Water Quality Trading Scenario: *Point Source–Nonpoint Source Trading*

Contents

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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.

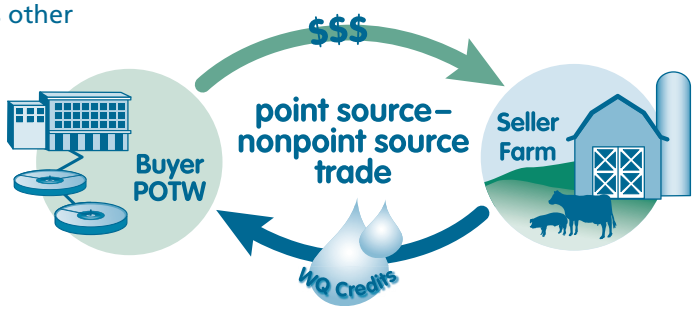


Figure 1. Point source–nonpoint source trade.

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

- 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

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. 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 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.

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:

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

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).

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.

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.

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.

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.

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.

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)

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 × 2,376 lbs/yr = 1,901 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.

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.

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

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

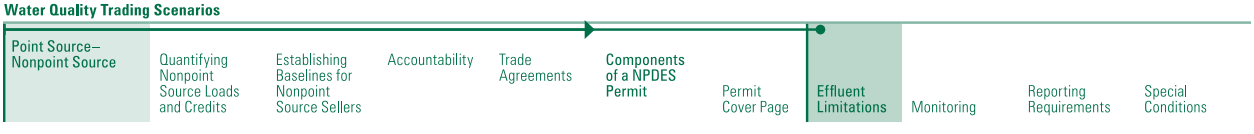
Effluent limitations are the primary mechanism for controlling the discharge of pollutants from point sources into receiving waters. When developing a permit, the permitting authority focuses much of its effort on deriving appropriate effluent limitations. As in all NPDES permits, permits that include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

Credits required = (Actual Discharge – WQBEL) x 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.

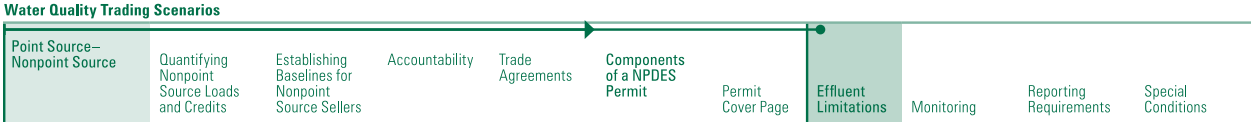
Anti-backsliding, Antidegradation, and New Discharges Special Considerations

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*.

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

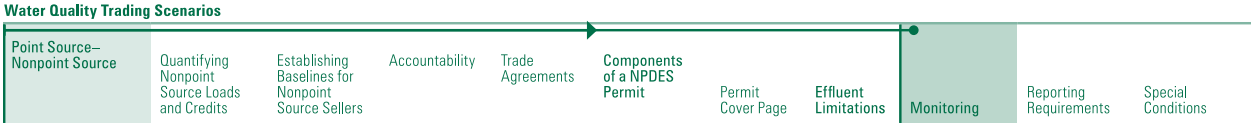
Permitting authorities may want to consider developing monitoring and reporting requirements to characterize waste streams and receiving waters, evaluate wastewater treatment efficiency, and determine compliance with permit conditions in the trade agreement. Monitoring and reporting conditions of a NPDES 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



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.

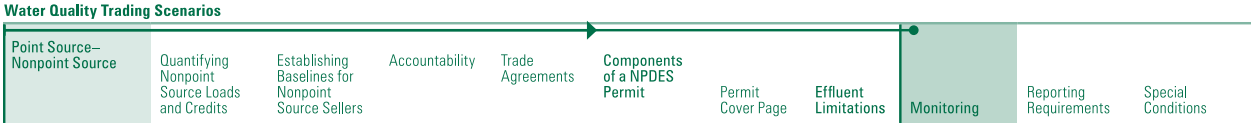
BMP Monitoring and Trade Tracking

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*).



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

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

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.

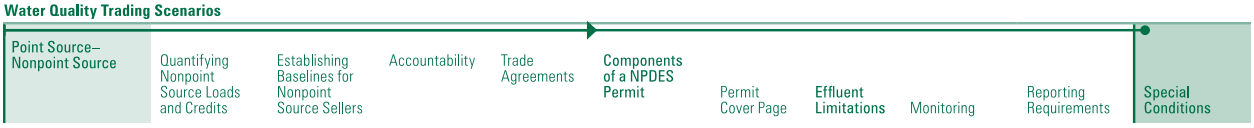
Special Conditions

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.



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

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 it 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.

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.

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.