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REGULATORY STUDIES PROGRAM

# Public Interest Comment on The Environmental Protection Agency's Proposed Water Quality Trading Policy [1]

The Regulatory Studies Program (RSP) of the Mercatus Center at George Mason University is dedicated to advancing knowledge of the impact of regulation on society. As part of its mission, RSP conducts careful and independent analyses employing contemporary economic scholarship to assess rulemaking proposals from the perspective of the public interest. Thus, this comment on the Environmental Protection Agency's Proposed Policy on Water Quality Trading[2] does not represent the views of any particular affected party or special interest group, but is designed to evaluate the effect of the Agency's proposal on overall consumer welfare.

## I. Introduction

The U.S. EPA's announced intention to accelerate support of permit-trading for improving water quality is timely and commendable (67FR34709). The timing is right because the standard technology-based regulatory approaches, born in the 1970s, cannot meet the challenge for controlling nonpoint-source pollution or for achieving meaningful gains in the control of point-sources. These approaches also lack the flexibility needed to serve as a foundation for building water-shed or river-basin approaches for managing improved water quality.[3] They lack incentives for the discovery and implementation of superior water pollution control strategies.

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[2] 67FR34709; May 15, 2002.

[3] The challenge is widely recognized. For example, see "Market-based Water Quality Management Yields Cleaner Water at Lower Cost." Washington, D.C.: World Resources Institute, May 24, 2000. www.wri.org/press , June 14, 2000. For similar comments, see J. Clarence Davies and Jan Mazurek, *Does the U.S. System Work?* Washington, D.C.: Resources for the Future, 1997, and Bruce Yandle, Harnessing Markets to Improve Water Quality, *Environmental Protection*, March 1999, 54.

Improvements in information technology now make it possible to monitor outcomes at lower cost and, therefore, to emphasize river basin and watershed management as opposed to managing point sources. Another element of good timing relates to the fact that there is accumulated and compelling experience that shows how market incentives can be applied effectively for improving outcomes.[4] The benefits to be obtained from markets are not speculative; they are real.

These same improvements in information technology also make it possible to realign responsibility for improving water quality. States, localities, and watershed associations can experiment with a variety of institutional arrangements, incentive systems, and technical innovations. The federal EPA can focus its efforts on monitoring outcomes, achieving consistency in the measurement of water quality, and sharing the knowledge that is learned from experience. The experiments that EPA cites in support of its water trading proposal demonstrate the progress that can be made through such experimentation and innovation. The benefits of federalism are real.

The proposal is commendable because properly installed market incentives can reduce the cost of improving water quality nationwide. As noted in the *2000 Economic Report of the President*, "[t]he challenge in addressing environmental problems lies in harnessing and channeling the power of markets, so that they both deliver continued economic growth and foster sound environmental practices."[5]

There are four conditions that support the use of water quality permit trading where one discharger cleans up more so that another discharger can increase its discharge, while still improving the water quality of the affected stream. These are:

1. **There are significant differences in incremental control costs among dischargers in the same water quality control region.** The cost of obtaining additional environmental improvements by requiring municipal and industrial point-source dischargers to clean up even more is often far larger than the cost of obtaining the same benefits from controlling storm water and improving the environmental management of agricultural and construction activities in the same water quality control region. By imposing the same, or even stricter, performance standards and allowing all regulated parties to search for and trade with the low-cost provider of effluent reductions, greater progress can be made in achieving water quality goals.

[4] EPA has accumulated much of this evidence, some under the auspices of the TMDL program and other evidence from experiments sponsored in Colorado, New Jersey, and the Chesapeake Bay. An earlier and detailed analysis of what was later called TMDL is found in M.T. Maloney and Bruce Yandle, Building Markets for Tradable Pollution Rights, Terry L. Anderson, ed., San Francisco: Pacific Institute for Public Policy Research, 1983, 283-320. See also Roger Meiners and Bruce Yandle, *Proposed Changes to the Total Maximum Daily Load Program (TMDL) and to the National Pollution Discharge Elimination System (NPDES) and Water Quality Standards (WQS) Regulations,* Public Interest Comment 2000-1, Arlington VA: Mercatus Center at George Mason University (January 19, 2000). For early discussion and documentation of European experience, see Blair T. Bower, Alan Kneese, et al., *Incentives in Water Quality Management in France and the Ruhr Area*, Washington, DC: Resources for the Future, 1981.

[5] *Economic Report of the President, 2000*. Washington, D.C.: Government Printing Office, Feb. 2000, 239.

2. **There are economies of scale in waste treatment by municipal treatment works and industrial plants, making it possible to reduce combined costs when water quality goals for the same river basin or water quality control region are met cooperatively through trading.** Contracting allows dischargers of the same pollutant in the same water quality control region to share treatment facilities and use lower cost cleanup technologies wherever they may be located.

3. **The ability to produce more cleanup and sell it gives an incentive to discover lower costs for pollution control.** When discharge permits have value, which is to say it is cheaper for one water quality user to reduce its discharge and sell the resulting permit to another party, then all dischargers have an incentive to search for and find more effective ways to reduce discharge. The discovery of cleaner technologies and methods of manufacturing provides an incentive to improve water quality.

4. **Technology for supporting permit trading and contracts is available**. There is experience-tested technology available for modeling and managing the ecological characteristics of rivers and streams that are affected by multiple dischargers. Crucial water quality "hot spots" can be identified and the effects of increased and decreased discharge by specific water quality users can be estimated, and related to the hot spots. Discharge permits can be tailored to fit desired environmental outcomes.

Our comment on this important EPA initiative is organized as follows: Since it is crucially important to understand the context into which permit trading might operate, we next describe the current regulatory baseline. Here, we identify baseline characteristics that limit the potential environmental gains that can come from permit trading. The next part of our comment reports on recent experience that validates the positive prospects for permit trading. In this section, we briefly recount experiences gained in the Tar-Pamlico River Basin Association in North Carolina and in the State of Virginia's point-source initiative. Finally, we offer recommendations for the design of an EPA permit-trading program that will open the door for obtaining greater water quality improvements at lower cost. An Appendix grades EPA's proposal on the elements of a regulatory "checklist" used by the Mercatus Center's Regulatory Studies Program.

## II. The Existing Regulatory Framework and its Limitations

### A Thirty Year Old Command and Control System

The federal regulatory blueprint that states follow in managing effluent from point sources is based on the Federal Water Pollution Control Act of 1972 as amended in 1977 and 1987.[6] Nonpoint-source pollution, such as runoff from streets, parking lots, and farmers' fields, is not controlled as rigorously as is industrial and municipal effluents. This source of pollution is regulated more broadly by statutes that provide grant programs and call for the states to have plans of action and programs to address nonpoint-source discharge. The EPA and the

[6] In describing this framework, we oversimplify to make several key points, recognizing that we run the risk of omitting important elements of the regulatory framework in our discussion.

National Oceanic and Atmospheric Administration jointly administer a nonpoint-source control program in coastal areas under the Coastal Zone Management Act. There are also permit requirements for the control of storm water runoff.

Technology-based effluent guidelines form the foundation for the regulation of industrial and municipal waste. These EPA-issued guidelines require technology for major components of industrial manufacturing processes and for municipal treatment plants. The technology-based standards, and permits based on the technology, are specified for point sources of discharge into rivers, streams, and lakes. There are differing and increasingly stringent technology-based standards that are specified in the federal blueprint. For states to have delegated authority for managing their own water quality control programs, they must follow the federal blueprint. The blueprint does not end with technology-based standards. The states must supplement the technology-based approach by also considering the water quality of waste-receiving streams. All streams in a state must be assigned a water quality designation, e.g., public water supply, agricultural and industrial, and so on.

The basic design of the command-and-control technology-based standards assumes that when the proper controls are installed and operating at each and every discharge point in a plant or along a river, then the desired level of pollution reduction will occur. The quality of the receiving water will be improved. When this does not happen, the regulatory authorities must identify impaired waters and take action to gain improvements. Once the total maximum daily load (TMDL) is determined for a designated stream, the shares of that load are allocated to dischargers who must follow the technology-based control approach described in the permit they hold.

The original blueprint did not recognize or accommodate the potential cost savings that come from differences in incremental cost for operating controls on one source versus another, even in the same plant. In other words, if the incremental cost of reducing a particular pollutant is higher for one source than for another, inside the same plant, the blueprint does not generally allow for increasing control where it is cheaper so that higher costs will be avoided, while achieving the same water quality goal. The same holds true for two industrial or municipal treatment plants that might be located along the same river. If incremental treatment costs for the same pollutant are high for one and low for another, there is no regulatory mechanism in the basic blueprint that encourages trade. From time to time, special initiatives have promoted trading in the context of the basic blueprint. But these have been the exception, never the rule.

In March 1994, EPA announced its guidelines for watershed based permitting.[7] Then, in 1996, EPA provided a tightly focused discussion of permit trading for watersheds that gave more precise information on how such trades would work.[8] While the described process opened possibilities for reducing costs for achieving water quality standards, the mechanism

[7] U.S. EPA, Office of Wastewater Management, Watershed Based Permitting, http://www.epa.gov/npdes/pubs/owmow109.pdf, viewed June 6, 2002. The purpose of this initiative was to integrate the permit-based system for eliminating pollution into a water shed management context.

[8] U.S. EPA, Effluent Trading in Watersheds: Policy Statement, http://www.epa.gov/owow/watershed/tradebl.html, viewed June 8, 2002.

is not allowed to serve as the fundamental means for achieving water quality goals; it is an exception that allows adjustment to the original water pollution control blueprint.[9]

The 1996 watershed trading guidelines required that before engaging in permit trading, a source "must be in compliance, and remain in compliance, with applicable technology-based limits."[10] Even though the old technology-based regime was not relaxed, the new effluent trading guidelines did allow for intra-plant trades. That is, a plant with multiple sources and varying control costs could juggle pollution reduction activities across its sources to minimize cost, so long as the combined effect met the water quality goal. Even here, however, the guidelines indicated that each source within the plant would still be required to meet an individual technology-based constraint.

The effects of the technology constraint can be seen in EPA's list of places where permit trading is now approaching implementation.[11] Of 34 trading organizations identified nationwide, 16 have actually implemented a trade. And of these, only 10 have had more than one trade. In some cases, the effort to develop trading has gone on for almost 20 years. For the most part, trading activity can be described as strictly experimental. Technology-based standards still form the foundation of the regulatory regime.

Thirty years have been devoted to building an effective regulatory edifice based on technology-based standards that focus on inputs and not outcomes. While significant water quality improvements have been made, there has been little reason to develop the regulatory infrastructure and expertise for managing an outcome-based system. Now, however, it is recognized that substantial parts of the nation's inventory of rivers, lakes, and shorelines are not supporting water quality standards.[12] If permit trading is to supplement or replace technology-based regulation, then greater attention must be devoted to modeling and monitoring outcomes.

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[9] We recognize that EPA, through it regional offices and special programs, allows for and on occasion encourages innovation. Project XL, announced in 1995, is an example. But XL was seriously hampered by the fact, acknowledged by EPA, that statutory requirements for technology-based controls were still present. (See 62FR19872, 19876 (April 23, 1997). For discussion of this point and a brief summary of the XL experience, see Jonathan H. Adler, Let Fifty Flowers Bloom: Transforming the States into Laboratories of Environmental Policy, Federalism Project Roundtable Paper Series, American Enterprise Institute, Washington, D.C., January 2002, 16-19.)

[10] Ibid. We note that the definition of technology-based limits is critical to the prospect of generating substantial gains from trading. If this means that each source must have the usual technology-based controls in place before trading is considered, then, the prospects for trade are dampened. A summary of Wisconsin's experience with watershed-based trading indicates that the EPA has indeed stated that normal technology based standards are to be met before and after a trade is made. (See Watershed-Based Trading & the Law: Wisconsin's Experience, a report prepared by Amy B.F. Tutwiler and Paul Kent, Davis & Kuelthau, Attorneys, in preparation for the Fox-Wolf Basin 2000 meeting. http://www.fwb2k.org/research/legalrept/tradelaw.htm, viewed June 6, 2002.

[11] Mahesh Podar, A Summary of U.S. Effluent Trading and Offset Projects, Washington, D.C.: U.S. EPA, Office of Water, November, 1999. http://www.epa.gov/owow/watershed/trading/traenvrn.pdf, viewed June 6, 2002.

[12] This comment is based on the 1998 National Water Quality Inventory Report to Congress from EPA, which is summarized in EPA's final TMDL rule, 65FR43585-43570, July 13, 2000, at 43587.

As mentioned earlier, the combination of technology-based standards and state water quality designations yields a program that defines total maximum daily loads (TMDLs) for all impaired bodies of water in a state. EPA has recently issued regulations that formalize the TMDL approach. The proposed rules initially required "offsets" to be generated by dischargers that sought to increase discharge. This implied that there would be permit trading among water quality users in particular streams, provided that each party to a trade was meeting the requirements of the technology-based standard. However, the final TMDL rules did not require offsets, leaving it unclear whether, and how, offset trading will be allowed. On the surface, as described in these few sentences, the TMDL program, which could affect some "300,000 miles of rivers and shoreline and approximately 5 million acres of lakes" is constrained by the older technology-based standards that must still be met before trading is allowed.[13] If all technology-based standards are to be met by trading parties, before trades can occur, then a significant part of the gains from trade will be sacrificed.

**Removing Old Limitations from the New and Improved Framework**

EPA's newly proposed permit-trading policy opens the gate to possibilities for expanded application of market incentives for achieving water quality objectives. The policy is a general one; it supports trading for managing water quality in unimpaired waters, in impaired waters, for achieving the limitations of TMDLs, and for non-TMDL purposes. Put differently, EPA's proposed support of trading embraces the entire spectrum of water pollution control.

While embracing all the situations where water quality is to be achieved and maintained, EPA's proposal is sharply limited by the technology-standard constraint. In EPA's policy statement, the agency indicates that: "EPA does not support trading to comply with technology-based effluent limitations except as expressly authorized by federal regulation."[14] The strictest interpretation of this statement implies that there will be no opportunities for trade unless and until each potential trading party has met the constraints of a technology-based EPA-approved, or state-approved, permit. New entrants to a river basin that might seek to purchase water quality improvements from existing water quality users would not be allowed to do so until after they had incurred the capital cost of meeting technology-based standards. Obviously, the prospects for cost reduction through permit trading are sharply reduced by this constraint.

For EPA's proposal to become a foundation for a new and improved approach for achieving higher water quality goals, the concept of permit trading will need to be expanded to include all forms of experimentation in the management of watersheds and water quality. This, we believe, is the time to introduce waivers that allow water quality users to avoid costly technology-based standards if they can assure that even more can be accomplished through the use of contracts, trading, and incentives.

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[13] U.S. EPA, Office of Water, Overview of Current Total Maximum Daily Load—TMDL—Program and Regulations, http://www.epa.gov/owow/tmdl/overviewfs.html, viewed June 8, 2002. We note that the final TMDL rule was issued on July 13, 2000 (65FR43585-43570), but funding for implementing the new TMDL rule was denied by Congress for FY2000 and FY20001.

[14] U.S. EPA, Office of Water, Proposed Water Quality Trading Policy, May 14, 2002.

Two water quality control activities undertaken in North Carolina and Virginia illustrate the possibilities offered by market-based controls. They are described in the next section.

## III. The Experience in North Carolina and Virginia

### Nutrient Trading in North Carolina's Tar-Pamlico River Basin

North Carolina's Tar-Pamlico Basin Association is North America's foremost example of a nutrient trading community with experience in point-source and nonpoint-source trading. Headquartered in Greenville, N.C., the association, which has 14 members who are point-source dischargers of nutrients into the Tar-Pamlico River, came into being after a series of fish kills and other water quality problems caused the Tar-Pamlico basin to be designated nutrient sensitive water. This 1989 action by the North Carolina Department of Environmental Management led to a series of meetings to determine a course of action for reducing the total load of phosphorous and nitrogen making its way into the rivers. At the time, all of the point-source dischargers, mainly publicly-owned treatment works (POTWs), were operating within the limits of their discharge permits. Indeed, if all of the POTWs had shut down, it is possible that there would have still been a nutrient loading problem in the Tar-Pamlico river basin.[15] The loadings from agricultural activities were just too large all by themselves; and, of course, the agricultural sector was not a part of EPA's control network. In short, EPA's technology-based standards could not get the job done. A new approach had to be taken. Fortunately, an organization was already in place for organizing a solution.

Earlier, in 1981, the private Pamlico-Tar River Foundation had been formed by citizens in Washington, N.C., one of several small towns located in the river basin, for the purpose of protecting and promoting the environmental quality of the Tar-Pamlico River.[16] Joining with the North Carolina Environmental Defense Fund, the Foundation petitioned the state to designate the waters nutrient sensitive. The two organizations took the lead in developing an innovative approach for improving Tar-Pamlico water quality.

It was clear that traditional technology-based command-and-control regulation could not solve the problem. Some process had to be developed for engaging farmers and other producers of nonpoint-source discharge in an overall river basin solution. A total of 200,000 kg/yr in loading (180,000 kg in nitrogen and 20,000 kg in phosphorous) had to be reduced in order to achieve water quality goals.

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[15] This and the discussion that follows are based on data reported by Elaine Jacobson, Leon Danielson, and Dana Hoag, The Tar-Pamlico River Basin Nutrient Trading Program, Department of Agricultural and Resource Economics, North Carolina State University, April 1994, http://www.bae.ncsu.edu/bae/programs/extension/arep/tarpam.html, downloaded January 1, 1997. The data indicate 28% of the nitrogen and 8% of the phosphorous are from point sources. Agriculture and livestock amount to 44% of the loadings for the two nutrients. Also see U.S. EPA, Office of Water, TMDL Case Study: Tar-Pamlico Basin, North Carolina, http://www.epa.owow/tmdl/cs10/cs10.htm, downloaded April 12, 2000.

[16] The Pamlico-Tar Foundation, http://www/ptrf.org/about.htm, viewed June 9, 2002.

The prospects for cost savings by means of cooperation, as opposed to point-by-point controls, was promising. EPA studies of the cost of removing pollutants in the area indicated that further reductions in nutrients from industrial sources and POTWs ranged from $1892 to $17,294 per kilogram.[17] The cost of removing the same pollutant by nonpoint sources was estimated to range from $147 to $262 per kg. While these were estimates, the numbers indicated the possibility for huge gains from trade. If only the operator paying $17,294 per kilogram to remove wastes could purchase reductions from the farmer who could remove the waste for $147 per kg.

Those leading the effort developed the idea of an association whose members would include the point-source dischargers who wished to join. The strict requirements that go with technology-based standards would be relaxed for association members, but not for those who chose not to join. Instead, all members would pay $56 per kg of excess nutrient discharges into a fund administered by the North Carolina Agricultural Cost Sharing Program, a state activity. The dollar amount was based on an estimate at the time of the nonpoint-source control cost in a particular region. Trading ratios that recognized the effects of a farmer's nutrient reduction on a particular POTW location were then determined. In some cases, the Association would provide funds for three units of farmer reduction for every one unit discharged by a POTW.

If the 200,000 kg reduction target were met solely through transactions with nonpoint-source dischargers, the association would need to generate $11.2 million. The association agreed to make a minimum payment of $500,000 in the first four years of operation, and proposed to achieve the 200,000 kg reduction over a period of five years. In the first year, they proposed to reduce 100,000 kg; 25,000 kg/yr would be eliminated in the four later years.

With the association organized and the nutrient trading plan accepted, the next step involved developing a computer simulation of the entire river basin and the linkages between discharges and water quality. The association raised approximately $400,000 for the purpose and completed the software development. They were no longer flying in the dark. The next step involved examining as a system all the facilities operated by members. The association found that some POTWs had much lower cost than others, and the low cost ones could expand their cleanup activities. Higher cost POTW operations were reduced, and engineering adjustments were made throughout the basin. Just this action enabled the association to meet its reduction goals for the first four years. It was clear that the nutrient trading association had incentives that were not present in the old days of technology-based standards for each and every point. By opening the door for trading and innovation, the U.S. EPA and state regulators made it possible for Tar-Pamlico to prove that more can be accomplished at lower cost when the incentives are right. The association has shown that:

[17] U.S. EPA, Office Water and Office of Policy, Incentive Analysis for Clean Water Act Reauthorization: Point Source/Nonpoint Source Discharge Reductions, April 1992, cited in Bruce Yandle, Community Markets to Control Nonpoint Source Pollution, Roger E. Meiners and Bruce Yandle, eds. *Taking the Environment Seriously*, Lanham, MD: Rowman & Littlefield Publishers, 1993, 185-207, at 193. The cost estimates were stated in term of pounds. These have converted to kilograms, 1 kilogram = 2.2 pounds.

- Through a coordinated watershed approach, the association met its first phase reduction goals by simply minimizing cost across participating POTWs. No trades were necessary.

- Funds generated by member discharge fees are being transferred to state programs that then provide cost-sharing funds to farmers who participate in nutrient discharge reduction activities. The lower cost provider is offsetting the higher cost operator's control costs.

- Without trading, the association estimates it would have cost its members as average of $7 million in technology upgrades to achieve a comparable level of nutrient reduction that $1 million investment in nonpoint source controls yield.[18]

**Economic Incentives for Nutrient Reduction in Virginia**

Virginia's experience with reducing nutrient flows from point sources into the Chesapeake Bay is instructive because it differs dramatically from the trading model contemplated by EPA's proposed guidelines. It thus illustrates the variety of solutions that can be found to a problem, and the value of allowing states to experiment. Because it is not one of the case studies that EPA has examined, we take some time to describe the context and origins of the Virginia program.[19]

As a signatory of the Chesapeake Bay Agreement, the Commonwealth of Virginia had made a voluntary commitment in 1987 to reduce flows of nitrogen and phosphorous in tributaries of the Chesapeake by 40 percent by the end of 2000. In 1996, Governor George Allen committed to reach those goals by voluntary means, without imposing regulations on point and nonpoint sources in Virginia. The Environmental Protection Agency, also a signatory to the Agreement, was the "scorekeeper" on progress towards the Bay Agreement goals. Beyond that, however, EPA had no role in shaping the strategies used by states to meet those goals.

Virginia conducted a "tributary planning process" in each watershed flowing into the Chesapeake; so that state and local officials, point sources, farmers, and citizens could share information and ideas. From that process a widespread consensus developed in Virginia. There was a strong desire to make the voluntary program successful. People understood that both point and non-point sources of nutrients needed to be reduced, and there were strong sentiments that those reductions should be proportionate. Note that this is not necessarily the most cost-effective approach, but public opinion favored proportionate reductions in each of the tributaries, and between point and nonpoint sources.

[18] U.S. EPA, TMDL Case Study: Tar-Pamlico Basin, North Carolina, wysiwyg://6/http://www.epa.gov/owow/tmdl/cs10/cs10.htm, downloaded October 8, 2001.

[19] One of us, Brian Mannix, was Virginia's Deputy Secretary of Natural Resources from 1996-1998 and was involved in both the legislative and administrative development of Virginia's program.

There was also a consensus that the substantial costs of the program should be shared, with half coming from state funds and half coming from the sources themselves.[20] Note that this consensus was a compromise between two competing points of view. Downstream communities—those bordering the Chesapeake—viewed nutrients as pollutants and felt that the upstream polluters should pay. Residents upstream on the tributaries were more concerned with other pollutants that affected local water quality; nutrient reduction would produce no local water quality benefits, and therefore the downstream beneficiaries should pay. Through the tributary planning process most participants came to appreciate that there is merit in both of these points of view, which supported a perception that 50-50 cost sharing would be fair.

In 1998 Governor Allen proposed legislation to reduce nutrient flows in the Chesapeake and included $11 million in his budget for the state share of costs. This proposal had to compete with concerns about a range of other water quality issues in Virginia. Some communities were facing very expensive programs to remedy combined sewer overflows (CSOs), and thought that any available state money should go to CSO projects; others thought that money should be available outside the Chesapeake watershed. To some extent these other concerns were accommodated. The General Assembly passed an alternative bill proposed by then Delegate (now Secretary of Natural Resources) Tayloe Murphy that preserved key features of the Governor's proposal, but did not make any provision for water quality trading.

Virginia's Water Quality Improvement Act of 1997 created a Water Quality Improvement Fund (WQIF), from which the Commonwealth could make grants to Publicly Owned Treatment Works (POTWs) to cover 50 percent or more of the cost of nutrient reduction projects. Initial funding was $15 million; in 1998 an additional $63 million was added to the fund. If it accepted a grant, a POTW would have to meet a standard of 8mg/l for nitrogen in the effluent stream. The act required that the grantee pay a penalty if the nutrient reduction goals were not met.[21]

With this legislative authority, Virginia sought to establish a cost-effective program for nutrient reduction. Sources were asked to make grant proposals for nutrient reduction projects. The applications were scored on a number of features, including cost-effectiveness in dollars per pound of nitrogen removed. Priority was given to the most cost-effective projects (making the grant process, in effect, an auction for nutrient reduction).

These nutrient reduction commitments were incorporated into a bilateral contract between each source and the Commonwealth, with the following features:

[20] There was also a desire for federal assistance, and Virginia's legislation made provision for including federal funds, but did not depend on their availability.

[21] POTWs argued strongly that the penalty should not be punitive, since this was a voluntary program, and in any case should never amount to more than the amount of the grant plus interest.

- The initial grant from the WQIF would cover 50 percent of the cost of biological nutrient reduction (BNR) projects or alternative technologies. The other 50 percent typically was borrowed from a revolving loan fund.[22]

- Grantees would report nutrient loads annually. If actual performance fell short (by more than 10%) of the statutory goal of 8mg/l, then the grantee would pay a penalty back into the WQIF.

- The penalty would be proportionate to the amount of expected nutrient reduction that was not achieved, using a dollar-per-pound rate calculated by amortizing the initial grant over the projected nutrient reductions during the life of the project.[23] In this way, the grant would be repaid, with interest, on that portion of the promised performance that was not delivered.

In effect, the 50-50 grant-loan combination would be adjusted year by year, converting *grant* into *loan* whenever performance fell short of goals. If no nutrient reduction was ever achieved, eventually all of the grant money would be returned to the Water Quality Improvement Fund, with interest, where it would be available to pay for other nutrient reduction projects.

In the second year of the program the contract terms were modified so that a grantee could get credit for achieving more nutrient reduction than it had originally committed. The same rate, in dollars per pound, that was used to calculate a source's penalty was applied to calculate its "bonus" if it exceeded the contracted target. In effect, the bonus would retroactively convert revolving-fund *loan* into WQIF *grant*. The legal authority to do this was the provision that the Commonwealth could make a grant for 50 percent *or more* of a project's cost. This provision made it possible to pay bonuses that doubled the amount of the original grant—if the source managed to achieve double the amount of nutrient reduction that it had originally promised.[24]

This innovative tax/subsidy system has been at least as successful in getting nutrient reduction installed in Virginia POTWs as have the regulatory strategies pursued in some other states. Some key features to note are:

- Virginia's strategy was not federally imposed or approved. Virginia was free to design a program that met its own needs and that enjoyed widespread and bipartisan political support. While the EPA's Chesapeake Bay Program staff looked at the program with great interest, it did not act as a regulator, but as a scorekeeper. Virginia was accountable only for the results achieved.

[22] As in other states, major capital projects at POTWs in Virginia are usually financed with loans from a state-managed revolving fund, which is also supported with federal money. For localities in financial distress, interest rates from the revolving fund are discounted.

[23] The amortization rate was the same interest rate that a community would be eligible for in the revolving loan fund.

[24] Unfortunately, recent budget shortfalls have prevented Virginia from implementing the bonus feature of the program.

- Virginia's program was not regulatory. All enforcement mechanisms are found in contracts, not in regulations.

- Rather than permit trading, Virginia used an auction mechanism (the grant application process, with priority for cost-effectiveness) to achieve economic efficiency in the initial allocation of funds.

- Rather than tradable permits (a "quantity instrument"), Virginia's program uses a "price instrument" (the penalty/bonus feature of the contracts, also called a tax/subsidy) to achieve its goals and provide incentives for innovation.

After several years of operation it is clear that Virginia's program, although successful, can be improved. Nutrient reduction continues to compete with other water quality programs for scarce funds. It is difficult to know what the right priorities are until better models of water quality can be developed. The cost-effectiveness of nutrient reduction can be further improved, particularly by finding a better balance between point source and nonpoint source projects. That could best be done through trading or a similar market mechanism. But market participants need to know what they are trading, and that requires a more robust and reliable scoring system for nutrient reduction projects.

In providing guidance and assistance to the states regarding water quality trading, EPA should resist the temptation to take a command-and-control approach. It is *not* helpful to promulgate detailed lists of features a program must and must not contain. It *is* helpful to share ideas, experiences, and knowledge. EPA's priority should be to develop the infrastructure—in the form of water quality monitoring and modeling—without which trading is not possible. It should hold states accountable for results, but allow them to experiment with methods. In this way, we can improve water quality with the benefits of federalism as well as the benefits of economic incentives.

**An Interstate Trade for Nutrient Reduction**

There is one other feature of Virginia's program that is worth noting. Because not all of its capital projects could be completed by the year 2000, Virginia looked for a temporary means of reducing nutrient flows until its long-term program was in place. It found an opportunity at the Blue Plains POTW in the District of Columbia. This is a very large plant, at which the technology for nutrient reduction is a little different from other plants. Blue Plains can use methanol in a special BNR process, with low capital costs but high variable costs. As a long-run solution, this technology was not cost-effective compared to capital projects available in Virginia. But it could be put in place quickly. Virginia therefore offered to finance nutrient reduction at Blue Plains in order to reach its goals for 2000; it would continue to do so until it had completed its own more permanent capital projects.

There were substantial obstacles to this trade, however. In the recent past Virginia had experience with both fiscal malfeasance and operational malfeasance at Blue Plains. It had won lawsuits against Blue Plains, without finding any effective means of enforcing the judgment of the court. Thus it was not clear how Virginia could have any confidence in its ability to enforce a nutrient trading contract with Blue Plains.

For its part, the management of Blue Plains had some serious concerns about the proposed trade. Virginia was asking it to reduce nutrient flows well below the level specified in its permit.[25] It worried that, after Virginia stopped paying for the project, the EPA would use an "anti-backsliding" provision to require Blue Plains to continue to operate the expensive BNR system, without identifying an alternative source of funds.

It was clear that some third party was needed to guarantee the terms of the contract to both Virginia and Blue Plains, and it was also clear that EPA could serve this role well. With direct oversight of the Blue Plains permit, EPA could effectively monitor compliance with the contract terms; and it was the only party that could definitively settle the anti-backsliding issue. Moreover, EPA was the scorekeeper for all the participants in the Bay Program, and therefore could ensure that Virginia either got credit for the nutrient reduction it paid for, or else got its money back. EPA's Chesapeake Bay Program staff expressed a willingness to play this role.

With that understanding, the Blue Plains trade was supported by both Governor Allen and Governor Gilmore, and the Virginia General Assembly set aside the $3.5 million in the 1998 budget for a grant to the Environmental Protection Agency to be used for nutrient reduction at DC's Blue Plains plant. It is striking that this offer was made, not in fulfillment of any obligation under federal or state law, but in order to achieve water quality goals that had been voluntarily established. While this innovative interstate trade ultimately was not consummated,[26] it does illustrate the important role that EPA plays as a monitor of performance and an arbiter of contract terms, particularly across state jurisdictions.

## IV. Recommendations

EPA's permit trading proposal provides an excellent opportunity for the agency to draw on 30 years' experience with input regulation and to venture forward with a rich set of outcome-focused control experiments. On the basis of our review of experience with trading and the possibilities offered by the proposal, we offer the following recommendations:

- EPA's permit trading policy should focus strictly on outcomes, not on inputs. The constraints posed by technology-based, input regulation stand in the way of making meaningful progress in achieving improved water quality. Any state offering a proposal that assures improvements that exceed those made possible by current regulatory baseline should be granted a waiver and encouraged to innovate for the sake of improved water quality.

[25] The Blue Plains permit is issued directly by the federal EPA.

[26] To meet Virginia's goals, this project needed to be installed very quickly; the parties were not able to come to terms within the relevant time frame.

- The new permit trading policy should be expanded to include and encourage the use of all forms of economic incentives. This could include the use of effluent fees, taxes, and simple performance contracting where one party pays another to perform pollution control activities.

- The EPA should allocate agency resources to the improvement of watershed modeling capabilities. The agency should provide leadership in the development of software that can be used in determining baselines for contracts that support permit trades. The agency should also allocate additional resources to the development of monitoring technologies that support outcome-based water quality regulation.

- The agency should pursue modification of the Clean Water Act to allow, by statute, alternate institutions for improving water quality. The agency should not simply engage in yet another experiment that will ultimately be frustrated by longer run statutory constraints.

In competitive markets, new technologies and better management strategies continuously erode the value of capital that is obsolete, in a process Schumpeter called "creative destruction."[27] In the world of government programs, however, this process requires conscious effort; it is anything but automatic. Having come up with a new and improved way to pursue water quality goals, the EPA needs to engage in some creative destruction—it should make an effort to phase out, or to delegate, those aspects of its water quality regulations that have become obsolete and are standing in the way of progress in improving water quality. This is the only way that the proposed water quality trading policy can achieve its full potential.

[27] Joseph Schumpeter, *Capitalism, Socialism and Democracy*, New Yorker: Harper, 1975 [1942], 84.

**Appendix I**

# RSP Checklist

## EPA's Water Quality Trading Policy

| Element | Agency Approach | RSP Comments |
|---|---|---|
| 1. Has the agency identified a significant market failure? | The Water Trading Policy is intended to promote market-like mechanisms to correct a regulatory failure—the inefficiency of command-and-control effluent standards.<br><br>Grade: A- | This is the right strategy. It could perhaps be sharpened by giving more attention to the underlying problem: property rights in water quality are weak, so that there are few opportunities for private bargaining to improve water quality. |
| 2. Has the agency identified an appropriate federal role? | The proposed policy allows states and tribes to develop trading systems that EPA will then approve. The agency insists that its existing effluent standards first be met.<br><br>Grade: B | Water quality regulation is a complex collaboration among federal, state, local, and tribal governments, as well as interstate and international commissions. The proposed policy should allow the EPA to do a much better job of delimiting an appropriate federal role: providing robust models of water quality that allow tradable units to be well defined, and measuring results. As the trading policy goes forward, EPA should prune back federal rules and roles that are no longer necessary and that may interfere with the sound functioning of the market for water quality. |
| 3. Has the agency examined alternative approaches? | The proposed policy represents a major alternative to the existing regulatory regime.<br><br>Grade: A- | EPA needs to recognize that the water trading policy is indeed an alternative—and not just an additive—to the existing command-and-control regulations. Also, it should be flexible in allowing for approaches, such as the tax/subsidy approach in Virginia, that fall outside the agency's preconceived vision of how trading should work. |

| Element | Agency Approach | RSP Comments |
|---|---|---|
| 4. Does the agency attempt to maximize net benefits? | The trading policy relies on market transactions to find opportunities to increase net benefits.<br><br>Grade: B | The process of market exchange will find opportunities to improve efficiency that could not be discovered by any other means. Unfortunately, the proposed policy disallows transactions that would improve water quality but violate effluent standards. In order to maximize net benefits, results—i.e., water quality—should come first. |
| 5. Does the proposal have a strong scientific or technical basis? | The proposed water trading policy is supported not only by sound economic theory, but also by experimental evidence from EPA-sponsored pilot projects.<br><br>Grade: A | Kudos. |
| 6. Are distributional effects clearly understood? | At this stage there is little discussion of distributional effects. Allowing voluntary trades does not significantly redistribute income.<br><br>Grade: A | One advantage of the proposed policy is that decisions about who should bear the costs of water quality improvements can, to some degree, be separated from decisions about where those improvements can most cost-effectively be obtained. Reducing agricultural runoff, for example, does not necessarily mean imposing new costs on farmers. |
| 7. Are individual choices and property impacts understood? | Grade: A- | Market-like mechanisms for pollution control are much more compatible with individual choice and private management of property than are command-and-control strategies. |