entity administering the credit exchange will have the primary responsibility for resolving these nonpoint source, credit-generation issues. This section presents the technical challenges related to nonpoint source credit generation and then addresses issues specific to developing and issuing NPDES permits that implement point source–nonpoint source trades where the point source, or an entity representing a group of point sources, purchases credits from a nonpoint source credit exchange.

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Quantifying Nonpoint Source Loads and Credits

For most continuous point source discharges, measuring pollutant loads and the effectiveness of controls is simply a matter of measuring pollutant concentrations in effluent and converting concentration-based limits to mass-based limits using flow. Conversely, as noted in U.S. Environmental Protection Agency’s (EPA) *Water Quality Trading Policy* (Trading Policy), the diffuse nature of nonpoint source pollutants along with variability in precipitation, land management practices, and the effect of soil type, slope, and cover on pollutant loadings to receiving waters, creates a great degree of uncertainty in determining loading from nonpoint sources and measuring the effectiveness of BMPs. For example, pollutant loads in runoff from a crop field are dependent on crop type, soil type, slope, fertilizer use patterns, weather and the amount of time it takes for runoff to reach the receiving water. These factors could vary by season and from year to year; therefore, the pollutant load is highly variable and may be difficult to measure. The same factors contribute to difficulties in measuring the effectiveness of BMPs used to reduce nonpoint source pollutant loads.

Nonpoint sources typically employ BMPs to reduce pollutant loading to a receiving water. BMPs are schedules of activities, technologies, structural controls, changes in or prohibitions of practices, maintenance procedures, and other measures to prevent or mitigate pollutant runoff to waters. Examples of nonpoint source BMPs include riparian buffer plantings, wetland creation or restoration, sediment basins, filter strips, crop sequencing, and nutrient management. Nonpoint source pollutant load reductions can sometimes be measured directly, but trading programs typically use the best available performance information to estimate load reductions for a particular BMP and then discount these estimated values using uncertainty ratios to account for the technical challenges in determining BMP effectiveness.

Potential Issues

Lag Time

Permitting authorities should be aware of potential time lags between BMP installation and full pollutant reduction efficiency. BMPs that are not yet fully functional cannot generate the full number of expected credits. Credits generated by nonpoint sources through installation of BMPs may not be available immediately because of a time lag between installation of the BMP and its effectiveness in reducing loadings or otherwise improving water quality. In some cases, the credit generation could be prorated on the basis of pollutant reduction the BMP is achieving during the current reconciliation period, even where the BMP has not reached its maximum expected pollutant reduction efficiency. The decisions required to determine when credits have been generated may have already been made in the program design. The permitting authority should be aware of these decisions made in trading program design.

Clean Water Services, Oregon

Clean Water Services can compensate for the heat load from publicly owned treatment works (POTWs) with nonpoint sources generating credits through increased shade provided by riparian planting. Because trees provide more shading as they grow, a component of Oregon Department of Environmental Quality’s (DEQ) Heat Source model is used to determine effective shade for each project based on the year of initiation.

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If the trade agreement or other document external to the permit does not dictate how and when credits become available for purchase, the NPDES permit should address the time lag between BMP installation and full treatment efficiency (see [Reporting Requirements](#)).

Period of BMP Performance

The permitting authority should also determine whether and when a BMP's credit generating capacity expires. Credit generation by nonpoint sources might decrease or stop if the BMP becomes less effective due to a natural degeneration, a lack of maintenance, or changing conditions on-site. A BMP's life expectancy depends on proper design, placement, and maintenance. Some BMPs have a discrete or short life or must be renewed. For example, nonpoint sources must renew crop sequencing each season. Other BMPs have a longer life span but require ongoing maintenance and repair to maintain effectiveness. For example, a sediment catch basin requires periodic inspection to ensure structural integrity and regular cleaning to remove and properly dispose of collected sediments. In addition, activities or conditions may change on-site affecting the efficiency of installed BMPs. For example, a vegetated buffer strip designed to filter sediment from a 5-acre crop field may be overwhelmed and become ineffective if the operator decided to increase the field size to 8 acres.

Proper operation and maintenance are critical to ensuring the ongoing performance and attaining the expected life span of a BMP. Trading programs should include mechanisms to ensure that BMPs installed to generate credits are being operated and maintained according to procedures and guidelines established by Natural Resources Conservation Service (NRCS), EPA, or other agencies or product manufacturers.

The permitting authority should specify in the permit the approved BMPs and associated expected life spans established by the trading program. Continued credit generation may require periodic certification that a nonpoint source continues to implement a practice, that the nonpoint source is taking specified operation and maintenance actions, and that the BMP design and specification are still appropriate for the site. The trading program should account for the life span of a credit source and determine when credits are deemed permanently expired and thus unavailable for any future allocation. Permits implementing nonpoint source trading can contain or reference provisions to require certification of BMP performance and define when a BMP generating credits expires (see [Reporting Requirements](#) and [Special Conditions](#)).

Lower Boise River, Idaho

The Lower Boise trading framework addresses the issue of certifying BMP performance by having the NPDES point sources purchasing credits sign a [Reduction Credit Certificate](#) at the end of each month, certifying that the BMP is still in place and that it produced a specific reduction amount during the month that just occurred. The NPDES buyer certifies that they are aware of the penalties for false certification by signing that Reduction Credit Certificate, which then establishes the credit that they can then transfer into their own account and use to cover their discharge. EPA and Idaho Department of Environmental Quality (Idaho DEQ) conduct random audits of some BMPs to determine if the certification was valid.

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BMP Failure

To address the potential inadequacy of generated credits (i.e., treatment control failure), credit exchanges should consider reserving credits that would be available to credit purchasers if the primary credit source is insufficient. Entities administering credit exchanges can reserve credits in a number of ways. One option is for the credit exchange to *overbuy* available credits from nonpoint source BMPs approved to generate credits. Another option is to require point source dischargers that want the ability to purchase credits from the credit exchange—now or in the future—to pay a user fee to the credit exchange that will in turn finance additional nonpoint source BMPs approved to generate credits.

Uncertainty

EPA’s Trading Policy recommends that states and tribes establish methods to account for greater uncertainties in estimates of nonpoint source loads and reductions (see Appendix B). There are three types of uncertainty related to nonpoint source BMPs:

- Measurement uncertainty, which addresses the level of confidence in the field testing of a nonpoint source BMP
- Implementation uncertainty, which addresses the level of confidence that a nonpoint source BMP is properly designed, installed, maintained, and operated
- Performance uncertainty, which addresses the risk of a BMP failing to produce the expected results

Options for Addressing Uncertainty

Uncertainty Ratios

The application of an uncertainty ratio helps ensure that actual loads resulting from a trade do not violate the water quality standards despite the inability to accurately measure them (Jones et al. 2005). An uncertainty ratio should be applied to estimated nonpoint source load reductions to account for any potential inaccuracies in the methodology or assumptions used in the estimation. Uncertainty ratios are particularly important to account for potential inaccuracies in the estimation methodology when credits from nonpoint source BMPs are estimated or calculated.

Uncertainty, and therefore the uncertainty ratio, can be reduced by enhancing the level of confidence in BMP effectiveness values through employing one or more of the following three practices.

Monitoring BMP Effectiveness

Monitoring BMPs installed for generating credits is the most effective method for reducing uncertainty. Two types of monitoring are possible. In some instances it is possible to conduct edge-of-field monitoring to determine BMP performance. Another type of monitoring is ambient monitoring. Placing monitoring gauges in the stream at strategic locations between the buyer and the seller would allow for gauging water quality impacts of BMPs. EPA’s *Monitoring Guidance for Determining Effectiveness of Nonpoint Source Controls* (EPA/841-B-96-004) provides guidance on the design of water quality monitoring programs to assess both impacts from nonpoint sources and effectiveness of control practices and management measures.

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Modeling BMP Effectiveness

Modeling that uses local data to calculate nonpoint source pollutant loadings and BMP effectiveness is also an important tool. For instance, estimates of pollutant reductions (e.g., total phosphorus (TP) and sediment) might be based on soil erosion reductions using the standardized or revised Universal Soil Loss Equation (USLE). This method incorporates soil type, plant cover, rainfall, slope, and agricultural conservation practice factors to calculate the soil loss from an area. The soil loss information may then be translated to estimate loadings of sediment-bound phosphorus. An uncertainty ratio should be applied to modeled estimates. All modeling should be ground truthed by local monitoring data, which could lead to a reduction in uncertainty.

Estimating BMP Effectiveness

Where monitoring and modeling are impracticable, BMP effectiveness can be estimated through other means. For example, it might be possible to identify a set of tested BMPs with performance data that have been well established through field testing or under controlled conditions. These data may be used to estimate the reductions achieved at a nonpoint source that installs one or more of the tested BMPs. The trading program, with input from local soil and conservation experts, might identify a list of local BMPs that meet minimum design, construction, maintenance, and monitoring requirements. Preestablished performance data can be used to estimate loading reductions for local nonpoint sources. Potential uncertainty ratio reduction is an advantage of implementing local BMPs with high levels of measurement precision and accuracy.

South Nation River Watershed, Ontario, Canada

The trading program established formulae that are used to calculate the amount of phosphorus that is controlled annually from various agricultural practices. For example, the formula used to calculate the amount of phosphorus controlled through proper manure storage is:

$$\text{Kg of P per year controlled} = \# \text{ of animals} \times \text{animal phosphorus factor} \times \text{days} \times 0.04$$

where:

- # of animals = the number of animals contributing manure to the area,
- Animal phosphorus factor = U.S. Department of Agriculture’s (USDA) estimates of the amount of phosphorus excreted per animal,
- Days = the number of days that the animals are contributing manure to the area, and
- 0.04 represents the assumption that approximately 4 percent of the total amount of manure excreted would have been transported in runoff from improperly stored manure.

In addition to manure storage, formulae have also been established to calculate the amount of phosphorus controlled through use of clean water diversions, proper storage and handling of milkhouse washwater, preventing livestock access to watercourses, various cropping practices, and buffer strips (O’Grady and Wilson No date).

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The Idaho Department of Environmental Quality’s draft Pollutant Trading Guidance

Idaho DEQ’s November 2003 draft *Pollutant Trading Guidance* provides a list of approved agricultural BMPs that can be used to generate TP reduction credits for trading in the Lower Boise River watershed. The draft guidance document includes estimates of BMP effectiveness and uncertainty discounts for specific watersheds (the uncertainty discount is subtracted from the effectiveness estimate). The guidance also lists the procedures for determining the amount of credits and associated monitoring and maintenance requirements for each BMP. Table 1 lists selected BMPs approved by Idaho DEQ for use in nutrient trading in the Lower Boise River watershed. A separate list of watershed-specific BMPs, along with effectiveness estimates and uncertainty ratios, will be generated for each watershed that would like to develop a trading program consistent with the Idaho *Pollutant Trading Guidance*. For more information on [trading in Idaho](#), see Appendix A.

Table 1. Selected BMPs approved for trading in the Lower Boise River watershed

| BMP | Life span | Effectiveness | Uncertainty |
|------------------------------|-----------|---------------|-------------|
| Sediment Basins (farm scale) | 20 years | 75% | 10% |
| Constructed Wetland | 15 years | 90% | 5% |
| Microirrigation | 10 years | 100% | 2% |
| Crop Sequencing | 1 season | 90% | 10% |
| Filter Strips | 1 season | 55% | 15% |

Establishing Baselines for Nonpoint Source Sellers

As stated in the *Essential Trading Information for Permit Writers* section, a nonpoint source should meet the specified baseline before entering the trading market as a credit seller. Baseline is defined as the pollutant control requirements that apply to a buyer and seller in the absence of trading. After a seller meets its baseline, it can generate credits.¹ A baseline for a nonpoint can be derived from a load allocation (LA) established under a total maximum daily load (TMDL). Where an LA does not exist, EPA’s Trading Policy states that state and local requirements or existing practices should determine a nonpoint source’s baseline (see Figure 2). The trading program provisions could also specify some additional minimum level of control that nonpoint sources would have to achieve before they could generate credits. The baseline level of control should never be less than existing practice. There are difficulties associated with establishing baselines for nonpoint sources and, although permitting authorities may not have direct involvement in establishing these baselines, a permit writer should be aware of these issues and how they might affect the trading provisions in permits.

To be reliable, trading programs establishing baselines for nonpoint source sellers should use the maximum amount of verifiable information on loadings in a watershed, such as a TMDL

¹ Some trading programs may require a seller to implement controls beyond the baseline before generating credits.

or other watershed loading analysis. Where a TMDL establishes a reliable LA for nonpoint sources, an individual nonpoint source's portion of the LA can be used to set its trading baseline. Where a TMDL or similar analysis is not available or does not represent the most accurate information on nonpoint source loading in the watershed, the trading program or state policy can establish a set of minimum BMPs that a nonpoint source must install to be eligible for trading. The pollutant load from the nonpoint source after installing these BMPs would be considered the baseline for estimating further reductions that could then be counted as credits. The permit should reference any state trading program or other document that contains the model used for estimating credits. It is important to note that nonpoint source baselines established using less-verifiable information on pollutant loading are likely to have less public support and, more relevant to permit writers, may be challenged as inconsistent with water quality standards.

| Nonpoint Source Seller Baseline for Trading | |
|---|---|
| NPS Seller With TMDL | NPS Seller Without TMDL |
| Load allocation | State and local requirements and/or existing practice |

Figure 2. Nonpoint source seller baseline for trading.

Nonpoint Source Baseline Derived from TMDL Load Allocations

An LA established under a TMDL defines the nonpoint source load reductions necessary to achieve water quality standards. EPA would not support a trading program that allows nonpoint sources to sell credits if the discharge is contributing to water quality impairment; therefore, nonpoint sources should meet their portion of the LA before generating credits to sell on the trading market.

TMDLs might specify an LA for an individual nonpoint source or for a category of nonpoint source dischargers in a watershed. If established for an individual nonpoint source (e.g., a single farm), the individual nonpoint source should use the LA as its baseline for generating credits. However, if the TMDL establishes an aggregate LA for a category of nonpoint sources (e.g., all farms in a watershed) or all nonpoint sources on a particular tributary, the watershed stakeholders, including the permitting authority or trading program, need to decide how to equitably distribute that aggregate LA among the individual nonpoint source dischargers in a scientifically valid manner. For example, if the LA is expressed as an overall load reduction percentage (e.g., 25 percent reduction in total nitrogen (TN) loading watershed-wide), the trading program might require each nonpoint source discharger to reduce its individual loading by that percentage before generating credits. Alternatively, where the LA is expressed as a total aggregate loading reduction (i.e., total pounds per day), the trading program would distribute the LA among the individual nonpoint sources

EPA's Trading Policy states that where a TMDL is in place, the LA or other appropriate baseline serves as the threshold for nonpoint sources to generate credits. This does not mean that EPA requires all nonpoint sources in a watershed to meet an aggregate LA for a single nonpoint source to participate in trading. The Trading Policy's intent is that each nonpoint source participating in trading under a TMDL make reductions consistent with the LA before they can generate credits (additional reductions) for sale. This approach ensures that progress is made toward water quality standards with each trade. States have flexibility to set other appropriate baselines and can, in fact, decide to require all nonpoint sources to meet the baseline before participating in trading.

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to define the baseline for each nonpoint source. The trading program might use land cover, total production, proximity to the waterbody of concern, or some other variable to determine the appropriate distribution of the aggregate LA among individual nonpoint sources. The best method of distributing an aggregate LA among nonpoint source dischargers will vary; watershed stakeholders should work together to determine the most appropriate method for establishing the nonpoint source baseline.

Once the LA is equitably distributed among nonpoint sources in the watershed, an individual nonpoint source should reduce its load by its portion of the LA before it generates credits. To verify the required load reduction and quantify the credits generated after the baseline is met requires quantification of the nonpoint source load, either through direct monitoring or estimation. For more information, see the *Quantifying Nonpoint Source Loads and Credits* section above.

Nonpoint Source Baseline Set at a Minimum Level of BMP Implementation

In watersheds where a TMDL has not been developed, the nonpoint source baseline is derived from state, tribal, and local requirements. The nonpoint source should meet this baseline before generating credits. A trading program can choose to require a more stringent level of BMP control before credits can be generated. In any case, the level of control required to generate credits should never be less than existing practice.

In any watershed, it is likely that different nonpoint sources will be at different levels or stages of BMP implementation. For example, in a watershed where animal feeding operations (AFOs) are the primary nonpoint source pollutant contributors, some AFOs might be actively working with the Natural Resources Conservation Service (NRCS) to implement comprehensive nutrient management plans that minimize nutrient and sediment runoff. Other AFOs might not have installed any BMPs either because they do not participate in any NRCS programs or because they are in the early stages of planning and implementation. These nonpoint source facilities might contribute a much greater pollutant load than those who have proactively reduced nonpoint source pollutants. A trading program can choose to require nonpoint sources to implement a minimum level of BMPs before trading to provide some level of equity among nonpoint source credit generators in the watershed. In addition, implementing a minimum level of BMPs demonstrates a commitment on the part of the credit generators participating in the trading program.

Trading programs should consider baseline equity issues among nonpoint source participants. EPA encourages states or trading programs to set a minimum level of BMP requirements for nonpoint sources before they can generate credits.

Where the nonpoint source baseline is set at a minimum level of BMP implementation, credits can be generated after meeting the minimum level of control. Quantifying the credits generated will generally require quantification of the nonpoint source load after implementing the minimum required BMPs, either through direct monitoring or estimation. For more information, see the *Quantifying Nonpoint Source Loads and Credits* section above. In certain instances, it is impossible or impracticable to quantify a baseline by measuring or estimating

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Lower Boise River, Idaho

In Idaho, DEQ designates the nonpoint source baseline year (currently 1996 for the Lower Boise, but this may be amended based on the technical outcome of a pending TMDL) for each trading marketplace in the state. Each nonpoint source then calculates the baseline load for the baseline year and uses it to determine the eligibility of reductions to serve as credits for trading. In other words, in the Lower Boise River watershed, if a nonpoint source installed a BMP in 1999, the farm would have already created eligible credits. However, pollutant reductions from a BMP installed in 1994 would not be eligible. Nonpoint sources in Idaho are required to use the BMP List’s estimating equation for particular BMPs (which incorporates the USDA Surface Irrigation Soil Loss (SISL) equation) to calculate baseline loads. For more information about this trading program, see Appendix A.

the nonpoint source pollutant load. In these cases, a trading program could allow nonpoint sources to generate credits for estimated reductions from BMPs. For example, if sufficient data are available to establish that a particular BMP, installed under specified conditions, will achieve a loading reduction of X lbs/day, the nonpoint source might be allowed to generate credits equivalent to X lbs/day without actually having quantified the pollutant load before installing the BMP. Trading programs should use this approach only where sufficient data on the efficacy of the BMPs are available to develop a reliable estimate of the expected reductions. The baseline pollutant load should always be quantified where possible.

Red Cedar River, Wisconsin

TP reduction credits associated with a BMP were estimated using TP loading models to estimate reductions from well-established and well-understood practices. Soil testing of each field was done to calculate the TP delivery to the stream from the field where the BMP was used (Breetz et al. 2004). For more information about this trading program, see Appendix A.

Determining Maximum Feasible Nonpoint Source Load Reductions

It is not feasible for a nonpoint source to control 100 percent of its pollutant runoff to a waterbody. Therefore, it is important that some analysis be done to estimate the maximum amount of pollutant runoff that can be controlled from the nonpoint sources in a watershed. The difference between this estimate and the nonpoint source’s baseline equals the maximum nonpoint source load reductions available for trading.² This is a way to ensure that credits being purchased result in actual reductions. This increases the surety that the trading program can meet its goal of achieving water quality standards.

² The maximum tradable nonpoint source load reduction is not equal to the maximum number of credits available for trading in a watershed because of the impact of trading ratios. Because trading ratios can vary depending on many factors (as described in the *Developing Trade Ratios* section), determining the maximum number of credits is not as useful as determining the maximum tradable nonpoint source load reduction for the purpose of ensuring that every trade results in a reduction of total load to the waterbody.

Water Quality Trading Scenarios

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A trading program can directly calculate the maximum tradable nonpoint source load reduction for a watershed. A watershed’s maximum tradable nonpoint source load reduction can be calculated by first determining the maximum feasible implementation of BMPs; second, estimating the reduction from that level of BMP implementation based on watershed modeling, published BMP efficiency information, or best professional judgment; and finally, taking the difference between the maximum loadings reduction and the aggregate baseline for all sellers. In addition, this calculation could be done for an individual farm.

The trading program may want to include a mechanism for ensuring that this maximum tradable nonpoint source load reductions is not exceeded. This could be done, for example, by specifying the maximum tradable nonpoint source load reductions in the program documentation and then tracking credit sales, and therefore load reductions, by nonpoint sources to ensure that this maximum is not exceeded.

Pennsylvania’s Tradable Loads for Addressing the Chesapeake Bay’s Tributary Strategies

In 2003 EPA developed a document titled, *The Technical Support Document for the Identification of Chesapeake Bay Designated Uses and Attainability* to help states develop and adopt refined water quality standards to address nutrient- and sediment-based pollution in the Chesapeake Bay and its tidal tributaries. As part of this analysis, the Chesapeake Bay Program developed four nutrient reduction scenarios on the basis of different levels of BMP and control technology implementation by 2010. The levels ranged from current implementation to “everything, everywhere, by everybody” (E3), which approximates the maximum nutrient and sediment load reductions available in the watershed. To create the most objective and uniform maximum implementation level possible, the E3 scenario was developed without considering site-specific constraints and program participation levels. If these factors were considered, certain aspects of the E3 scenario may not be feasible. Nutrient and sediment loads resulting from each nutrient reduction scenario were estimated using the Chesapeake Bay Program’s Phase 4.3 Watershed Model. For example, the estimated loadings for the E3 scenario for Pennsylvania agriculture were 21,153,000 lbs TN/yr and 1,896,000 lbs TP/yr. (More information on the development of the E3 scenario is available in Appendix A of the *Technical Support Document* at www.chesapeakebay.net/uaasupport.htm)

Recognizing that model estimates based on the E3 scenario likely overestimated the maximum feasible nutrient and sediment load reductions, Pennsylvania made adjustments to the estimates to better represent a feasible effort. One adjustment was reducing by 10 percent the level of nonpoint source reductions estimated in the E3 scenario. The selection of a 10 percent reduction is subjective, because estimates of the feasible level of implementation for nonpoint source BMP implementation vary widely. Additionally, Pennsylvania estimated the reductions for those BMPs in *Pennsylvania’s Tributary Strategy* that were not included in the E3 scenario. These additional reductions were included in the revised E3 scenario. The estimated loadings for the revised scenario for agriculture were 21,819,000 lbs TN/yr and 1,726,000 lbs TP/yr. After adjusting the E3 scenario estimates, Pennsylvania estimated the maximum allowable credits as the difference between the load estimates from the revised E3 scenario and the *Pennsylvania Tributary Strategy* loadings goal. The Tributary Strategy loads for agriculture were 27,580,000 lbs TN/yr and 2,123,000 lbs TP/yr yielding final tradable loads of 5,760,000 lbs TN/yr and 397,000 lbs TP/yr. The scenario values and the tradable load values will change as new BMPs are developed or the efficiencies of existing BMPs are revised.

Water Quality Trading Scenarios

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Accountability

Mechanisms Under the NPDES Program

EPA’s Trading Policy notes that “States and tribes should establish clear enforceable mechanisms consistent with NPDES regulations that ensure legal accountability for the generation of credits that are traded.”

Such enforceable mechanisms might include, among other things, requirements for water quality or effluent monitoring, credit purchase and sale accounting, and assessment of BMP effectiveness. These mechanisms might be contained in state regulations, the project trade agreement, or both. By incorporating such accountability provisions of the trade agreement (or the entire trade agreement) into a NPDES permit, the state or tribe makes the point source legally responsible for their performance.

EPA’s Trading Policy also states that “In the event of default by another source generating credits, an NPDES permittee using those credits is responsible for complying with the effluent limitations that would apply if the trade had not occurred.”

To account for the possibility of a failed trade (e.g., insufficient generation of necessary credits by the seller), EPA recommends that the permit (and any accompanying trade agreement) clearly describe the respective responsibilities and legal liability (if any) of the buyer and the seller (see *Special Conditions*).

Mechanisms Outside of the NPDES Program

To further clarify and protect their interests, the trading parties may choose to enter into a contract or other agreement separate from any applicable NPDES permit. Such a contract or agreement could, where appropriate, address a variety of financial or legal considerations and contingencies among the trading parties, including what happens in the case of default by any party. For example, the point source buyer might use such a contract to memorialize an agreement that the credits it needs are available; the nonpoint source seller might use such a contract to guarantee payment for its services; a credit exchange might use such a contract for both of these reasons. Where a credit exchange is involved, the exchange might enter into separate contracts with the buyer and seller, all parties could enter into one contract, or the buyer and seller could enter into a contract without the exchange.

Great Miami River Watershed, Ohio

After a soil and water conservation district’s proposal is approved, the Miami Conservancy District (MCD, the broker of the program) enters into a contract with the successful soil and water conservation district for project implementation. The soil and water conservation district then enters into a project agreement with the nonpoint source responsible for implementing the BMPs. MCD tracks the credits generated and allocates them to the buyers. A separate Load Reduction Workgroup will evaluate the accuracy of reduction estimates every two years. For more information on this program, see Appendix A.

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Trade Agreements

Typically, the terms that govern a trading program will be developed outside the NPDES permit process and can be incorporated or reflected in the permit (see [Appendix C](#)). The Trading Policy describes several mechanisms for implementing trading through NPDES permits (see [Appendix B](#)). NPDES permits authorizing water quality trading should reference any existing trade agreement in the permit and fact sheet.

All trade agreements referenced in NPDES fact sheets and permits should meet certain minimum standards to help ensure the trades authorized by the permit are consistent with water quality standards. At a minimum, the trade agreement should be a written agreement that is signed and dated by authorized representatives of all trading partners. Verbal trade agreements should not be referenced in NPDES permits. The written trade agreement should contain sufficient detail to allow the permitting authority to determine with some degree of certainty that the terms of the agreement will result in loading reductions and generation of sufficient credits to satisfy water quality requirements. If there is no formal, outside trade agreement, trading can still occur; however, the permit writer will need to more explicitly describe the trading program in the fact sheet and authorize specific aspects of the trading program as permit conditions. Trading partners can specify the details pertaining to the negotiated terms of the trade (e.g., credit price, payment schedule, consequences for failure to fulfill negotiated terms) in a separate, written and signed contract.

Trade Agreements with Nonpoint Source Credit Exchanges

A nonpoint source credit exchange is a pool of nonpoint source credits managed by a third party that facilitates trades. As a result, point sources purchasing credits from a nonpoint source credit exchange do not trade directly with nonpoint sources. The nonpoint source generates pollutant load reductions and sells the pollutant load reductions as credits to the entity administering the nonpoint source credit exchange. Point sources may then purchase credits from the credit exchange rather than directly from the nonpoint sources. Point source purchasers, therefore, will enter into trade agreements with the nonpoint source credit exchange.

As described above, the entity administering the nonpoint source credit exchange can establish standards for trading, set credit prices, determine eligible credits, verify the operation and maintenance of BMPs, account for delivery, location, and uncertainty ratios and track important trade information for all participants. A trade agreement established between a point source and the nonpoint source credit exchange should outline all these issues, and the permitting authority should consider the information contained in the trade agreement when developing permits for participating point sources.

Water Quality Trading Scenarios

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Maize Creek Example: Trade Agreements

■ What You Need to Know...

Pollutant: Biochemical Oxygen Demand

Driver: Maize Creek Watershed Management Plan nutrient reduction goals (pre-TMDL) for point and nonpoint sources

Nonpoint Source Credit Exchange: Maize Creek Producers' Nutrient Exchange (MCPN Exchange)—Nitrogen and Phosphorus

- **Credit Sellers:** Ten farms in the Maize Creek Watershed
- **Agricultural Nutrient Reduction Goals (baseline):** 10 percent reduction in TP and TN loading from current estimated loads to reduce in-stream biochemical oxygen demand (BOD).
- **Estimated Load Reduction:** The Niblet County Soil and Water Conservation District established the MCPN Exchange to facilitate trading between local farms and point source dischargers in the Maize Creek Watershed. The MCPN Exchange has developed a list of BMPs eligible for trading along with estimated loading reductions. The BMP loading reductions estimates, as well as applicable ratios, have been reviewed and approved by the state NPDES permitting authority. Ten farms implemented conservation tillage to achieve the baseline of a 10 percent reduction in TP and TN loads from current estimated loads. These 10 farms are eligible to participate in the MCPN Exchange and have signed the required trade agreement. The farms have agreed to install and maintain additional BMPs to reduce in-stream BOD by reducing TP and TN loads. Collectively, participants in the MCPN Exchange will meet the BOD load reduction needs of the point sources in the watershed. The loading reductions are based on an average loading reduction per month over a typical 12-month period for the watershed. The MCPN Exchange will monitor BMP installation and maintenance to verify availability and continued generation of credits, as well as track and report all trades to all participants.

Credit Buyer: City of Earlington POTW^a

- **Existing TBEL^b:** 1,000 lbs/day (average monthly) of BOD
- **Current Loading:** 1,000 lbs/day (average monthly) of BOD
- **Approved Watershed Management Plan Total BOD Reduction Goal:** 15 percent reduction from current BOD loading (reduction of 150 lbs/day (average monthly) to 850 lbs/day)
- **WWTP^c Treatment Capabilities:** Treatment to 1,000 lbs/day of BOD (average monthly)

Location: All the farms participating in the MCPN Exchange are upstream of potential point source buyers, including the Earlington POTW. All point and nonpoint sources discharge directly to Maize Creek.

Notes: ^a POTW = publicly owned treatment works; ^b TBEL = technology-based effluent limitations; ^c WWTP = wastewater treatment plant

Water Quality Trading Scenarios

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| Nonpoint Source Credit Exchange | The Function of a Nonpoint Source Credit Exchange | Quantifying Nonpoint Source Loads and Credits | Establishing Baselines for Nonpoint Source Sellers | Accountability | Trade Agreements | Components of a NPDES Permit | Permit Cover Page | Effluent Limitations | Monitoring | Reporting Requirements | Special Conditions |
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Maize Creek Example: Trade Agreements *(continued)*

Applicable Trade Ratios:

- **Delivery:** The MCPN Exchange has developed a set of ratios that account for the location of the farms in relation to each potential buyer.
- **Uncertainty:** The MCPN Exchange developed a set of uncertainty ratios to account for uncertainties associated with BMP efficiencies, implementation, maintenance and monitoring.
- **Equivalency:** The MCPN Exchange has worked with the NPDES permitting authority to develop a ratio to relate the in-stream effects of nitrogen and phosphorus loading reductions by the farms to required BOD reductions by point source buyers.

The NPDES permitting authority has reviewed and approves of all ratios developed by the MCPN Exchange. These ratios will be applied to the loading reductions achieved by the member farms to determine the number of credits generated.

Multiple point sources within the Maize Creek Watershed, including the city of Earington POTW, wish to participate in the MCPN Exchange and have asked the permitting authority to authorize them to trade to meet the BOD load-reduction goals in the approved Maize Creek Watershed Management Plan. The NPDES permitting authority worked with the MCPN Exchange, potential point source buyers, and other key stakeholders to craft the provisions of the trade agreement and provided the necessary information (e.g., baseline, minimum control levels) to facilitate the trade between the city of Earington POTW and the MCPN Exchange. The city of Earington POTW’s permit is scheduled for renewal in 3 years, and at that time, the NPDES permit writer will incorporate provisions to allow the city of Earington POTW to purchase from the MCPN Exchange the equivalent of 150 lbs/day of total BOD necessary to achieve the 15 percent load reduction required under the approved watershed management plan.

As required, the permitting authority receives a copy of the trade agreement that is signed and dated by authorized representatives of the city of Earington POTW and the MCPN Exchange. The permit writer reviews the trade agreement to verify that the information is accurate and consistent with water quality standards. The permit writer develops permit requirements for the city of Earington POTW that are consistent with the provisions in the trade agreement and incorporates those requirements in the effluent limitations (i.e., baseline and minimum control level), reporting, and monitoring provisions of the permit.

The basic terms of the trade agreement between the city of Earington POTW and the MCPN Exchange are as follows:

- The city of Earington POTW will purchase the necessary amount of equivalent total BOD credits to compensate for a discharge of 150 lbs/day of BOD (average monthly) for a period of 5 years to correspond with the NPDES permit term.
- The delivery, uncertainty, and equivalency ratios approved by the NPDES permitting authority will be applied to the nitrogen- and phosphorus-loading reductions achieved by the member farms to determine the number of BOD credits generated. Nutrient load reductions will be converted to BOD credits by the exchange using the applicable ratios.

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| Nonpoint Source Credit Exchange | The Function of a Nonpoint Source Credit Exchange | Quantifying Nonpoint Source Loads and Credits | Establishing Baselines for Nonpoint Source Sellers | Accountability | Trade Agreements | Components of a NPDES Permit | Permit Cover Page | Effluent Limitations | Monitoring | Reporting Requirements | Special Conditions |
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Maize Creek Example: Trade Agreements *(continued)*

- Member farms must continue to meet their baseline requirement of 10 percent nutrient reduction (either through continuation of conservation tillage, or through alternate approved BMPs) to maintain eligibility to participate in the MCPN Exchange.
- Credit buyers must meet applicable minimum control levels before purchasing credits to meet the baseline established in the Maize Creek Watershed Management Plan.
- The MCPN Exchange will conduct the necessary BMP monitoring and inspections to verify and certify credit generation.
- The MCPN exchange will provide the city of Earlington POTW with the necessary BOD Analysis Reports to submit to the NPDES permitting authority to verify and certify the generation of credits by agricultural operations participating in the exchange.
- Trades occur monthly and credits may not be applied in any month other than the one in which the credits are generated.

In a separate contract, the city of Earlington POTW and the MCPN Exchange articulate the financial and liability conditions for the trade. The terms of the separate contract, which the permit writer does not ask to see because it has no bearing on the NPDES permit requirements for the city of Earlington POTW, are as follows:

- The city of Earlington POTW will pay the MCPN Exchange \$22.50 per credit of BOD on a monthly basis. All payments for a calendar month are due to the MCPN Exchange by the 15th of the following calendar month.
- The city of Earlington POTW will pay the MCPN Exchange an administration fee of \$15 per month during the 5-year permit term. This fee will help defray the cost of BMP inspection, monitoring, reporting, and other administrative functions of the exchange.
- Failure to fulfill the terms of this agreement on behalf of the city of Earlington POTW will result in a breach of the trade agreement and terminate participation in the purchase of TP credits through the MCPN Exchange.

The city of Earlington POTW’s renewed NPDES permit will not include any provisions of the city of Earlington POTW’s contract with the MCPN Exchange; however, the NPDES permit writer receives a copy of the trade agreement that is signed and dated by authorized representatives of the city of Earlington POTW and the MCPN Exchange. The permit writer reviews the trade agreement to verify that the information related to baselines and estimated pollutant load reductions is accurate and does not conflict with any of the city of Earlington POTW’s existing NPDES permit requirements. At the time of permit renewal, the NPDES permit writer will incorporate provisions to authorize the purchase of BOD credits from the MCPN Exchange and ensure that the permit effluent limitations, monitoring, reporting, and special conditions requirements reflect the purchase of BOD credits to achieve compliance with the facility’s water quality-based effluent limitation (WQBEL). The permit writer will incorporate provisions as necessary from the signed trade agreement in the permit and reference the agreement in the fact sheet. A copy of the trade agreement is also attached as part of the permit’s administrative record.

Water Quality Trading Scenarios

| Nonpoint Source Credit Exchange | The Function of a Nonpoint Source Credit Exchange | Quantifying Nonpoint Source Loads and Credits | Establishing Baselines for Nonpoint Source Sellers | Accountability | Trade Agreements | Components of a NPDES Permit | Permit Cover Page | Effluent Limitations | Monitoring | Reporting Requirements | Special Conditions |
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Components of a NPDES Permit

NPDES permits that authorize water quality trading are no different than typical NPDES permits in many respects—they require the same structure, analyses, and justification. All permits have five basic components: (1) cover page; (2) effluent limitations; (3) monitoring and reporting requirements; (4) special conditions; and (5) standard conditions. Standard conditions are the same for all NPDES permits and will not be addressed in this Toolkit. In addition, consistent with Title 40 of the *Code of Federal Regulations* (CFR) section 124.6, all permits are subject to public notice and comment. This process provides all interested parties an opportunity to comment on the trading provisions in the permit.

Each NPDES permit is accompanied by a permit fact sheet. The information in these fact sheets is not enforceable. The purpose of the fact sheet is to explain to the public the requirements in the permit. Thus, at a minimum, the fact sheet should explain to the public any trading provisions in the permit. There is a wide variety of options for including trading information in the fact sheet that ranges from explaining the minimum control level (buyer) or trading limit (seller) to including the entire trading program.

There are a variety of issues, however, that may require special consideration when developing a permit to implement water quality trading with a nonpoint source credit exchange. Appendix E provides the permit writer with a list of fundamental questions that should be addressed during the permit development process.

Permit Cover Page

The cover page of a NPDES permit typically contains the name and location of the permittee(s), a statement authorizing the discharge, the specific locations for which a discharge is authorized (including the name of the receiving water), and the effective period of the permit (not to exceed 5 years). In addition, the cover page may list the pollutants regulated by the permit. For instance, the cover page of an overlay permit for TP may state that the overlay permit addresses only TP and that other parameters are addressed in each facility’s individual permit.

The cover page also could specifically authorize trading between the permitted point source and the nonpoint source(s) generating credits. However, whereas the cover page for a permit that includes trading between point sources would include the specific authorized discharge locations for each point source, because a nonpoint source is a diffuse pollutant source (e.g., farms, ski areas, golf courses), a permit that implements a trade with a nonpoint source trading partner might not reference a specific discharge location for the nonpoint source involved in the trade. The cover page could, however, simply name the nonpoint source either by category (e.g., farms, golf courses) or by the name of the specific nonpoint source (e.g., Rock Creek Dairy, Rolling Hills Country Club) and provide a general description of nonpoint source location (e.g., Hudson River at West Point). Further, if the point source purchased credits from a nonpoint source credit exchange, the cover page should name the nonpoint source credit exchange or managing party.

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The cover page also should address the regulation, legal authority, policy statements, planning documents and the trade agreement that support trading between point and nonpoint sources in the Authority section of the cover page. If the state has issued regulations or policy documents authorizing water quality trading, the permit writer should reference these. For example, if trading is considered a water-quality management tool in the state’s Water Quality Management Plan, this may establish authority for integrating trading into NPDES permits and can be referenced on the cover page (Jones et al. 2005).

Effluent Limitations

Effluent limitations are the primary mechanism for controlling the discharge of pollutants from point sources into receiving waters. When developing a permit, the permitting authority focuses much of its effort on deriving appropriate effluent limitations. As in all NPDES permits, permits that include trading must include any applicable TBELs and, where necessary, WQBELs, that are derived from and comply with all applicable technology and water quality standards. Furthermore, limits must be enforceable, and the process for deriving the limits should be scientifically valid and transparent.

EPA’s Trading Policy does not support trading to meet TBELs unless trading is specifically authorized in the categorical effluent limitation guidelines on which the TBELs are based. Applicable TBELs thus serve as the minimum control level below which the buyer’s treatment levels cannot fall. This section discusses the overarching principles of how to express all applicable effluent limitations in permits for dischargers participating in water quality trades.

Credit Buyers

Permits for credit buyers should include both the baseline, which is the WQBEL that defines the level of discharge the buyer would have to meet through treatment **when not** trading, and a minimum control level that must be achieved through treatment **when** trading. The permit should also include the amount of pollutant load to be offset (minimum control level – baseline) through credit purchases when trading. Most often, the applicable TBEL will serve as the minimum control level. A permitting authority can choose to impose a more-stringent minimum control level than the TBEL to prevent localized exceedances of water quality standards near the point of discharge but not one that is less stringent the TBEL. In a NPDES permit or fact sheet, the effluent limitations for a credit buyer could be described as follows:

- The Discharger must meet, through treatment or trading, a mass-based effluent limitation for Pollutant A of **<insert baseline>**. If this effluent limitation is met through trading, the Discharger must purchase credits from authorized Sellers in an amount sufficient to compensate for the discharge of Pollutant A from Outfall 001 in excess of **<insert baseline>**, but at no time shall the maximum mass discharge of Pollutant A during **<insert averaging period>** exceed the minimum control level of **<insert minimum control level>**. Thus, the maximum mass discharge of Pollutant A to be offset through credit purchases is **<insert minimum control level – baseline>**.

Water Quality Trading Scenarios



Maize Creek Example: Effluent Limitations

Applicable Trade Ratios:

- **Delivery:** The MCPN Exchange has developed a set of ratios that account for the location of the farms in relation to each potential buyer.
- **Uncertainty:** The MCPN Exchange developed a set of uncertainty ratios to account for uncertainties associated with BMP efficiencies, implementation, maintenance and monitoring.
- **Equivalency:** The MCPN Exchange has worked with the NPDES permitting authority to develop a ratio to relate the in-stream effects of nitrogen- and phosphorus-loading reductions by the farms to required BOD reductions by point source buyers.

Multiple point sources within the watershed, including the city of Earington POTW, wish to participate in the exchange and have asked the permitting authority to authorize them to trade to meet the BOD loading reduction requirements in the approved watershed management plan. The permitting authority has chosen to modify individual permits to authorize trading with the exchange.

The POTW’s existing permit includes state required TBELs the permittee currently meets.

The permit writer will include the calculated WQBELs and trading provisions in the renewed permit for the city of Earington POTW. The permit will also include the minimum control level (i.e., TBEL or existing discharge) that chooses to trade with the exchange.

Permit Language:

Table 2. Monthly average mass loading effluent limitations for BOD

| Facility | Units | Existing TBEL | WQBEL | Effluent limitation with trading |
|------------------------|---------|---------------|----------------|------------------------------------|
| City of Earington POTW | lbs/day | 1,000 | 850 (Baseline) | 1,000 (Minimum Control Level/TBEL) |

- A. The permittee is authorized to discharge BOD from permitted outfalls to Maize Creek provided the discharge meets the limitations set forth herein. Provision X of this permit authorizes the permittee to purchase BOD credits generated by nonpoint source phosphorus load reductions from Maize Creek Producers Nutrient Exchange (MCPN Exchange).
- B. The discharge from Outfall 001 shall comply with the monthly mass loading of BOD established by either a or b:
 - a. The WQBEL set forth in Table 2; or,
 - b. The Effluent Limitation With Trading set forth in Table 2 provided the permittee has secured BOD credits generated by nonpoint source phosphorus load reductions from the Exchange sufficient to compensate for any discharge in excess of the WQBEL set forth in

Maize Creek Example: Effluent Limitations *(continued)*

Table 2. The number of pounds of nonpoint source phosphorus load reductions required to be purchased shall be calculated as follows:

$$\text{Pounds phosphorus required} = (\text{Actual Discharge} - \text{WQBEL}) \times \text{Trade ratio}$$

Where:

Actual discharge = the BOD load, expressed in lbs/day as a monthly average,

Trade ratio = Ratios established in the trade agreement between the permittee and the MCPN Exchange and incorporated by reference herein

- C. Credits purchased by the permittee may be applied only for the calendar month(s) during which they were generated by the exchange.

Pollutant Form, Units of Measure, and Timing Considerations

The permit should explicitly identify the **pollutant or pollutants being traded**. The permitting authority should ensure that the trading program or agreement and the calculated WQBELs are consistent in terms of the form of the pollutant, units of measure, and timing.

For example, if the pollutant specified in the WQBEL is nitrate-nitrogen, credits generated under the trade agreement should be for nitrate-nitrogen and not for total Kjeldahl nitrogen (TKN) or some other form. If, on the other hand, the WQBEL is for TN, buyers and sellers should trade TN credits. In this case, a discharger may be required to measure TN. If there are concerns about localized impacts, and WQBELs are also specified for a particular form or forms of nitrogen, the discharger may be required to monitor TKN, nitrite, and nitrate (all expressed as N) and then calculate its TN discharge.

Also an **equivalency ratio** may be needed when two sources are trading pollutants such as TN or TP, but are actually discharging different forms of nitrogen or phosphorus (e.g., one discharger’s phosphorus discharge is made up primarily of biologically available phosphorus while its trading partner’s discharger is primarily bound phosphorus). An equivalency ratio may also be needed in cross-pollutant trading of oxygen demanding pollutants (e.g., phosphorus and BOD). In this case, the equivalency ratio would equal the ratio between the two pollutants impacts on oxygen demand. Where possible, the nonpoint source credit exchange or trading program should account for any necessary equivalency ratios with regard to pollutant form or type; the permit writer simply needs to be aware of the pollutant form or type addressed in the trade agreement to ensure that the permit is consistent. Note, however, that under most circumstances it will be difficult to account for equivalency ratios in a nonpoint source credit exchange model. The equivalency ratio is calculated on the basis of the ratios of different forms or types of a pollutant in the discharges of both the credit generator and the credit purchaser. Therefore, unless all the nonpoint source credit generators are discharging pollutant forms or types with the same ratio, the credit exchange would have to track individual transactions from generators to sellers to determine how much each credit would be worth.

Water Quality Trading Scenarios



For example, a point source purchaser needs to purchase credits from the credit exchange equivalent to 100 lbs/day for the ratio of pollutant forms being discharged at the point source. The credit exchange has credits deposited by 5 different nonpoint sources (Source A, Source B, Source C, Source D, and Source E), each discharging the pollutant forms at a different ratio. The credit exchange may have to sell credits to the point source from one, two, three, four, or all five of the nonpoint sources. The credit exchange would have to make sure that the correct equivalency ratio is applied to the credits deposited by Source A, based on which point source is buying the credits that Source A deposited. The exchange has to apply a different set of ratios for the credits from Sources B, C, D, and E. The situation becomes more complicated if the credits from one or more of the nonpoint sources are split between multiple point source buyers. Finally, it is possible that, depending on the ratios, there may not be enough credits to meet all of the buyers' needs, but that would not be known until the credit exchange determines how many credits each nonpoint source deposits and how many credits each point source needs and begins to optimize the distribution of credits based on all of the possible combinations of buyers, sellers, and ratios. In complicated credit exchange situations like this, an extended period of monitoring before trading may be necessary to better determine the expected BMP performance from each potential nonpoint source credit seller and, thus, whether the exchange will have enough credits to satisfy the needs of all the potential buyers.

Maize Creek Example: Pollutant Form, Units of Measure, and Timing

■ What You Need to Know...

Pollutant: Biochemical Oxygen Demand

Driver: Maize Creek Watershed Management Plan nutrient reduction goals (pre-TMDL) for point and nonpoint sources

Nonpoint Source Credit Exchange: Maize Creek Producers' Nutrient Exchange—Nitrogen and Phosphorus

Credit Sellers: *Ten farms in the Maize Creek Watershed*

Credit Buyer: *City of Earlington POTW*

Location: All the farms participating in the MCPN Exchange are upstream of all potential point source buyers. All point and nonpoint sources discharge directly to Maize Creek.

Pollutant Form

The watershed management plan indicates a need for the city of Earlington POTW, the credit buyer, to control BOD discharges. The plan includes loading reduction recommendations for the members of MCPN Exchange (credit seller) as well. Each member farm will install one or more BMPs from an approved list established in the trade agreement to reduce phosphorus and nitrogen loads 10 percent as indicated in the watershed management plan. Because controlling nutrients reduces oxygen demand, the credit exchange was able to work with the permitting authority to establish an equivalency ratio that accounts for the relationship between nutrients and BOD load reductions. This will enable the MCPN Exchange to sell the nutrient reductions in the form of BOD credits to the POTW.



Maize Creek Example: Pollutant Form, Units of Measure, and Timing *(continued)*

Units of Measure

The BOD WQBELs based on the reduction recommendations in the watershed management plan are expressed in lbs/day as a monthly average to correspond with the units and averaging period in the plan. The BOD limits in the POTW's existing permit are also expressed in lbs/day as a monthly average. The trade agreement also specifies these units for trading. The nutrient load reductions for the credit exchange will be calculated and expressed in lbs/day as a monthly average over a typical 12-month period to determine the number of credits they can generate to sell the POTW.

Timing of Credits

Credits are available beginning at the time of permit issuance. This allows 24 months for the MCPN Exchange member farms' BMPs to be fully implemented and 12 months for the credit exchange to gather monitoring data to verify that the BMPs are achieving the expected nutrient removal efficiency and will generate credits as expected. These data are necessary to better understand how loading and reduction may vary over time and to develop monthly credit generation data to correspond with monthly average effluent limitations. Trades will occur monthly to correspond with monthly average effluent limitations. The MCPN Exchange member farms will be able to continue to generate credits as long as the controls are properly operated and maintained, the credit exchange is able to demonstrate reductions, and the nonpoint source baseline does not change in a way that would reduce or eliminate the credits (e.g., based on a new TMDL that includes WLAs for the permittee or LAs for the MCPN Exchange member farms). The ability of MCPN Exchange to continue to generate credits will be assessed during the renewal of the city of Earlington's POTW NPDES permit every 5 years.

Anti-backsliding, Antidegradation, and New Discharges Special Considerations

EPA's Trading Policy discusses anti-backsliding and antidegradation and how these provisions can be met through trading.

Anti-backsliding

The term *anti-backsliding* refers to a statutory provision (CWA section 402(o)) that, in general, prohibits the renewal, reissuance, or modification of an existing NPDES permit that contains WQBELs, permit conditions, or standards that are less stringent than those established in the previous permit (USEPA 1996b). The CWA establishes exceptions to this general anti-backsliding prohibition. EPA has consistently interpreted section 402(o)(1) to allow for less stringent effluent limitations if either an exception under section 402(o)(2) or, for WQBELs, the requirements of section 303(d)(4) are met (USEPA 1996b). Section 402(o)(2) and 40 CFR 122.44(l) provide exceptions for circumstances such as material and substantial alterations to the facility, new information, events beyond the permittee's control, and permit modifications under other sections of the CWA. Section 303(d)(4), which applies only to WQBELs, allows a less-stringent WQBEL in a reissued permit when the facility is discharging to a waterbody attaining water quality standards as long as the waterbody continues to attain water quality standards even after the WQBEL is relaxed. In addition, revising the limitation must

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be consistent with the state’s antidegradation policy. If the discharge is to a waterbody that is not attaining water quality standards, a less-stringent WQBEL is allowed only when the cumulative effect of all revised effluent limitations results in progress towards attainment of water quality standards. For a detailed discussion of the anti-backsliding exceptions, see EPA’s *NPDES Permit Writers’ Manual* (EPA-833-B-96-003). EPA’s Trading Policy states:

EPA believes that the anti-backsliding provisions of Section 303(d)(4) of the CWA will generally be satisfied where a point source increases its discharge through the use of credits in accordance with alternate or variable water quality based effluent limitations contained in an NPDES permit, in a manner consistent with provisions for trading under a TMDL, or consistent with the provisions for pre-TMDL trading included in a watershed plan.

A permit writer should simply explain in the fact sheet of the permit how the limitations in the permit, after accounting for any trading provisions, are at least as stringent as the limits in the previous permit or, alternatively, how anti-backsliding provisions of the CWA are satisfied.

Antidegradation

As repeated throughout this document, NPDES permits may not facilitate trades that would result in nonattainment of an applicable water quality standard, including the applicable antidegradation provisions of water quality standards. Permitting authorities should ensure that WQBELs developed to facilitate trade agreements accord with antidegradation provisions and that antidegradation reviews are performed when required. Nothing in the Trading Policy per se changes how states apply their antidegradation policies, though states may modify their antidegradation policies to recognize trading.

The Trading Policy states:

EPA does not believe that trades and trading programs will result in “lower water quality”...or that antidegradation review would be required under EPA’s regulations when the trades or trading programs achieve a no net increase of the pollutant traded and do not result in any impairment of designated uses.

Special considerations for antidegradation relative to water quality trading depend on the tier of protection applied to the waterbody as described below.

Tier 1 is the minimum level of protection under antidegradation policies. For Tier 1 waters, the antidegradation policy mandates protection of existing in-stream uses. Because EPA neither supports trading activities nor allows issuance of permits that violate applicable water quality standards, which should protect existing uses at a minimum, any supported trading activities incorporated into a NPDES permit should not violate antidegradation policies applicable to Tier 1 waters.

Tier 2 protects waters where the existing water quality is higher than required to support aquatic life and recreational uses. Water quality in Tier 2 waters may be lowered (only to the level that would continue to support existing and designated uses), but only if an antidegradation review finds that (1) it is necessary to lower water quality to accommodate important social or economic development, (2) all intergovernmental and public participation provisions have

Water Quality Trading Scenarios



been satisfied, and (3) the highest statutory and regulatory requirements for point sources and BMPs for nonpoint sources have been achieved. The Trading Policy supports trading to maintain high water quality when trading is used to compensate for new or increased discharges. Thus, the Trading Policy supports reductions of existing pollutant loadings to compensate for the new or increased load so that the result is *no lowering of water quality*. A state, in applying its antidegradation policy, may decide to authorize a new or increased discharge to high-quality water and may decide to use trading to completely or partially compensate for that increased load. If the increased load to Tier 2 waters is only partially compensated for by trading, an antidegradation review would be required to address the increased load.

Tier 3 protects the quality of outstanding national resource waters and waters of exceptional recreational or ecological significance. In general, antidegradation policies do not allow any increase in loading to Tier 3 waters that would result in lower water quality. EPA supports trading in Tier 3 waters to maintain water quality.

Monitoring

Permitting authorities may want to consider developing monitoring and reporting requirements to characterize waste streams and receiving waters, evaluate wastewater treatment efficiency, and determine compliance with permit conditions in the trade agreement. Monitoring and reporting conditions of a NPDES permit may contain specific requirements for sampling location, sample collection method, monitoring frequencies, analytical methods, recordkeeping, and reporting. If the permit conditions include compliance with provisions in a trade agreement, the permitting authority should include monitoring, record-keeping, and reporting requirements that facilitate compliance evaluations and, where necessary, enforcement actions related to the trading requirements. Discharge monitoring requirements should be consistent with the provisions of the trade agreement in terms of pollutants and forms of pollutants monitored, reporting units, and timing. The permit provisions should ensure that the results of discharge monitoring will be useful to the permittee, the permitting authority, and the general public in determining whether the provisions of the trade agreement are being met. Permits that authorize point source–nonpoint sources trades via a nonpoint source credit exchange should also address the unique considerations for monitoring and reporting that will facilitate evaluating the effectiveness of BMPs used to generate pollutant reduction credits.

Sample Collection and Analysis

The same discharge sampling location used for compliance in any existing NPDES permits should be used for determining compliance with effluent limitations developed for traded parameters. Samples collected as part of a self-monitoring program required by a NPDES permit must be performed in accordance with EPA-approved analytical methods specified in 40 CFR Part 136 (*Guidelines for Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act*) where Part 136 contains methods for the pollutant of concern. Where no Part 136 methods are available, the permit writer should specify which method the point source should use for compliance monitoring.

Water Quality Trading Scenarios

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Parties Responsible for Monitoring

In a permit that authorizes trading between a point source(s) and a nonpoint source credit exchange, the permittee(s) will be responsible for all the monitoring activities that would normally be required in any NPDES permit. If the permit is an overlay permit covering multiple point sources and is used to incorporate water quality trading for specific pollutants, the permitting authority may establish monitoring requirements by reference to the facility’s individual NPDES permit for consistency. Alternatively, the overlay permit could specifically list the monitoring location and requirements.

Ambient Monitoring

Ambient monitoring is one way to show whether a trade agreement meets or improves water quality. In addition to traditional discharge monitoring requirements, ambient water quality monitoring may be appropriate at strategic locations to ensure that the trade is not creating localized exceedances of water quality standards and to document the performance of the overall trading program. Permits with mixing zones may include monitoring requirements as appropriate to ensure that water quality criteria are not exceeded at the edge of the applicable mixing zone.

BMP Monitoring and Trade Tracking

To assure that nonpoint source BMPs are performing properly, the permitting authority should add permit conditions specifying that a BMP be monitored and inspected on a regular basis. For permits that authorize trading with a nonpoint source credit exchange, however, such provisions may not be necessary. In general, the credit exchange will likely have the responsibility for monitoring BMPs and verifying pollutant reductions. In some cases, the trading program itself might establish these responsibilities. The permit writer should determine whether and how the nonpoint source credit exchange verifies pollutant reductions. In some cases, monitoring and inspections might be required of point sources if the credit exchange does not adequately monitor BMPs. In other cases, a third party assumes responsibility for BMP monitoring.

Under any of these scenarios, the permitting authority should be aware of the monitoring and reporting responsibilities established in the trading program or through the credit exchange and should ensure that the permit conditions do not contradict these requirements. Where the trading program provides that the point source conduct inspections and monitoring of nonpoint source BMPs, the permit should incorporate or reference those requirements. Where the trading program provides that a third party conduct inspections and monitoring, the permit should also reference those requirements and clarify the permittee’s responsibilities, if any, for reporting or using the information and data gathered through the inspections and monitoring activities or conducting these activities itself should the third party fail to fulfill its responsibilities.

Permitting authorities should consider developing trade tracking forms and establishing discharger trade reporting requirements to monitor trading activities and any alternative compliance activities implemented if a BMP fails to perform as expected (see *Special Conditions*). In addition, credit exchanges should consider holding surplus credits in reserve to be used to compensate for point source pollutant loads in the event of a failed trade.

Water Quality Trading Scenarios



Maize Creek Example: Monitoring

■ What You Need to Know...

Pollutant: Biochemical Oxygen Demand

Driver: Maize Creek Watershed Management Plan nutrient reduction goals (pre-TMDL) for point and nonpoint sources

Nonpoint Source Credit Exchange: *Maize Creek Producers' Nutrient Exchange—Nitrogen and Phosphorus*

Credit Sellers: *Ten farms in the Maize Creek Watershed*

Credit Buyer: *City of Earlington POTW*

Location: All the farms participating in the MCPN Exchange are upstream of potential point source buyers, including the city of Earlington POTW. All point and nonpoint sources discharge directly to Maize Creek.

The facility's existing permit includes TBELs based on state treatment standards for BOD and monitoring requirements to sample the effluent monthly for BOD to determine compliance. The renewed permit will incorporate new effluent limits (based on the approved watershed management plan) as well as the necessary provisions and effluent limits to authorize trading.

In the renewed permit, the POTW will be required to monitor for BOD weekly. The discharger will be required to submit monthly discharge monitoring reports (DMRs) year-round by the 15th of the month following monitoring to the permitting authority to gauge compliance. Ambient receiving water monitoring requirements are included in the existing NPDES permits and are adequate to ensure that localized exceedances of water quality standards do not develop as a result of trades.

Permit Language:

- The permittee shall monitor effluent BOD a minimum of one time per week. The permittee shall determine the average monthly mass loading based on actual monthly average flow. Flow monitoring shall be continuous.

Reporting Requirements

The permitting authority should establish reporting requirements to support the evaluation of water quality trading programs. For example, in addition to reporting discharge monitoring results, permitting authorities might require a permittee to report the number of credits purchased. Permitting authorities might also require an annual monitoring report specific to the pollutants involved in the trade, to provide information on annual loading in accordance with the requirements of the trading program. Permits incorporating water quality trades should require reporting at a frequency appropriate to determine compliance with the trading provisions. Permitting authorities should consider any requirements of the trading programs related to monitoring and reporting and ensure that the permits are consistent with these requirements. Permits may require reporting of monitoring results at a frequency established through the permit on a case-by-case basis but in no case may that frequency be less than once per year.

Water Quality Trading Scenarios

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In addition to reporting of discharge monitoring results, trading programs may establish other reporting and tracking requirements. It is essential that there is a mechanism for tracking trades. The nonpoint source credit exchange should conduct trade tracking and reporting for credit generation. If the credit exchange does not report trades to the permitting authority, the permitting authority might require the permittee to submit an additional form such as a reduction credit certificate form (see [Appendix C](#)). The permitting authority can hold point sources liable if they violate any trading provision included in the permit or any trade agreement incorporated by reference into the permit, and point sources are certainly liable if they do not meet their permit limits.

If not provided by the nonpoint source credit exchange, the permitting authority might also want to require verification of project installation and performance specifications before allowing the permittee to use credits. The permit could include provisions requiring the point source purchaser to provide the required verification.

Data Reporting to EPA

EPA administers two systems to store NPDES permit data and track compliance, the Permit Compliance System (PCS) and the new Integrated Compliance Information System (ICIS). PCS is the old, computerized management information system that contains data on NPDES permit-holding facilities to track the permit, compliance, and enforcement status of these facilities.

The new system, ICIS, was deployed in June 2006 to approximately 20 states. ICIS contains integrated enforcement and compliance information across most of EPA’s programs including all federal administrative and judicial enforcement actions. In addition, ICIS has the capability to track other activities occurring in an EPA Region that support enforcement and compliance programs. These include Incident Tracking, Compliance Assistance, and Compliance Monitoring. In the future, ICIS will be deployed to all states, and PCS will no longer be used.

Neither PCS nor ICIS is structured to actually track trades.

PCS is designed to compare actual discharge monitoring data against required effluent limitations to determine a facility’s compliance with its NPDES permit. To determine compliance under a trading scenario, it is necessary for the NPDES permitting authority to compare actual discharge monitoring data and the quantity of credits purchased against required effluent limitations. For credit buyers, compliance is actually tracked against two effluent limitations—the minimum control level and the baseline. The challenge in using PCS to determine compliance under a trading scenario is that the system does not automatically make adjustments to the reported actual discharge—it will not subtract the quantity of credits purchased. Therefore, this type of adjustment must be done before entering information into PCS so that the system has only one reported number to compare against an effluent limitation.

Point source credit buyers have a baseline and a minimum control level (the facility’s TBEL or current discharge, whichever is most stringent). To determine compliance for a credit buyer, the NPDES permitting authority will need to know that (1) the facility’s actual discharge is less than or equal to its minimum control level, and (2) that the number of credits purchased results in the facility achieving its baseline. Therefore, point source credit buyers could report

Water Quality Trading Scenarios



Maize Creek Example: Reporting

■ What You Need to Know...

Pollutant: Biochemical Oxygen Demand

Driver: Maize Creek Watershed Management Plan nutrient reduction goals (pre-TMDL) for point and nonpoint sources

Nonpoint Source Credit Exchange: *Maize Creek Producers' Nutrient Exchange—Nitrogen and Phosphorus*

Credit Sellers: *Ten farms located in the Maize Creek Watershed*

Credit Buyer: *City of Earlington POTW*

Location: All the farms participating in the MCPN Exchange are upstream of potential point source buyers, including the city of Earlington POTW. All point and nonpoint sources discharge directly to Maize Creek.

The city of Earlington POTW's renewed permit authorizes trading for BOD with the MCPN Exchange. The permit requires, in addition to monitoring reports, regular reporting of any changes to the trade agreement and reports for tracking trades. The facility's permit will contain monthly average effluent limitations for BOD; therefore, monthly trade transactions will be necessary to maintain compliance. The trade agreement between the permittee and the MCPN Exchange indicates that trades will be tracked by the exchange. The trade tracking system generates trading notification forms and monthly trading summaries for the entire program. Credits must be used in the same month they are generated and trading notification forms must be submitted to the regulatory agency by the 15th of the month following the trade.

In addition, the permit requires biannual reporting to summarize year-to-date transactions and actual reductions and loading reflected by monitoring. According to the trade agreement, this is to be compiled by the MCPN Exchange but must be reported on a facility-specific basis to the permitting authority.

Permit Language:

No trade is valid unless it is recorded in the Maize Creek Producers Nutrient Exchange electronic trade tracking system or equivalent system that records all trades and generates trading notification forms and a monthly summary of all trades valid for each calendar month. The recordkeeping system must be capable of ensuring that a particular credit is not sold to more than one trading participant. The trading notification forms and trading summary may be compiled by the MCPN Exchange, but each permittee is responsible for the submittal of all documentation and reports. Trading notification forms for each monthly trade must be submitted to <the Permitting Authority> by the 15th day of the month following the trade.

two types of information: (1) the facility's actual discharge, and (2) the difference between the actual discharge and the quantity of credits purchased. Both numbers would be entered into PCS to determine compliance. PCS would compare the actual discharge against the minimum control level to determine permit compliance and eligibility as a credit buyer. PCS would also compare the difference between the actual discharge and the quantity of credits

Water Quality Trading Scenarios



purchased against the facility’s baseline; the difference should be less than or equal to the WQBEL to indicate that the facility has purchased enough credits to meet its baseline and remain in compliance with its WQBEL. PCS can accommodate two different effluent limits for the same parameter; therefore, it has the capability to determine compliance with both the minimum control level and the baseline for a credit buyer.

ICIS also allows the NPDES permitting authority to report two limits; therefore, this system can also accommodate both the baseline and the minimum control level for credit buyers. New DMR forms will also have two lines to report both the baseline and the minimum control level. Like PCS, ICIS does not actually adjust actual discharges with the number of credits bought. Under the current design, ICIS will allow a facility with an existing NPDES permit to also have a trading partner entered into the system. Once a trading partner is entered for a facility, ICIS will allow the entry of an adjusted value for the buyer—this is the reported actual discharge adjusted by the number of credits bought. If an adjusted value is entered, this value is used to determine permit violations and percent exceedances (USEPA 2006).

In addition to challenges related to limits and the type of information to report, NPDES permits with trading provisions might also raise issues related to reporting periods and automated compliance tracking. PCS will not support a reporting extension beyond 30 days. This type of reporting extension might be necessary in some instances to allow adequate time for the administrative activities necessary for trading partners to coordinate and reconcile trades. ICIS, however, will support a 45-day reporting period. In rare instances when a permitting authority uses annual limits, both PCS and ICIS will allow for one limit to be monthly and one to be annual. However, the permitting authority will have to manually flag annual limit effluent violations for reportable noncompliance (RNC) and significant noncompliance (SNC) to track compliance.

Special Conditions

Special conditions are developed to supplement effluent limitations and may include additional monitoring activities, management practices, pollution prevention requirements, ambient stream surveys, compliance schedules (if authorized by the permitting authority), and toxicity reduction evaluations (TREs). Special conditions also include permit modification and reopener conditions and can be used to address water quality trading. Special conditions of a NPDES permit will be very important in incorporating the terms of a trade agreement. Even where the specific terms of the agreement are not directly incorporated into the permit, the special conditions will be used to refer to, and require compliance with, the trade agreement housed in a separate document.

The special conditions included in a NPDES permit to implement trading will depend on provisions of the trade agreement and the effluent limitations and monitoring and reporting requirements established in the permit. However, the permitting authority should consider incorporating special conditions that support the trading conditions. For example, the special conditions of the permit may specify conditions for purchasing credits, additional monitoring and special reporting requirements, and special conditions for failed trades.



Specifying Conditions for Purchasing Credits

Permits that implement trades between point sources and a nonpoint source credit exchange should specify the practices or approaches used to generate credits, if possible. The permitting authority might choose to include these conditions as part of the effluent limitations section of the permit, or as a special condition. While the permit cannot require a nonpoint source to use a particular BMP to generate credits, it can prohibit a point source from purchasing credits that were not generated through use of approved BMPs. Specificity in the permit will depend on the nonpoint source credit exchange’s mechanisms for tracking the nonpoint source practices and approaches used to generate credits and distributing credits to point sources. A nonpoint source credit exchange might obtain credits from a nonpoint source and, in some instances, will have no mechanism in place to link the exact origin of specific credits purchased by a point source. Depending on the structure of the nonpoint source credit exchange, the permitting authority or entity managing the trade might determine the appropriate BMPs external to the permit.

The special conditions specific to point source–nonpoint source trading via a nonpoint source credit exchange should also address the timing of when credits are available and when the practice or approach generating credits expires as an eligible source of credits. If not adequately addressed through the nonpoint source credit exchange, the permit might stipulate that continued credit generation requires periodic certification that a practice is still in place and that the nonpoint source is taking specified operation and maintenance actions. As discussed above, permitting authorities may consider establishing monitoring and reporting requirements to ensure that nonpoint sources generating credits are properly installing and maintaining BMPs to continue generating credits. This is especially important if a trade relies on calculated credits and neither the permit nor the nonpoint source credit exchange requires monitoring data to verify pollutant reductions.

Special conditions also could be used to specify the reconciliation period for credits or when credits may be used relative to when they are generated. Effluent limitations will dictate the reconciliation period, as discussed above, but special conditions can clarify the reconciliation period and ensure that credits are not based on future reductions that cannot be verified, thus reducing the risk of noncompliance.

Special conditions addressing liability, provisional requirements that apply when credits are unavailable or when a limit is exceeded, and outlining the specific requirements for establishing trade agreements among permittees can be important in issuing acceptable permits that will not require modification each time circumstances change for one of the dischargers covered under the permit.

Lower Boise River, Idaho

The Lower Boise model uses pounds of TP as its unit of measurement and reconciles trade account balances monthly against the reported discharge amounts. The point source must sign and submit new [Reduction Credit Certificates](#) at the end of each month to establish the credit for that month that they can transfer to their own account using the Trade Notification Form. The credits can be used to offset only pollutant discharge for the same month in which they were created. The trades are monitored through the automated Trade Tracking System. For more information about this trading program, see Appendix A.

Water Quality Trading Scenarios



Additional Monitoring and Special Reporting

The permitting authority might articulate special monitoring requirements as special conditions, as described above. If not adequately addressed through the nonpoint source credit exchange, the permitting authority might require additional monitoring to assess the effectiveness of BMPs or to verify BMP installation, implementation, and maintenance. Any special conditions established to determine BMP effectiveness should specify the party responsible for conducting monitoring and inspections to verify BMP effectiveness and accuracy of the trade ratios assumed in the permit.

Tracking trading activities is particularly important in point source–nonpoint source trades. Because the permittee is the only trading partner regulated, the permitting authority generally will not be able to require tracking information to be reported by the credit exchange. Where permitting authorities will not receive adequate credit tracking reports from the credit exchange, they should consider establishing special conditions in the permit that facilitate tracking. For point source–nonpoint source trades via nonpoint source credit exchanges, the permitting authority might require the point source to provide additional information on the nonpoint source(s) generating the credits or the nonpoint source credit exchange selling the credits reported in the tracking report. For instance, the permit might require the permittee to provide or obtain tracking information via the nonpoint source credit exchange, such as

- Identification of nonpoint source (name, address, phone number)
- Type and location of BMP
- Monitoring method and frequency
- Monitoring results (actual measured quantities, or observations regarding installation and maintenance, at nonpoint source)
- Subtraction of a portion of the reported reduction amount (in pounds) to meet any retirement ratio requirement as specified in the trade agreement
- Conversion of reduction quantity to normalized measure of loading (multiply by trade ratio, including location or delivery ratio, equivalency ratio, and uncertainty ratio, where applicable)
- Time period for which credit is verified, per monitoring requirements for that BMP
- Certifying statement signed by the point source that the information provided is true, accurate, and complete, and that the installation, maintenance, and monitoring of the BMP meets the requirements for that BMP as specified in the trade agreement (Idaho DEQ 2000)

This information may be provided to the permittee by the nonpoint source credit exchange or another entity (e.g., a soil and water conservation district) through a mechanism such as a memorandum of understanding (MOU) or a trade agreement.

Special Conditions for Failed Trades

The success of a trade depends on credit sellers fulfilling trade obligations. Where a point source–nonpoint source trade involves a nonpoint source credit exchange, the nonpoint source credit exchange or trading program might include mechanisms to ensure that the



trade obligations are met by participating nonpoint sources. In addition, credit exchanges should consider holding surplus credits in reserve to be used to compensate for point source pollutant loads in the event of a failed trade. The permitting authority might use special conditions to establish provisional requirements that apply if the credits a point source buyer needs are unavailable from either the credit exchange or surplus credits held in reserve and a point source is unable to comply with calculated WQBELs. The permitting authority would include these special conditions in addition to any enforcement provisions. The trading program should address what degree of risk the permittee bears from purchasing credits that nonpoint sources do not deliver or are proven invalid at a later point in time. The trading program or trade agreement might also describe the respective responsibilities of the buyer and the seller in the case of a failed trade. In any case, the burden of compliance falls on the permittee. The permittee can address the risk of trade failure in a private contract with the seller. The permit might require the permittee notify the permitting authority when a trade fails or how and when it will either secure credits from an alternate source or comply with the calculated WQBELs established in the permit. Monthly reconciliation minimizes risk by requiring certification from buyers and sellers on a monthly basis.

Finally, the permitting authority may reference a reserve of surplus credits held by the nonpoint source credit exchange as a means of managing uncertainty of nonpoint source trading. All such reserved credits would be generated in the same time period they are used or traded. Special conditions could establish the availability of credits held in reserve to the permittee and any conditions placed on the permittee if it desires to use reserved credits.

Accountability

Permits that cover one or more point sources buying credits from a nonpoint source credit exchange should state that the permitted point sources are responsible for meeting effluent limitations derived from water quality standards regardless of whether the nonpoint source trading partners or credit exchange comply with the terms of a trade agreement.

Maize Creek Example: Special Conditions

■ *What You Need to Know...*

Pollutant: Biochemical Oxygen Demand

Driver: Maize Creek Watershed Management Plan nutrient reduction goals (pre-TMDL) for point and nonpoint sources

Nonpoint Source Credit Exchange: *Maize Creek Producers’ Nutrient Exchange—Nitrogen and Phosphorus*

Credit Sellers: *Ten farms in the Maize Creek Watershed*

Credit Buyer: *City of Earlington POTW*

Location: All the farms participating in the MCPN Exchange are upstream of potential point source buyers, including the city of Earlington POTW. All point and nonpoint sources discharge directly to Maize Creek.

Water Quality Trading Scenarios

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| Nonpoint Source Credit Exchange | The Function of a Nonpoint Source Credit Exchange | Quantifying Nonpoint Source Loads and Credits | Establishing Baselines for Nonpoint Source Sellers | Accountability | Trade Agreements | Components of a NPDES Permit | Permit Cover Page | Effluent Limitations | Monitoring | Reporting Requirements | Special Conditions |
|---------------------------------|---|---|--|----------------|------------------|------------------------------|-------------------|----------------------|------------|------------------------|--------------------|

Maize Creek Example: Special Conditions *(continued)*

The NPDES permit writer has reviewed the signed trade agreement for trading between Earington POTW and the MCPN Exchange. The agreement describes how the POTW will meet its new WQBEL through trading with the MCPN Exchange. The NPDES permit writer has developed the appropriate effluent limitations, monitoring, and reporting requirements for the POTW. The special conditions in the POTW NPDES permit focus on general authority, credit definition, notification of amendment to the trade agreement, notification of unavailability of credits, BMP certification, permit reopeners and modification provisions, and enforcement liability.

Permit Language:

General Authority

The permittee is authorized to participate in water quality trading with the Maize Creek Producers Nutrient Exchange, as specified in the Maize Creek Producers Nutrient Exchange Trade agreement, for the purposes of complying with the BOD effluent limitations and the watershed management plan goals required in this permit (Table 2). The authority to use trading for compliance with these limits is derived from: <insert state law where applicable> and section 402 of the federal Clean Water Act 33 United States Code (U.S.C.) section 1342. EPA's policies on Water Quality Trading (1/13/03) and Watershed-Based NPDES Permitting (1/7/03) endorse water quality credit trading. Additionally the Maize Creek Watershed Management Plan authorizes water quality trading as a means of achieving the allocations established.

Credit Definition

Credits will be measured in pounds of BOD per day on a monthly average basis. One trading credit shall be defined as one (1) unit of pollutant reduction (pound of BOD) to Maize Creek. All pollutant load reductions purchased and sold by the Maize Creek Nutrient Exchange as equivalent BOD credits represent pollutant load reductions with the appropriate delivery, uncertainty, and equivalency trading ratios applied as detailed in the Maize Creek Producers Nutrient Exchange Trade agreement. All valid credits are tradable. The permittee may purchase credits from the Maize Creek Producers Nutrient Exchange so long as the BMPs utilized to generate credits are documented as providing pollutant reductions beyond the load reduction indicated in the Maize Creek Watershed Management Plan.

Notification of Amendment to the Trade Agreement

The permittee is required to notify the permitting authority in writing within 7 days of the Maize Creek Producers Nutrient Exchange Trade Agreement being amended, modified, or revoked. This notification must include the details of any amendment or modification in addition to the justification for the change(s).

Notification of Unavailability of Credits

The permittee is required to notify the permitting authority in writing within 7 days of becoming aware that credits used or intended for use by the permittee to comply with the terms of this permit are unavailable or determined to be invalid. This notification must include an explanation of how the permittee will ensure compliance with the WQBELs established in this permit, either

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|---------------------------------|---|---|--|----------------|------------------|------------------------------|-------------------|----------------------|------------|------------------------|--------------------|
| Nonpoint Source Credit Exchange | The Function of a Nonpoint Source Credit Exchange | Quantifying Nonpoint Source Loads and Credits | Establishing Baselines for Nonpoint Source Sellers | Accountability | Trade Agreements | Components of a NPDES Permit | Permit Cover Page | Effluent Limitations | Monitoring | Reporting Requirements | Special Conditions |
|---------------------------------|---|---|--|----------------|------------------|------------------------------|-------------------|----------------------|------------|------------------------|--------------------|

Maize Creek Example: Special Conditions *(continued)*

Permit Language (continued):

through implementation of on-site controls or by conducting an approved emergency phosphorus offset project approved by the NPDES permit writer.

BMP Certification

The Maize Creek Producers Nutrient Exchange Trade Agreement specifies that each member will install BMPs beginning in January 2008. The Trade Agreement also includes a requirement that the BMPs be maintained in accordance with NRCS Conservation Practice Standard 350 for sediment basins and NRCS Conservation Practice Standard 656 for constructed wetlands. The permittee is required to inspect BMPs to verify the BMPs have been installed and are being maintained as required under the trade agreement. This permit authorizes the Niblet County SWCD to conduct these inspections on behalf of the permittee, per the terms of the signed MOU with the permittee. The permittee is required to submit a certification each year with the annual report, required by section X of this permit, that the permittee or the Niblet County SWCD has performed these inspections.

Permit Reopeners, Modification Provisions

The permitting authority may, for any reason provided by law, summary proceedings or otherwise, revoke or suspend this permit or modify it to establish any appropriate conditions, schedules of compliance, or other provisions which may be necessary to protect human health or the environment or to implement a new Maize Creek BOD TMDL should one be developed. The permitting authority may also reopen and modify the permit to suspend the ability to trade credits to comply with the total BOD waste discharge limitations in Table 2.

Enforcement Liability

The permittee is liable for meeting its most stringent effluent limitation. No liability clauses contained in other legal documents (e.g., trade agreements, contracts) established between the permittee and other authorized buyers and sellers are enforceable under this permit.

Glossary

The sources for these definitions vary. Some are unique to water quality trading and are defined here by EPA for purposes of this Toolkit. Other definitions are based on federal regulations, as well as EPA policy and guidance. If the definition has a source, it is noted by number (1-6). For the list of sources, see the bottom of this section.

Average Monthly Effluent Limitation: The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during that month divided by the number of daily discharges measured during that month. 40 CFR 122.2.

Animal Feeding Operation (AFO): Lot or facility (other than an aquatic animal production facility) where the following conditions are met:

- Animals (other than aquatic animals) have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and
- Crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility. 40 CFR 122.23(b)(1).

Anti-backsliding: A provision in the Clean Water Act (CWA) and NPDES regulations (CWA section 303(d)(4); CWA section 402(c); 40 CFR 122.44(l)) that requires a reissued permit to be as stringent as the previous permit with some exceptions. (1)

Antidegradation: Policies that ensure protection of existing uses and of water quality for a particular waterbody where the water quality exceeds levels necessary to protect fish and wildlife propagation and recreation on and in the water. Antidegradation also includes special protection of waters designated as outstanding national resource waters. Antidegradation plans are adopted by each state to minimize adverse effects on water. 40 CFR 131.12. (1)

Baseline: 1.) The pollutant control requirements that apply to buyers and sellers in the absence of trading. Sellers must first achieve their applicable baselines before they can enter the trading market and sell credits. Buyers can purchase credits to achieve their applicable baselines once they have met their minimum control levels. 2.) Some programs use baseline to define loads in a specific year, which usually represents the starting point of the program.

Best Available Technology Economically Achievable (BAT): Technology-based standard established by the Clean Water Act as the most appropriate means available on a national basis for controlling the direct discharge of toxic and nonconventional pollutants to navigable waters. BAT effluent limitations guidelines, in general, represent the best existing

performance of treatment technologies that are economically achievable within an industrial point source category or subcategory. (6)

Best Conventional Pollutant Control Technology (BCT): Technology-based standard for the discharge from existing industrial point sources of conventional pollutants including biochemical oxygen demand, total suspended solids, fecal coliform, pH, oil and grease. The BCT is established in light of a two-part cost reasonableness test, which compares the cost for an industry to reduce its pollutant discharge with the cost to a POTW for similar levels of reduction of a pollutant loading. The second test examines the cost-effectiveness of additional industrial treatment beyond BPT. EPA must find limits that are reasonable under both tests before establishing them as BCT. (6)

Best Management Practice (BMP): For point sources, 40 CFR 122.2 defines BMPs as schedules of activities, prohibitions of practices, maintenance procedures, and other treatment controls and pollutant removal devices (structural and nonstructural) to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and activities to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. For nonpoint sources, BMPs are defined in 40 CFR 130.2 as methods, measures or practices selected by an agency to meet its nonpoint source control needs. BMPs include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters.

Best Practicable Control Technology Currently Available (BPT): The first level of technology-based standards established by the Clean Water Act to control pollutants discharged to waters of the United States. BPT effluent limitations guidelines are generally based on the average of the best existing performance by plants within an industrial category or subcategory. (6)

Compliance Schedule: A schedule of remedial measures included in a permit or an enforcement order, including a sequence of interim requirements (e.g., actions, operations, or milestone events) that lead to compliance with the Clean Water Act and regulations. (1)

Contract: Written agreement between the trading parties, separate from any applicable NPDES permit, in which the parties may address a variety of financial or legal considerations and contingencies, including what happens in the case of default by any party.

Credit, or Pollutant Reduction Credit: A measured or estimated unit of pollutant reduction per unit of time at the discharge location of the buyer or user of the credit. A seller generates excess load reductions by controlling its discharge beyond what is needed to meet its baseline. A buyer compensates a seller for creating the excess load reductions that are then converted into credits by using trade ratios. Where appropriate, the buyer can use the credits to meet a regulatory obligation.

Credit Exchange: A centralized reserve of pollutant reduction credits administered by a third party who buys credits from point or nonpoint sources to sell to point sources in need of credits to comply with calculated WQBELs.

Cross-Pollutant Trading: Trading across two different pollutant parameters when equivalent mass loads of the different parameters can be calculated and the water quality effects of those equivalent mass loads are similar (e.g., meeting an effluent limitation for biochemical oxygen demand by purchasing credits generated for reduction of a phosphorus load).

Daily Discharge: The discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant over the day.

Delivery Ratio: Factor applied to pollutant reduction credits when sources are directly discharging to a waterbody of concern that accounts for the distance and unique watershed features (e.g., hydrologic conditions) that will affect pollutant fate and transport between trading partners.

Designated Uses: Those uses specified in water quality standards for each waterbody or segment whether or not they are being attained. 40 CFR 131.3. Examples of designated uses include cold and warm water fisheries, public water supply, and irrigation. (1, 4)

Effluent Limitation: Any restriction imposed on quantities, discharge rates, and concentrations of pollutants that are discharged from point sources into waters of the United States, the waters of the contiguous zone, or the ocean. 40 CFR 122.2.

Effluent Limitation Guidelines and Standards (ELGs): A regulation published by EPA under section 304(b) of the Clean Water Act that establishes national technology-based effluent requirements for a specific industrial category.

Equivalency Ratio: Factor applied to pollutant reduction credits to adjust for trading different pollutants or different forms of the same pollutant.

Load Allocation (LA): The portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. LAs are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loads should be distinguished. 40 CFR 130.2.

Location Ratio: Factor applied to pollutant reduction credits when sources are upstream of a waterbody of concern that accounts for the distance and unique watershed features between a pollutant source and the downstream waterbody (e.g., bay, estuary, lake, reservoir) or area of interest (e.g., a hypoxic zone in a waterbody).

Maximum Daily Effluent Limitation: The highest allowable daily discharge of a pollutant. 40 CFR 122.2.

Minimum Control Level: The pollutant load that a point source buyer must first meet before buying credits to meet the facility's baseline. This pollutant load is either the TBEL specified in a permit or the current discharge level, depending on which is more stringent.

National Pollutant Discharge Elimination System (NPDES): The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Clean Water Act. 40 CFR 122.2. NPDES permits regulate discharges of pollutants from point sources to waters of the United States. Such discharges are illegal unless authorized by a NPDES permit. (1)

Nonpoint Sources (NPS): Diffuse pollution sources (i.e., without a single point of origin or not introduced into a receiving stream from a specific outlet). The pollutants are generally carried off the land by stormwater. Common nonpoint sources include runoff from agriculture, forestry, urban environments, land disposal, and saltwater intrusion. (2, 4)

Offset: 1.) n. Offsite treatment implemented by a regulated point source on upstream land not owned by the point source for the purposes of meeting its permit limit. 2.) n. Load reductions that are purchased by a new or expanding point source to offset its increased discharge to an impaired waterbody. (Note: EPA considers both types of offsets to be trading programs) 3.) v. to compensate for.

Overlay Permit: A NPDES permit issued to a group of point source dischargers that supplements individual permits by establishing permit limits and other requirements for one or more pollutant of concern that are not addressed in the existing individual permits.

Permitting Authority: EPA (an EPA Regional Administrator) or an authorized state, territory, or tribe. Under the Clean Water Act, most states are authorized to implement the NPDES permit program. (1)

Point Source: Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff. 40 CFR 122.2.

Publicly Owned Treatment Works (POTW): A treatment works as defined by section 212 of the Clean Water Act (CWA), which is owned by a state or municipality (as defined by section 502(4) of the CWA). This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances only if they convey wastewater to a POTW. The term also means the municipality as defined in section 502(4) of the CWA, which has jurisdiction over the Indirect Discharges to and the discharges from such a treatment works. 40 CFR 403.3.

Reconciliation Period: The period of time during which a seller generates water quality credits and a buyer purchases and uses those credits to compensate for a pollutant load that it discharges during that same time period.

Retirement Ratio: Factor applied to pollutant reduction credits to accelerate water quality improvement. The ratio indicates the proportion of credits that must be purchased in addition to the credits needed to meet regulatory obligations. These excess credits are taken out of circulation (retired) to accelerate water quality improvement.

Single-Pollutant Trading: Trading a single pollutant parameter or different forms of the same pollutant parameter when equivalent mass loads of the different forms can be calculated and the water quality effects of those equivalent mass loads are similar (i.e., meeting an effluent limitation for total nitrogen by purchasing credits generated for reduction of another source's total nitrogen load or by purchasing credits generated for reduction of another source's nitrate load).

Technology-Based Effluent Limitation (TBEL): A permit limit for a pollutant that is based on the capability of a treatment method to reduce the pollutant to a certain concentration. TBELs for POTWs are derived from the secondary treatment regulations (40 CFR Part 133) or state treatment standards. TBELs for non-POTWs are derived from national ELGs, state treatment standards, or on a case-by-case basis from the best professional judgment of the permit writer. (1)

Third party: Any entity that is not a buyer or seller in the trade. A third party can be a state agency, conservation district, private entity, or other organization or person. Third parties could assist in facilitating credit exchanges and verifying BMPs.

Total Maximum Daily Load (TMDL): A calculation of the maximum amount of a pollutant a waterbody can receive and still meet applicable water quality standards (accounting for seasonal variations and a margin of safety), including an allocation of pollutant loadings to point sources (wasteload allocations) and nonpoint sources (load allocations).

Trade Agreement: Document that specifies the overall trading policies that trading parties must follow to participate in trading. The NPDES permitting authority would approve the trade agreement and could either reference the terms of the trade agreement in the NPDES permit or include the trade agreement as part of the permit for each point source participating in a trade.

Trading Limit: Level of control on the pollutant discharge the point source seller chooses to achieve, through technology or BMPs, beyond that facility's baseline.

Trading: A market-based approach to achieving water quality standards in which a point source purchases pollutant reduction credits from another point source or a nonpoint source in the same watershed that are then used to meet the point source's pollutant discharge obligations. To be creditable to the point source purchaser, the credits must reflect actual, achieved pollutant reductions in excess of the credit seller's baseline. Under certain circumstances, a point source buyer may have to purchase more than one pound of upstream pollutant reduction to equal a pound discharged at its outfall.

Uncertainty Ratio: Factor applied to pollutant reduction credits generated by nonpoint sources that accounts for lack of information and risk associated with best management practice measurement, implementation and performance.

Waste Load Allocation (WLA): The portion of a receiving water's loading capacity (TMDL) that is allocated to one of its existing or future point sources of pollution. 40 CFR 130.2.

Water Quality Criteria (WQC): Elements of state water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use. 40 CFR 131.3.

Water Quality Standard (WQS): Provisions of state or federal law that consist of a designated use or uses for the waters of the United States, water quality criteria for such waters based on such uses, and an antidegradation policy. Water quality standards are to protect the public health or welfare, enhance the quality of water, and serve the purposes of the Clean Water Act. 40 CFR 131.3.

Water Quality Based-Effluent Limitation (WQBEL): An effluent limitation determined by selecting the most stringent of the effluent limits calculated using all applicable water quality criteria (e.g., aquatic life, human health, wildlife, translation of narrative criteria) for a specific point source to a specific receiving water for a given pollutant or based on the facility's wasteload allocation from a TMDL. (1)

EPA sources of definitions

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2. EPA. 2004. *Water Quality Trading Assessment Handbook: Can Water Quality Trading Advance Your Watershed's Goals?* EPA 841-B-04-001. U.S. Environmental Protection Agency, Office of Water. November.
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