REPORT OF THE
DEPARTMENT OF CONSERVATION AND RECREATION

Interim Report: Review and Analysis of Agricultural Water Quality Improvement Programs Delivered by Virginia's Soil and Water Conservation Districts

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

HOUSE DOCUMENT NO. 46

COMMONWEALTH OF VIRGINIA
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W. Tayloe Murphy, Jr.
Secretary of Natural Resources

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Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

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January 31, 2005

The Honorable John H. Chichester, Chairman of Senate Finance
The Honorable Charles R. Hawkins, Chairman of Senate Agriculture, Conservation and Natural Resources
The Honorable Vincent F. Callahan, Jr., Chairman of House Appropriations
The Honorable M. Kirkland Cox, Chairman of House Agriculture, Chesapeake and Natural Resources

Dear Sirs:

I am pleased to submit the attached interim report in accordance with the following 2004 Appropriations Act [Chapter 4 of the 2004 Virginia Acts of Assembly (Special Session 1)] items:

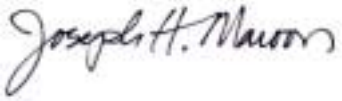
- Item 382 I requires the "Soil and Water Conservation Board prepare annual statistics, by District, that include the number of farmers, the number of acres in farms and in agricultural production (by product type), the number of farmers participating in District programs by program, the number of acres by product under each type of agricultural best management practice, the budgeted and expended funds for each agricultural best management practice…",

- Item 382 D.2. states "the Department shall review Soil and Water Conservation District (SWCD) operations and identify potential improvements in water quality and soil erosion programs. The review shall consider the relative needs of the various Districts, practices that offer the most cost-effective use of nonpoint source funding, and practices that are most appropriate given the characteristics of the various districts. The review shall incorporate the most recent findings on best management practice effectiveness. Based on the findings of the review, the Department shall propose changes in SWCD practices, staffing and funding, including the potential for performance-based funding, to improve the Commonwealth's nonpoint source programs…".

This interim report provides overviews of the fundamental issues and directions that have been taken thus far, and the planned focus of the analysis to be performed during 2005. The final report is to be completed by December 31, 2005.

We appreciate your consideration of this interim report and look forward to a continuing dialogue on this important topic as we work towards completion of this analysis in the coming year.

Respectfully submitted,



Joseph H. Maroon
Director

cc: The Honorable W. Tayloe Murphy, Jr.
Virginia Soil and Water Conservation Board
Mr. Paul Van Lenten
Mr. Neal Menkes

PREFACE

Two language amendments to the 2004 Appropriations Act adopted by the 2004 Virginia General Assembly direct the Virginia Soil and Water Conservation Board (VSWCB) and the Virginia Department of Conservation and Recreation (DCR) to perform analysis of the efficiency and effectiveness of agricultural best management practices (BMPs) that are implemented through Soil and Water Conservation Districts (SWCDs or districts). Appendix A of this report provides the legislative directives. Through discussion with staff of House Appropriation and Senate Finance Committees, the two separate language amendments were considered to be guidance for a single study. The essence of the study seeks reassurance that funds appropriated from public monies for implementation of agricultural BMPs are being carried out efficiently and effectively and that the BMPs are achieving the desired water quality results.

The science and understanding of agricultural BMP effectiveness is constantly changing and improving, sometimes challenging and refining conventional thinking. In addition, the system of effectively implementing BMPs through largely voluntary actions by farmers is complex. The Commonwealth of Virginia, through the efforts of the VSWCB and DCR in close partnership with local soil and water conservation districts and other significant partners such as the federal Natural Resources Conservation Services (NRCS) and the Virginia Department of Forestry, have been working for some time to develop, implement and improve the Agricultural Cost-Share Program offered to Virginia farmers and landowners. This interim report provides overviews of fundamental issues and directions being taken and planned with implementation of agricultural BMP incentive programs. The final report, due by December 31, 2005, will provide a more complete analysis.

DCR under the leadership of DCR Director Joseph H. Maroon has established a steering committee to assist with performance of the study and study recommendations. The committee is comprised of the following members:

Granville Maitland, Virginia Soil and Water Conservation Board (VSWCB); Appomattox River Soil and Water Conservation District (SWCD), Chairperson
Stephanie Martin, Executive Director of the Virginia Association of Soil and Water Conservation Districts (VASWCD)
Ricky Rash, VASWCD First Vice President; Piedmont SWCD, Chairperson
Cynthia Hancock, President of theVirginia SWCD Employees Association
Ken Carter, USDA Natural Resources Conservation Service (NRCS), Assistant State Conservationist (Programs)
Dave Faulkner, NRCS, Agricultural Economist
Jack Frye, Department of Conservation and Recreation (DCR), Division of Soil and Water Conservation (DSWC), Director
Mark Hollberg, DCR/DSWC Conservation District Coordinator (Staunton Field Office)
Gary Moore, DCR/DSWC Agricultural Incentives Program Manager

Mark Meador, DCR/DSWC District Programs Manager
Wayne Davis, DCR/DSWC Conservation District Coordinator (Tappahannock Field Office)
David Mueller, Virginia Department of Agriculture and Consumer Services (VDACS)
Jim Riddell, Virginia Cooperative Extension, Assistant Director, Agriculture and Natural Resources

Additional representatives from other partners will be added in coming meetings.

This interim report summarizes background information, provides an overview of activities and analysis performed in recent months, and conveys plans for further discussion and analysis to be performed during calendar year 2005.

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EXECUTIVE SUMMARY

Agricultural water quality improvement programs in Virginia began in a direct, deliberate way with the establishment of the Department of Conservation and Recreation's (DCR) Filter Strip Program in 1985 which offered farmers incentive payments to establish grass filters bordering crop lands. In the 20 years that followed, the Filter Strip program was quickly expanded to include a wide spectrum of agricultural best management practices (BMPs) which today exists as the Virginia Agricultural BMP Cost-Share Program. During this same time other incentive programs were established to enable farmers to receive Virginia state income tax credits and cash reimbursements to offset BMP implementation expenses. The Cost-Share Program has become the Commonwealth's most prevalent form for motivating farmers to implement BMPs. The Program is funded by Virginia general funds and through monies provided by the Water Quality Improvement Fund. In past decades, funds have ebbed and flowed with several years where little, if any state dollars were provided. In contrast, the 2005-06 biennium budget includes funds that enabled DCR to designate $6,233,062 in FY05 and $5,705,000 in FY06 for Cost-Share Program BMPs.

DCR maintains Cost-Share Program oversight and management. As each new program year begins (on July 1st) amendments to the Virginia Agricultural BMP Manual are considered. The Manual documents program guidance and the individual specifications for 60 agricultural BMPs. DCR relies on Virginia's 47 Soil and Water Conservation Districts (SWCDs or districts) to locally implement this state incentive program within the jurisdictions they serve. An additional important partner with program assistance is the USDA Natural Resources Conservation Service (NRCS). DCR sets program direction and administers program funds, while districts in close partnership with NRCS work to locally recruit and technically assist farmer participants.

Through the combined efforts of the conservation partners significant progress addressing agricultural water quality problems has occurred, however, many problems of the past are still present today. There are still gullies in fields, rolling croplands with needs for terracing, strip cropping, contour farming and other land management practices that have been effective soil erosion treatments for many years. However, the last decades have also seen tremendous strides in agricultural conservation. In recent times more advanced understandings of nonpoint source pollution and the contributions from agricultural operations created interest in implementing many diverse BMPs –to not only control soil loss, but manage nutrients, pathogens and agricultural chemicals. Advances in farming technologies are generating newer BMPs that reduce land tillage, utilize animal wastes for crop nutrition and more accurately measure and apply agricultural chemicals. Today all BMPs supported through incentives provided by the Commonwealth have conservation benefits and all reduce nonpoint source pollution.

The convergence of many new technologies are now being focused on improving water quality. Watersheds as small as few hundred acres or as large as the Chesapeake are analyzed by DCR staff with sophisticated computer models. By minimizing nonpoint source pollution and managing point sources, the aim is improved water quality and the recovery of aquatic health. Projections of agricultural BMPs that are needed to meet water quality goals in the Chesapeake Bay watershed by 2010 are daunting. Similar water quality needs exist in Virginia's Southern Rivers (SR). Given Virginia's recent experience, there are several key points that Virginia lawmakers must consider if the state Agricultural BMP Cost-Share Program is to improve its effectiveness:

- Significant peaks and valleys in BMP funding from year to year have dramatic impacts on technical staff – hirings and layoffs. If significant funding is devoted to provide incentives for implementation of agricultural BMPs, additional staff will be needed by SWCDs to provide technical services to farmers and provide oversight to ensure BMPs satisfy standards and specifications. Adding staff requires time to recruit, hire and train new employees.

- Virginia has chosen to address nonpoint source pollution problems largely through voluntary actions of land owners and managers. This means that farmers – even those with significant pollution loadings, are given a choice as to whether to implement BMPs. In the absence of requirements, incentives must be high enough to attract desired participants.

- Assessing agricultural BMP efficiency/effectiveness is complex. In some instances needed nonpoint source effectiveness data is unavailable, in other instances the available data is inconsistent and/or incomplete. Some BMPs prevent the introduction of agricultural chemicals (toxins, pesticides and herbicides) into surface and ground waters. Quantifying the pollution reduction benefits of these preventative pollution practices is especially difficult. Further research and analysis will continue during 2005. However it is important to note that research consistently supports the premise that preventing pollutants from entering surface and ground waters is much cheaper than removing contaminants once they are in place.

- At the scale of land treatment and BMPs needed, there is no guarantee voluntary participation by farmers (given the existing financial incentive opportunities) will achieve projected quantities of BMPs that are needed within the tributaries that feed the Chesapeake Bay. For example, planted cover crops are among the more effective, relatively low expense BMPs included within Virginia's tributary strategies. Baywide in Virginia there are 769,000 acres of cropland. The collective need for implementing cover crops within the Bay basin is over 402,000 acres, which must be implemented annually through 2010. Persuading farmers to implement this practice on over half of all available cropland within the basin every year through 2010 presents a tremendous challenge.

- Agricultural BMPs provide reductions in nonpoint source contaminants, but their life span of effectiveness is relatively short lived. BMPs that receive benefits of state incentives must be maintained for a specified period of time. Some practices have only a one year maintenance requirement, others must be maintained for five, or no more than ten years. Simply stated, annual and relatively short term BMPs (five and ten years) provide nonpoint source pollution reduction benefits. But those practices are not permanently established and are often not continued by farmers due to many factors.

- Accounting for actual and ongoing implementation of BMPs is difficult.

- Accounting for implementation of BMPs not paid for in part by state and federal dollars is challenging.

- Balancing needs for cost effective practices against more expensive practices is challenging.

- Resolving indicators of SWCD effectiveness with delivery of their water quality and erosion programs will require considerable analysis and overall consensus among conservation partners in order to identify and carry out meaningful improvements.

Where significant funding and focus by SWCDs have been applied, the successful implementation of agricultural BMPs is significant. For example by 2000, initial nonpoint source pollution reduction goals were achieved in the Shenandoah and lower Potomac rivers after SWCDs added needed staff and implemented a large portion of nearly $13 million in BMP incentive funding. Elsewhere, successes with pollution reductions through agricultural BMPs are mixed, especially in the Southern Rivers since achieving success is dependent on steady funding for trained staff, program promotion and financial incentives that motivate actions by farmers.

Discussions about ways to strengthen conservation programs implemented by SWCDs led to establishment of performance deliverables within agreements between DCR and each of Virginia's 47 SWCDs that took effect July 1, 2004. This action was prompted by events that occurred a year earlier. During April, 2003 the Governor's Natural Resources Leadership Summit brought together key agencies and organizations to exchange ideas and develop a proactive agenda dealing with Virginia's environmental and resource issues. From the summit the Governor's Natural Resources Partnership Agenda emerged. The Agenda identified numerous areas of opportunity and needed improvement. Regarding agricultural BMPs, the Agenda states: "The Department of Conservation and Recreation will develop a plan to coordinate with local soil and water conservation districts to better target the use of state cost-share dollars and encourage more farmers to implement conservation practices." DCR, working closely with key partner representatives defined a list of performance criteria each SWCD agrees to fulfill as they locally implement the Commonwealth's Agricultural BMP Cost-Share Program. The agreements more precisely describe the expected actions of districts with use of program monies, the targeting of BMPs to address the greatest water quality problems, and the need to seek program participants that are generating the greatest nonpoint source pollution loads.

During 2005, DCR and the Virginia Soil and Water Conservation Board (Board) with assistance from key partners will continue to pursue approaches to analyze and assess agricultural BMP efficiencies and effectiveness to enhance agricultural programs SWCDs implement to improve water quality. DCR and the Board will work to identify indicators of SWCD effectiveness related to the impacts agricultural programs are making among the farm communities they serve. Finally, possible changes and needed enhancements to the statewide system of SWCD program delivery will be considered for recommendation and adoption.

BACKGROUND

Agricultural BMPs and the Partnership System of Technical Services

Since their creation, Soil and Water Conservation Districts (SWCDs or districts) have assisted farmers with minimizing runoff (nonpoint source) pollution from agricultural operations. In the early years (1930s, 40s and 50s) following their establishment, districts focused on minimizing soil loss. In those days, conservation concerns pertained to maintaining soil for the sake of crop productivity and yield as much or perhaps more than environmental concerns that affected the condition of water and air resources. In Virginia, just as in other states across the country the system of providing land farmers with conservation planning and technical assistance relied upon a local delivery system of SWCDs, with support from the USDA Soil Erosion Service (later to become the Soil Conservation Service and today the Natural Resources Conservation Service), and support from the Commonwealth (funding and staff assistance).

Through the 1960s, 70s and 80s, public demand for improving the condition of natural resources resulted in new environmental laws, new programs and financial appropriations. In 1985 the Virginia Department of Conservation and Recreation (DCR) established an incentive program to encourage farmer adoption of a conservation practice that established vegetative buffers adjacent to farm fields. The Filter Strip program began with an incentive payment for farmers willing to follow practice guidelines. SWCDs along with NRCS provided technical assistance to farmers. SWCDs administered farmer payments through funds they received from DCR.

In the nearly 20 years since the inception of an incentive program for farmers to voluntarily implement agricultural conservation practices, much has changed and much remains essentially the same. Today what started as an incentive program to encourage adoption of a filter strip conservation practice has evolved into the Agricultural BMP Cost-Share Program. DCR provides program oversight, guidance and funding to the 47 SWCDs that locally implement this program across Virginia. DCR maintains guidance and specifications for 60 unique conservation practices. Certain practices provide farmers with opportunity to receive tax credits towards taxes due to the Commonwealth. Other practices provide funds to farmers on a cost-shared or financial incentive basis to encourage installation of BMPs. Other programs offered by other agencies (USDA and the Virginia Department of Environmental Quality (DEQ)) provide further cost-share and low interest loan program opportunities for Virginia farmers.

Over the years, new BMPs were introduced as agricultural technology advanced. New and better ways of applying nutrients and minimizing soil loss often meant direct savings to farmers while achieving reduced pollutants reaching state waters.

Virginia's approximate 47,000 full time farmers turn to many sources for advice and guidance on a broad spectrum of BMPs. Above all, guidance must be reliable and trustworthy. Tradition often dictates the business of farming.

What's worked well, or has at least been reasonably successful is passed along from generation to generation.

New changes in farming practices are often not immediately or broadly embraced and generally must be piloted and adopted within a local farming community. Field trials and tests are common ways of introducing new practices. This is one significant role that state cost-share funding has played, that is, it has enabled farmers to try new practices without much financial risk to them.

Agricultural BMPs - Evolution and Effectiveness

Since the Dust Bowl days of the 1930s, the development of agricultural BMPs has been driven by at least two significant forces. One force dealt with conservation issues on the farm –soil erosion, management of animal wastes, loss of nutrients through water runoff and so on. The other force was driven by new technologies, such as more efficient ways of applying nutrients, testing crop needs, maintaining vegetative cover on crop fields, and other innovative technologies. The BMPs that addressed these conservation problems and introduced new technologies were introduced with intentions of fixing actual problems in farm fields and stimulating farmer interest in incorporating more environmentally friendly practices that minimized nonpoint source pollution problems. The mindset of professional staff working with farmers was to take advantage of cost – share incentive funding for education and demonstration purposes –introducing new ways of addressing agricultural problems and new technologies and encouraging broader adoption by farmers.

Particularly within the last decade, new advances in computer-assisted modeling are enabling projections to be made of the beneficial effects of applying various combinations of land and water treatments aimed at achieving desired water quality goals within watersheds. After accounting for point source discharges and their releases into waterways, the nonpoint source contributions must also be managed to achieve desired water quality conditions. The nonpoint source contributions result from all land uses –residential, commercial, industrial, agricultural as well as public lands. While the body of literature documenting the efficiencies and effectiveness of BMPs is changing, overall there is widespread acceptance of the value of the practices, but much more scientific data is needed to document more real - world effectiveness.

With regards to agricultural BMPs, individual practices often exist to address specific nonpoint source problems. For example some BMPs most directly address soil erosion issues; others pertain to management of animal wastes; some address management of nutrients and others the management of crop pests. Calculations of the nonpoint source reduction benefit can be reasonably projected when estimated for specific fields where BMPs are applied. However, the ability to accurately calculate the benefit of specific BMPs for increasing distances from the edge of any field where a BMP is implemented becomes increasingly difficult and less accurate.

Projected deliveries of nonpoint source loads from the edge of fields to the edge of streams and ultimately, to the main stem of watersheds like the Chesapeake Bay must consider many more factors and those estimates while necessary, are less reliable.
Virginia's Agricultural BMP Cost-Share Program provides a very good source of information and data for nearly 20 years of BMP implementation. Field staff performing technical assistance for participating farmers calculate estimates of nonpoint source reductions –primarily soil erosion. However, the calculations of the nonpoint source pollution reduction benefits are projections of practice benefits at the edge of the field where the practice is applied.

Acknowledging that accurately estimating the nonpoint source reduction benefit of agricultural BMPs is difficult. The greater the distance from any particular BMP the greater the difficulty projecting the reduction benefit. Understanding the reduction benefit –tons of soil saved, pounds of nutrients kept in place-- is important when projections of costs for the reductions achieved are calculated. Ultimately it is important to attempt to understand for every dollar invested in agricultural BMPs, which BMPs provide the greatest nonpoint source reduction benefit. However, considerable research and analysis is needed.

The EPA Chesapeake Bay Program Phase 4.3 Watershed Model Nonpoint Source BMPs summary prepared December 22, 2003, provides a detailed list of selected agricultural BMPs and their reduction efficiencies. Many BMPs offered through cost-share and other incentives supported by the Commonwealth are not contained within the list. This situation exists since many BMPs offered through state incentives are not easily applied to Bay program goals and further, the documented reduction data is not available to enable the model to simulate reduction benefits. Much additional work is needed to analyze and document BMP reduction benefits in ways that will be accepted for inclusion in the model for a much broader group of BMPs applied on Virginia's agricultural lands.

The Bay Program's analysis does provide a basis for more accurately projecting the nonpoint source reduction benefits that are realized through specific agricultural BMPs. The reduction benefits of some BMPs remained unchanged, a few BMPs now receive greater credit for their water quality benefits and some BMPs now receive reduced nonpoint source pollution reduction estimates. As the science of understanding the water quality benefits of agricultural BMPs continues to advance, further adjustments and refinements to the estimates of these benefits should be expected. Ultimately these fine tunings provide a more accurate basis for correlating actions on the land and real impacts in water quality and the overall health of the Chesapeake Bay.

The Conservation Partner Work Force

Virginia's agricultural incentive programs are implemented at the local farm-by-farm level by 47 Soil and Water Conservation Districts with considerable assistance from the USDA Natural Resources Conservation Service (NRCS) and the guidance and support of DCR staff.

Other partners including Virginia Cooperative Extension, the Virginia Department of Forestry, the Virginia Department of Game and Inland Fisheries and others provide local technical assistance for certain practices.

Virginia's 47 SWCDs are almost entirely co-located in USDA NRCS field offices. This arrangement has evolved over 50 years, but the major growth of SWCD staff has occurred within the last 20 years. Prior to the mid-1980s most districts employed a part-time administrative secretary and very few employed a technical staff person. Today nearly every district employs no less than a full-time administrative assistant and a full-time technical employee. This has been made possible through increased state and local funding. Many districts have additional staff to perform managerial, educational and technical services. During this time, staff from NRCS have declined somewhat and NRCS is increasingly turning to districts for assistance with implementation of major federal conservation programs such as EQIP (Environmental Quality Incentive Program), CRP (Conservation Reserve Program) and others.

Maintaining a well trained, capable work force to implement state and federal agricultural incentive programs requires considerable investments. The investments include the financial expense of staff salaries; and the administrative infrastructure of offices, transportation, equipment and other support expenses. The investments by districts also pertain to commitments of staff time and expertise to ensure employees have the skills necessary to carry out their duties. Turnover of SWCD technical staff has been particularly high in recent years as districts often provide an ideal local training ground for many young people that wish to enter the natural resource conservation work force. Typically salaries paid to district employees are not high due to limited district funds and career advancement opportunities are limited. Consequently, turnover is high as staff are able to find more lucrative career opportunities in state and federal agencies and the private sector.

The level and consistency of state funding for cost-share programs has a direct impact on SWCD staffing and operations. The Agricultural BMP Cost-Share Program has experienced peaks and valleys in funding with a high of $13 million in statewide funding during 2000 and a low of less than $500,000 million in 2003. Frequent fluctuations in funding cause SWCDs to add staff during peak funding years and reduce staff when funding is low. Lag times exist during each extreme period where districts are unable to effectively service farmer requests for program assistance when funds are relatively plentiful. Likewise, when state or federal cost-share dollars are low, districts must reassign staff to perform other functions or lay off employees. "Gearing up", or adding staff requires considerable time of district board members and employees.

More consistent state cost-share funding for agricultural BMPs would provide many program benefits. Among them would be the maintenance of a more stable, well trained work force needed to deliver the related technical and educational assistance to farmers.

Virginia's Voluntary Approach to Farmer Implementation of Agricultural BMPs

After over fifty years of addressing agricultural conservation issues, Virginia along with many other states, has evolved into a partnership delivery system of federal, state and local conservation organizations. The delivery system relies on local technical experts working with members of the agricultural community to fix farm problems and encourage new conservation technologies.

Farmer willingness to implement conservation practices is dependent on many factors. Understandably, financial considerations are foremost as farmers weigh the costs of investing in their operations. Financial returns for crops and other farm commodities are generally at fixed prices. Farmers are unable to independently seek higher prices to offset increased expenses. Farm profit margins are narrow and the ability to invest in conservation practices is often limited, even though several conservation practices actually result in saving farmers money. Even with financial incentives and cost-share reimbursements, BMPs still require financial investments by farmers.

Coupled with financial realities are other compelling factors that pose challenges to partner agency staff that "sell" BMPs. Tradition creates resistance to change. "What worked for past generations is good enough for me"… "change may not work"…. "let others try it first…" are not uncommon farmer expressions heard by staff involved in "selling" conservation practices and programs. Beyond the unwillingness of some farmers to make changes due to family heritage and tradition are segments of the agricultural community that are unwilling to enter into a "government" program or service. This can be especially true when acceptance of incentive funding through Cost-Share programs requires contractual commitments of 5 years, 10 years or beyond.

In addition, the work force of field staff employed by conservation agencies must be accepted as credible resources with technical expertise, and be considered reliable and trustworthy. Incentive programs must offer sufficient financial opportunities. Long term expectations for maintaining BMPs must be reasonable. BMPs must align with farmer needs. For example, a farmer interested in dealing with poultry mortality from his poultry houses may not be willing to install a wooded buffer on the fringe of a field bordering a stream. Another farmer may be very willing to invest in the repair of an expanding gully in a crop field, but not interested or willing to invest in a practice to fence his beef cattle from waterways on his farm. While conservation professionals work to encourage farmers to implement BMPs that may achieve the greatest reductions in nonpoint source pollutants, ultimately only the farmer decides what they are willing to implement on their farm.

II. RELATED ACTIONS TAKEN TO DATE

DCR actions and activities during the latter months of 2004, towards fulfillment of this study are grouped and summarized in the four narratives that follow.

Establishment of NPS Implementation Agreements Between DCR & Each SWCD (47)

During the Governor's Natural Resources Leadership Summit held during April, 2003, two concerns surfaced that pertained to the Agricultural BMP Cost-Share Program. One concern pertained to whether the program is truly reaching a broad farmer clientele, or catering to the same farmers year after year. The other concern pertained to the targeting of BMPs and whether conservation practices are being effectively implemented to address the problems that create the greatest contributions of nonpoint source pollution to water quality. An outcome of the Governor's Summit was development of an Action Plan that addressed many natural resource issues and opportunities. Among many follow up tasks, the Action Plan charged DCR to work with SWCDs to assess the validity of the concerns and address any needed changes accordingly.

Considerable time and analysis were devoted by the DCR agency director and staff, and key representatives of the Virginia Association of Soil and Water Conservation Districts to address these concerns. Review of program data reveals:

- From a statewide perspective roughly 6,000 unique farmers have participated in the cost-share program during the last 6 years; fewer than 1/3rd have participated more than a single program year during that period. In fact, only 17% of the individuals received cost-share in two of the six program years and only 6% received cost-share in three of the six years analyzed. Farmers that have participated more than once are concentrated in the coastal plain and are implementing agronomic (rather than structural/engineered) practices. Agronomic practices are vegetative seasonal or annual practices such as planted field cover crops that do not involve moving earth, reshaping fields or building structures to manage animal wastes.

- The question of whether SWCDs are effectively targeting BMPs is complex. DCR in partnership with other key agencies has identified 497 delineated or segmented the land area of Virginia into relatively small watersheds throughout Virginia and prioritized each watershed using a variety of actual and potential nonpoint source pollution criteria. Estimated loads of nitrogen, phosphorus and sediment are calculated for each watershed giving consideration to land use within the watershed. Each small watershed receives a "high", "medium" or "low" rating for agricultural, urban, forest, and total land uses. The prioritization process is intended to help planners and decision-makers target which watersheds or hydrologic units should be given primary consideration for the use of NPS pollution control measures. Focus on watersheds with higher rankings having high NPS pollutant loads is a desired result of this system. DCR factors the rankings of high, medium and low ratings for agricultural nonpoint source pollution into the formula used for the allocation of Cost-Share Program monies made available to SWCDs. Districts with higher

priority watersheds receive a relatively greater share of available monies.
DCR's Cost-Share Program guidance directs districts to place emphasis on implementing BMPs in the highest priority watersheds. However, districts are empowered to consider local concerns and priorities and use professional judgement as they rank and fund local Cost-Share Program participants. Every watershed, regardless of its relative priority ranking contains farm operations that contribute significant nonpoint source pollution loads to local waters.

The precise location of each cost-shared BMP is recorded by technical staff that provide farmer assistance, and each practice location is entered in the Program database. Analysis of the geographic location of all cost-shared BMPs and their relationship to high, medium and low priority watersheds indicates opportunity for improvement with certain SWCDs and supports the need for those SWCDs to use more resources in their highest priority watersheds. In short, BMP placement generally indicates geographic targeting is occurring, however some districts may not be giving adequate attention to their highest priority watersheds.

To address these concerns and further improve the effectiveness of Virginia's incentive programs that are implemented by SWCDs, DCR established a first – ever Nonpoint Source Programs Implementation agreement with each of the 47 districts. Every SWCD endorsed their agreement for the fiscal year that began July 1, 2004. Of particular significance is the list of performance expectations contained within the agreement's Scope of Services. (See Appendix B.)

Included within the Agreement are expectations that each district will:

- Perform technical and administrative services for the Agricultural BMP Cost-Share and tax incentives programs. Of the annual Agricultural BMP Cost-Share funding made available to the district by DCR, up to 15% may be expended by the district to recoup technical and administrative expenses incurred by program implementation.

- After allowing for technical and administrative needs, issue no less than 90% of the remaining available funds for Agricultural BMPs to participating farmers during the program year.

- Fund BMPs in the highest priority agricultural and TMDL watersheds (as ranked by DCR). Exceptions will be allowable when justified by the district's approved secondary considerations.

- Approve BMPs that achieve the greatest reductions of nutrients and sediment to state waters through use of the most appropriate, cost effective practices.

- For SWCDs within the Chesapeake Bay basin, give priority to BMPs contained within Tributary Strategy (plans referred to as) "input decks".

- Actively identify farm operations that are generating the greatest nonpoint source pollution problems and focus recruitment on those owners and/or operators for participation in agricultural BMP incentive programs. From those farmers whose farms are contributing the greatest nonpoint source loads, establish a district goal for recruiting new program participants (farmers that have not received program funds within the past 5 years – since July, 2000) with a guide of bringing at least 3 new farmers for every 10 program participants (30%).

This Agreement is a significant step in providing further DCR direction to local SWCDs on the expenditure and targeting of limited state cost-share dollars.

DCR Staff Research and Data Analysis

As part of DCR's on-going analysis to improve the state's Cost-Share Program, in April, 2004 agency staff undertook an analysis of the agency's BMP Cost-Share program data for the preceding thirty months (2 ½ years). This was done as an initial step towards better understanding the relative cost-effectiveness of each BMP. Staff looked at the average nonpoint source reduction benefits of each practice, in relation to the average cost of implementing that practice. In short, this was done to better understand which BMPs provide the greatest nonpoint source reductions for the least investment in state funds. This very preliminary, initial look at BMP cost-effectiveness demonstrates the many difficulties with attempting to make comparisons between very different BMPs.

For instance, the DCR Cost-Share Program database provides very good documentation for tracking implementation of BMPs and their associated costs for nearly 20 years. However, it contains somewhat limited nutrient and sediment reduction estimates. Further, each BMP achieves nonpoint source reductions, but the reductions may be realized primarily for nutrients, or sediment, or perhaps provide some level of chemical/biological benefit. Very few BMPs achieve significant nonpoint source reduction benefits for all pollutants. Therefore, attempting to compare the benefit and cost-effectiveness of implementing a nutrient management plan against the installation of a manure storage structure, or a composting facility that addresses livestock mortality, is not easily achieved. With this background DCR combined annual and quarterly BMP implementation reports submitted by SWCDs, and prepared a rudimentary cost-effectiveness analysis for a portion of the agricultural BMPs that receive some incentive from the Commonwealth. This analysis estimates each BMP's cost-effectiveness by dividing the total actual cost of the practice by the tons of sediment, pounds of nitrogen, and pounds of phosphorus maintained in the field as a result of the implemented BMP.

Local SWCD technical staff generate sediment reduction estimates by calculating the Revised Universal Soil Loss Equation (RUSLE) on the before and after BMP implementation scenarios. This calculation provides an estimate of each BMP's effectiveness at reducing sedimentation and the associated nitrogen and phosphorus loads on a yearly basis.

Because the implementation period for BMPs vary according to practice and desired result, the total actual cost was divided by the lifespan of the practice to provide an annualized cost. This annualized cost was, in turn, divided by the tons of sediment reduced per year, the pounds of nitrogen reduced per year or the pounds of phosphorus reduced per year to calculate a cost-effectiveness figure expressed as Total BMP $ per ton of sediment reduced (per year), per pound of nitrogen reduced (per year) and per pound of phosphorus reduced (per year).

A preliminary look at the results of a very limited BMP cost-effectiveness analysis tends to support what might logically be expected. That is, the less expensive conservation practices that involve planting vegetative field covers (like cover crops, permanent cover on critical areas, reforestation on highly erodible crop/pasture lands…) tend to achieve the greatest nonpoint source reductions for the least expense. BMPs that require earth moving equipment to shape the landscape or establish structures (stream crossings, stabilize woodland erosion and so on) provide significant nonpoint source reduction benefits, but at greater expense.

These findings correlate reasonably well with the regional legislative Chesapeake Bay Commission's December, 2004 report: "Cost-Effective Strategies For the Bay". Following considerable analysis, the Chesapeake Bay Commission identified 6 practices (from all the practices used in tributary strategies and incorporated into the Bay Program's watershed model) and recommended Bay partners, including Virginia, focus limited resources on implementation of these practices. Five of the six practices are agricultural. The top choices are as follows:

1. Wastewater Treatment Plant Upgrades
2. Diet and Feed Adjustments (for livestock operations)
3. Traditional Nutrient Management
4. Enhanced Nutrient Management (also referred to as "yield reserve")
5. Conservation Tillage
6. Cover Crops

The agricultural practices (5 of the 6 among the list above) are relatively low cost BMPs that require minimal investment in reshaping land (e.g. correcting critically eroded gullies, creating basins to trap pollutants…) and structural components (e.g. fencing, wells for watering systems, storage structures for animal manures, and others). This approach of focusing limited resources on the most cost-effective BMPs that achieve the greatest nonpoint source pollution reductions is consistent with DCR's initial analysis of agricultural BMPs supported with state incentives. However, considerable additional analysis in Virginia is needed to better understand BMP cost-effectiveness and the geographic differences of cost-effectiveness even with a single BMP. For example, a BMP widely implemented in tidewater Virginia may not be as necessary in the Shenandoah Valley which therefore impacts the need and expense of implementing that practice in different regions of the state.

Additionally, as DCR continues to explore opportunities to improve targeting of the most cost-effective BMPs, consideration will be given to potential changes with incentives for nutrient management practices.

Of the six priority practices advocated by the Chesapeake Bay Commission's recent report, three focus directly on nutrient management approaches. DCR's Agricultural BMP Cost-Share Program presently provides a farmer incentive payment of 75% of the cost of preparing a new nutrient management plan on crop and grazing lands not to exceed $3/acre. For farms receiving on-farm generated animal manure the incentive rate cannot exceed $6/acre.

Farms needing revisions to existing plans can receive 75% of the plan revision expense not to exceed $1/acre and no more than $2/acre for farms utilizing on-farm generated animal manure.

The recently completed (December, 2004) "Review of Nutrient Management Planning in Virginia" study performed by the Join Legislative Audit and Review Commission (JLARC) includes among its recommendations that DCR consider increasing the caps or limits of incentive payments as a means of stimulating more interest from private, certified nutrient management plan writers. The JLARC report further notes opportunities for DCR to consider linking incentive payments in ways that improve nutrient management plan implementation by farmers and better target plan development and implementation in areas with the greatest nonpoint source pollution problems. Other opportunities referenced by the JLARC report include consideration of financial incentives with manure management concerns that include issues like the transport of poultry litter where supply exceeds land application by local farmers and implementation of a "yield reserve" program where farmers receive financial incentives to reduce fertilizer applications below recommended rates.

Further discussion and analysis of these opportunities and recommendations will be explored during the coming year.

Establishment of a Steering Committee to Guide Study Focus/Direction

Representatives from DCR, the Virginia Soil and Water Conservation Board, NRCS, and the Virginia Association of Soil and Water Conservation Districts (VASWCD) have been selected by the chairman of the Virginia Soil and Water Conservation Board (Board) and the DCR Director to assist with the conduct of the study. Representatives from other agencies/organizations will be invited to participate according to the needs and issues that will likely surface. Two meetings of this group were held on November 1, 2004 and December 16, 2004. The steering committee will serve to advise the Department and the Board on the focus and direction of this phase of this study during 2005. The steering committee's assistance and expertise will be invaluable as proposed changes in SWCD practices, staffing and funding are explored and formulated.

Other Actions/Activities –Possible Assistance by Virginia Commonwealth University

Other avenues for assistance and collaboration are being explored to assist with the analysis of additional research and data associated with this final report. DCR staff met with representatives from the Virginia Commonwealth University's (VCU) Center for Environmental Studies in early December 2004 to determine whether assistance with research and data collection might be possible.

III. STUDY FOCUS IN 2005

Study Focus in 2005:

In keeping with the legislative directive to complete this report by December 31, 2005, the Virginia Soil and Water Conservation Board and DCR with the assistance from representatives of Soil and Water Conservation Districts and other key partner agencies and organizations will:

- Seek to analyze and assess agricultural BMP efficiencies and effectiveness to enhance programs implemented by SWCDs that improve water quality;

- Work to identify indicators of SWCD effectiveness related to implementation of agricultural BMPs;

- Identify and recommend improvements and enhancements as needed to the statewide system of SWCD program delivery of agricultural BMPs; and

- Identify and recommend improvements and enhancements relating to the expenditure of state general fund dollars for agricultural cost-share programs.

Appendix A

Budgetary language included in the 2004 Appropriation Act [Chapter 4 of the 2004 Virginia Acts of Assembly (Special Session 1)]:

> [Item 382 I] " In conjunction with other reporting requirements included in this item, the Soil and Water Conservation Board shall prepare annual statistics, by District, that include the number of farmers, the number of acres in farms and in agricultural production (by product type), the number of farmers participating in District programs by program, the number of acres by product under each type of agricultural best management practice, the budgeted and expended funds for each agricultural best management practice, and other information needed by the Department of Conservation and Recreation to evaluate the quantitative impact of Soil and Water Conservation District practices and funding on Virginia's water quality and land conservation goals. This information shall be provided to the Director of the Department of Conservation and Recreation in a timely manner for the Department to complete its annual reporting requirements under this item."
>
> [Item 382 D.2.] "…The Department shall review Soil and Water Conservation District (SWCD) operations and identify potential improvements in water quality and soil erosion programs. The review shall consider the relative needs of the various Districts, practices that offer the most cost-effective use of nonpoint source funding, and practices that are most appropriate given the characteristics of the various districts. The review shall incorporate the most recent findings on best management practice effectiveness. Based on the findings of the review, the Department shall propose changes in SWCD practices, staffing and funding, including the potential for performance-based funding, to improve the Commonwealth's nonpoint source programs. The Department shall coordinate this review with the requirements of House Joint Resolution 72 of the 2004 Session and any planned reviews of its nutrient management regulations. Copies of an interim report shall be provided to the Chairmen of the House Committees on Appropriations, and Agriculture, Chesapeake and Natural Resources, and the Senate Committees on Finance, and Agriculture, Conservation and Natural Resources by December 31, 2004. The final report including the recommendations for SWCD practices and funding shall be provided by December 31, 2005."

Appendix B

DCR/SWCD Grant Agreement No. «AgreementN»

Soil & Water Conservation District (district)
FY 2004 – 2005 Scope of Services

Administer and provide technical assistance with nonpoint source (NPS) pollution reduction efforts including support and/or implementation of the following:

The Virginia Agricultural BMP Cost-Share program

"… locally deliver the Commonweath's Agricultural BMP Cost-Share Assistance Program under the direction of the Department of Conservation and Recreation as a means of promoting voluntary adoption of conservation management practices by farmers and land managers in support of the Department's nonpoint source pollution management program." (§10.1-546.1 Code of Virginia):

- Perform technical and administrative services for the Agricultural BMP Cost-Share and tax incentives programs. Of the annual Agricultural BMP Cost-Share funding made available to the district by DCR, up to 15% may be expended by the district to recoup technical and administrative expenses incurred by program implementation.

- After allowing for technical and administrative needs, issue no less than 90% of the remaining available funds for Agricultural BMPs to participating farmers during the program year.

- Fund BMPs in the highest priority agricultural and TMDL watersheds (as ranked by DCR). Exceptions will be allowable when justified by the district's approved secondary considerations.

- Approve BMPs that achieve the greatest reductions of nutrients and sediment to state waters through use of the most appropriate, cost effective practices.

- For SWCDs within the Chesapeake Bay basin, give priority to BMPs contained within Tributary Strategy input decks.

- Actively identify farm operations that are generating the greatest NPS pollution problems and focus recruitment on those owners and/or operators for participation in agricultural BMP incentive programs. From those farmers whose farms are contributing the greatest NPS loads, establish a district goal for recruiting new program participants (farmers that have not received program funds within the past 5 years – since July, 2000) with a guide of bringing at least 3 new farmers for every 10 program participants (30%).

Ensure staff implementing the Virginia Agricultural BMP Cost-Share Program, and other agricultural related programs, seek and maintain needed conservation planning certification and job approval authority for appropriate BMPs within the service area of the district. (Note: This is an existing expectation within the Operational Support grant agreement and it is applicable to this agreement)