
COMMONWEALTH of VIRGINIA

Standard Operating Procedures for Managing and Reporting Agricultural Non-Point Source Data to Virginia DEQ

Standard Operating Procedures for Soil and Manure Testing for Nutrient Management Plan Development

QUALITY ASSURANCE PROJECT PLAN

January, 2015

Department of Conservation and Recreation
Division of Soil and Water Conservation
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Department of Conservation and Recreation
Quality Assurance Project Plan

Group A – Project Management
A1 – Title and Approval Sheet

Plan Coverage: This *Quality Assurance Project Plan: Standard Operating Procedures for Managing and Reporting Non-Point Source BMP Data to the U.S. EPA – Chesapeake Bay Program Office* in combination with the *Quality Management Plan: Virginia Nonpoint Source Pollution Management Program* (Virginia DEQ, 2014) reflects the overall Quality Assurance Program framework and management systems necessary to assure that data generated by the Virginia Department of Conservation and Recreation’s Division of Soil and Water Conservation (DCR-DSWC) are of acceptable quality to meet the needs of the United States Environmental Protection Agency’s Chesapeake Bay Program Office (EPA-CBPO).

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A3 – Distribution List

This document is being provided to the following:

- Katherine Antos, EPA-CBPO, Project Officer
- Mary Ellen Ley, USGS / EPA-CBPO, Quality Assurance Coordinator
- Susan Hale, DCR-DSWC, Grant Manager
- James Davis-Martin, DEQ, Chesapeake Bay Program Coordinator
- William Keeling, DEQ-WD, NPS Modeling & Data Coordinator
- Larry Fender, DEQ-WD, Data Management Analyst
- Stephanie Martin, DCR-DSWC, Agricultural Cost Share Database Administrator
- Timothy Sexton, DCR-DSWC, Nutrient Management Program Manager
- Vicki Gardiakos, Geoinformatics Specialist

A4 – Project / Task Organization

Nonpoint source (NPS) pollution reduction tracking data is generated by a coordinated effort of DEQ and other agencies staff. The DCR database administrator is responsible for administration of the Agricultural Cost Share database to include computer code development and modification and quality assurance (QA) of the cost share data. The DCR regional conservation district coordinators (CDCs) provide quality assurance functions by reviewing the data generated by the soil and water conservation districts (districts or swcd's) they work with and by going on spot checks of installed BMPs.

The DCR Conservation Programs Data Specialist serves as the quality assurance officer and is in an independent unit from those generating the data. The Conservation Programs Data Specialist and staff in the grants section of the DCR-DSWC are responsible for maintaining the

official approved Quality Assurance Project Plan. Organization charts showing lines of authority and reporting responsibilities are provided in the Appendix #1.

A5 – Problem Definition and Background

The project objectives are to fulfill the reporting requirements of the EPA-CBPO for the Virginia Chesapeake Bay Implementation Grant, the Chesapeake Bay Regulatory and Accountability Program grant and the EPA Section 319(h) funding by supplying annual NPS BMP implementation data. This data is provided to EPA-CBPO for inclusion in the annual watershed model progress evaluations as stipulated in the grant documents. Professionally trained swcd conservation technicians work directly with landowners and operators to implement NPS BMPs designed and located to reduce and/or treat agricultural runoff. One hundred percent of BMPs implemented are certified as installed to specifications before Virginia Agricultural BMP Cost Share (VACS) payments are made. A robust spot check program involving both swcd and DCR staff is performed annually. Based on these inspections, Virginia is confident that BMPs reported to the NEIEN are correctly located, installed, functioning as designed and reported with a high degree of accuracy. The EPA-CBPO requested this document for their understanding of the various sources of NPS BMP data within and among jurisdictions as well as any analysis done by the jurisdictions prior to submission to EPA-CBPO.

The VACS Program's goal is to improve water quality in the state's streams, rivers, and the Chesapeake Bay. VACS offers cost-share assistance as an incentive to carry out construction or implementation of selected BMPs. The basis of VACS is to encourage the voluntary installation of agricultural BMPs to meet Virginia's NPS pollution reduction water quality objectives. Although resource based problems affecting water quality occur on all land uses, VACS promotes efforts for corrective action on agricultural lands only. VACS emphasizes the

implementation of agricultural BMPs in locations that provide the greatest nutrient and sediment reductions for the taxpayer's dollars spent. Cost-shared BMPs must maximize nutrient and sediment reductions and also protect the taxpayer's interest by implementing the most cost-effective BMPs possible in locations that achieve the greatest pollutant reductions on a field by field basis. VACS objectives include: reducing nutrients (nitrogen and phosphorus) and sediment loadings to the Chesapeake Bay, preventing additional pollution from entering state waters and meeting the criteria for Virginia's compliance with Section 319 of the Clean Water Act. VACS implementation should be based upon sound conservation planning and best professional judgment.

The agricultural BMPs reported through the NEIEN to the CBPO are generated by qualified professional conservation technicians from one of Virginia's forty seven swcds. These conservation technicians receive Natural Resources Conservation Service (NRCS) technical training in conservation and resource management as well as cost-share program administrative training from DCR. Secure logons and built-in quality assurance checks within the VACS tracking program ensure that accurate data is recorded for each BMP implemented and reported. Each BMP contract and instance within the contract is given a unique identifier tied to the swcd of its origin. The VACS data is accumulated by DCR's database administrator and transmitted to DEQ to be forwarded to CBPO.

A6 – Project / Task Description

The project includes NPS data collection and compilation. A full description of the quality assurance performed annually is included in the following sections. The environmental data produced from this project is used by the EPA-CBPO to project NPS reductions of nutrients and sediment via implementation of NPS BMPs within the Chesapeake Bay drainage of Virginia.

Internal NPS data. DCR obtains NPS tracking data from internal sources. The primary internal source of data is the VACS tracking program database. Other data provided internally is for nutrient management planning acreage.

Agricultural BMPs. Data in the VACS tracking program database originates from the 47 swcds and reflects the implementation of Agricultural and Conservation Reserve Enhancement Program (CREP) BMPs installed and funded through VACS, state tax credits, and CREP incentive programs. Specifications for all DCR approved BMPs are in the *Virginia Agricultural BMP Manual*. Each swcd has internet access to a secured server to access the VACS tracking program. The DCR central office staff maintains the database and updates data requirements associated each BMP reported for each program year. The VACS tracking program is used to track and report data associated with BMP implementation. The tracking program application and database are stored on remote servers accessed through the internet to allow for all information associated with BMP implementation to be entered and maintained in an enterprise database. The database web application provides printable contract forms that are used to obtain participant signatures. These paper files are archived by the swcd and retained for three years beyond the lifespan of the practice.

In order to adequately track program effectiveness and to make necessary management decisions, it is vital that all data requested on the DCR Incentives Programs Contract be imputed and updated in the VACS tracking program in a timely fashion. The tracking program and BMP database will be maintained on the Richmond server and will be available for generating reports through Logi Ad Hoc software accessible by the swcd and DCR staff.

DCR database management staff will officially collect data for all practices quarterly. All necessary data must be entered into the tracking program according to the identified cost-share program schedule for each quarter and at the close of the program year. SWCDs are to

submit an estimated funding need based on data entered into the VACS tracking program for the coming quarter to their CDC before quarterly disbursement letters can be generated.

The 2015 VACS Program schedule is as follows:

July 1, 2014	2015 VACS Program begins.
June/July 2014	CDCs inform swcds of program allocations.
July 2014	SWCDs may begin practice approval after Secondary Considerations have been approved.
July 31, 2014	Last date to submit suggestions & issues to the Agricultural BMP Technical Advisory Committee (TAC) for consideration for Program Year 2014.
August, 2014	Technical Advisory Committee sets Program of Work for the upcoming year
September 30, 2014	End of First Quarter. Quarterly reports due including requests for disbursements in 2 nd quarter due to CDCs by 10/15/2014.
December 31, 2014	End of Second Quarter. Quarterly reports due including requests for disbursements in 3 rd quarter due to CDCs by 1/15/2015.

March 31, 2015	End of Third Quarter. Quarterly reports due including request for disbursements in 4 th quarter due to CDCs by 4/15/2015.
March, 2015	Matrix of TAC suggested Changes for Program Year 2016 to Soil and Water Conservation Board for approval
May, 2015	Review and update of secondary considerations and submit to CDC by June 30, 2015.
June 30, 2015	End of Program Year. All applications entered into the VACS tracking program are to be identified as; (1) Complete <u>or</u> (2) Canceled, <u>or</u> (3) SL-6 Pending Lack of Funding <u>or</u> (4) Carry Over with an approved carry over date (only if practice is on the approved list and under construction). All completed projects must be paid by June 30, 2015. Final 2015 Cost-Share Program quarterly reports are due to CDCs by 7/15/2015.

NOTE: All BMP payment data for a quarter must be entered into the VACS tracking program by the 15th of the following month in order to qualify for a quarterly disbursement. VACS tracking program reports will be run by the DCR CDC on the 17th of the month.

This project also includes the quality assurance measures relevant to samples and laboratory procedures used during the development of nutrient management plans. (See pages 14 through 22.)

For NPS BMP implementation levels, the project is considered ongoing because reporting to the EPA-CBPO office is required annually. DEQ reports annual BMP implementation only once, the first year of the total lifespan of the practice. All non-annual BMPs are accumulated by EPA for annual progress runs. Only those Forestry and Residential Septic practices included in the VACS Program or the DEQ TMDL Grant Programs that are tracked in the VACS tracking program are reported to DEQ by DCR. These BMPs are included in the BMP Crosswalk for the NEIEN mapping report in Appendix 2.

It is noted that DEQ and CBPO have different names for the same practice. DCR and DEQ staff have attempted to crosswalk DCR practice codes to Scenario Builder names. This data is attached as Appendix 2.

A7 – Quality Objectives and Criteria

The EPA-CBPO is responsible for the planning and design aspects regarding the use of the NPS data provided by DEQ in the annual progress model runs. Details regarding the systematic planning process used to plan and design the study for this data requirement should be addressed to the EPA-CBPO. Details on the quality of data provided by DCR are included in the following sections.

All BMPs completed must be certified as complete and meeting appropriate VACS and NRCS standards prior to the issuance of any state cost share or tax credits. Each year a spot check process is accomplished where five percent (5%) of the BMPs completed in the last program year and 5% of BMPs still within their lifespan are visited and assessed to ensure they are being properly utilized and maintained. Any BMP found out of compliance with specifications is noted and the swcd follows the procedures in the *Virginia Agricultural BMP Manual* Spot Check Procedures Overview section (Pg. I-75) and Practice Failure section (Pg. I-

24) if appropriate. Participants that do not maintain practices or do not bring the practice up to specification and standards are expected to return on a pro-rata share basis any cost share and tax credits authorized by the swcd. Analyses of spot check summary reports from CDCs consistently show that over ninety percent (91%) of the BMPs spot checked are found to be in compliance, including some practices that may be in the tenth year of a ten year lifespan.

A8 – Special Training Certifications

Details regarding specialized training and certifications for DCR NPS programs are provided in Section IV, Personnel Qualifications and Training of the *Quality Management Plan: Virginia Nonpoint Source Pollution Management Program* (Virginia DEQ, 2013). Each new program year, training sessions are held to discuss any revisions to the VACS program. Any revisions to the agricultural BMP technical specifications and program policies are reflected in the VACS program revisions each program year. Training sessions and workshops are provided on the VACS program application with special emphasis on any revisions or improvements to the application. These trainings help maintain data quality by ensuring that the swcd personnel entering data into the application are properly trained on how to use the application and that the input of data is uniform and correct. The trainings emphasize the importance of quality data and data reporting. The CDCs and Richmond Central Office staff also offer VACS Helpdesk support to address specific questions and data concerns. This helps maintain data quality by ensuring that the agricultural BMP technical specifications and program policies are interpreted properly. Furthermore, guidelines, policies and training aides are available for reference on the DCR website. A specific presentation entitled “*ROLES & RESPONSIBILITIES FOR DELIVERY OF VIRGINIA AGRICULTURAL BEST MANAGEMENT PRACTICES COST SHARE PROGRAM (VACS) For District Directors & District Staff*” is at

http://www.dcr.virginia.gov/soil_and_water/bmptraining.shtml. SWCD conservation specialist personnel typically have agricultural experience or educational backgrounds and over time gain job approval authority through the United States Department of Agriculture's (USDA) NRCS training program. Agricultural BMPs implemented require the signature of the swcd conservation specialist who is required to have job approval authority on that agricultural BMP type, certifying that the BMP was implemented according to the applicable technical specifications.

A9 – Documentation of Records

SWCDs will retain all billings and supporting data in their files according to the following unless notified by DCR.

- SWCDs must complete their data input to the VACS tracking program according to the program schedule published in the front of the manual.
- Conservation plans and practice design sheets should be kept with individual case files according to swcd policy.
- Minimum document retention for VACS application forms will be three (3) years. Canceled applications may be discarded after the (3) year period if not needed for future reference by the swcd.
- If the practice is installed, documentation should be retained for three (3) years beyond the lifespan of the practice.

Each swcd's VACS data is entered and maintained in a centralized enterprise database accessible via a secured web-based interface. DCR and other agency data are appended to the data tables needed to supply data to the NEIEN schemas and are transmitted via established NEIEN protocols for inclusion in the annual progress run input deck by DEQ.

Group B – Data Generation and Acquisition

Sections B1 through B8 of this QAPP pertain to samples collected for developing Virginia nutrient management plans. Nutrient management plans are prepared to indicate how primary nutrients are to be managed on farm fields and other lands for crop production and in ways, which protect groundwater and surface water from excessive nutrient enrichment.

Laboratories approved by DCR perform soil test and manure sample analysis, and pre-sidedress soil nitrate tests are conducted as a field procedure. Soil test analysis includes information on soil fertility levels for phosphorus and potassium, and pH levels. Manure test analysis includes percentage of moisture, total nitrogen or total Kjeldahl nitrogen, *ammonium nitrogen*, total phosphorus, and total potassium. The pre-sidedress nitrate test is a procedure used to determine soil nitrate-nitrogen levels at a specific time during a corn crop and a few horticultural crops growing season. Sections B1 through B8 below are completed as relevant for each of these three types of samples.

B1 – Sampling Process Design (Experimental Design)

Soil test samples. The design strategy for nutrient management soil test samples is found in Virginia's *Nutrient Management Training and Certification Regulations, 4 VAC 50-85, § 10.1 – 104.2* of the Code of Virginia (Effective: March 13, 2014). Soil analysis is required for each field at least once every three years to determine the soil fertility and pH, and to update the nutrient management plan. The excerpt below is from the "Required nutrient management plan procedures" section of the regulations:

“... Soil analysis results shall be dated no more than three years prior to the beginning date of the nutrient management plan. A single composite soil sample should represent an area up to approximately 20 acres. Fields such as those common to strip cropping may be combined when soils, previous cropping history, and soil fertility are similar...”.

Manure samples. Manure samples are collected from specific operations in order to accurately assess the nutrient concentrations for the purpose of calculating manure application rates to supply crop nutrient needs. Manure samples are collected for laboratory analysis in order to determine the exact nutrient content. Manure analysis is recommended before field application until a baseline nutrient content is established for the specific manure type on the corresponding farm operation. After a baseline nutrient content is established, a manure analysis is recommended at least once every three years for dry or semisolid manures, and at least once every year for liquid manures. The analysis determines the appropriate rate of animal manures to apply based on the nutrient needs of various crops, soil types, and other production factors.

Soil nitrate test. The pre-sidedress soil nitrate tests involve field sampling and field analysis of soil nitrate levels found in the top 12 inches of soil. The sample is taken when corn is approximately 10 to 15 inches in height. The amount of nitrate-nitrogen in the soil sample is a representative index of the plant-available nitrogen that will mineralize from soil organic matter. Recommendations for sidedress nitrogen fertilizer rates applied to corn at the ~ 12 to 24 inch growth state can be modified depending on the level of nitrate-nitrogen found in the soil. Certified nutrient management specialists use these tests to modify top dressing or side dressing application rates of nitrogen in accordance with the *Virginia Nutrient Management Standards and Criteria (June 2014)*.

The soil nitrate test is a field procedure and is not normally performed by a laboratory. Past research data used to calibrate the soil nitrate tests, for both lab tests and various field test kits, was not conclusive for readings below 21 ppm of nitrate-nitrogen in soils. Above this level, the data statistically justified that no crop responses to additional nitrogen was expected. This may limit the use of the procedure in certain instances (i.e. for readings before 21 ppm) the test is used primarily to identify fields, which need no additional nitrogen, and is a reliable predictor in this setting. Recommendations for nitrogen sidedress application rates for fields with 20 or less ppm is based the soil nitrate test results and guidance provided on page 64 of the *Virginia Nutrient Management Standards and Criteria (June 2014)*. Use of the test results when soils are found to be at 21 ppm or greater does result in significant nitrogen use reductions by farmers, so targeted use of the kits is essential to Chesapeake Bay and statewide nutrient reduction efforts.

B2 – Sampling Methods

Soil test samples. The sampling method including data collection procedures to be followed for soil testing samples is found in Virginia’s *Nutrient Management Training and Certification Regulations, 4 VAC 50-85, § 10.1 – 104.2* of the Code of Virginia (Effective: March 13, 2014). The excerpt below is from the “Required nutrient management plan procedures” section of the regulations:

“Representative soil sample cores shall be obtained from the soil surface to a depth of four inches (0-4”) for fields that have not been tilled within the past three years, and from the soil surface to a depth of six inches (0-6”) for fields, which are tilled or have been tilled within the past three years. Soil sampling of fields based on the subfield grids or management zones may be utilized....”

Manure samples. It is important that representative samples are obtained. Accepted manure-sampling techniques are outlined in Chapter 9, “Manure as a Nutrient Source”, in the Mid-Atlantic Regional Water Program’s February 2006 publication, *The Mid-Atlantic Nutrient Management Handbook* (MAWP 06-02). Detailed sampling and handling procedures for semi-solid lot manure, liquid manure slurry, lagoon liquid, and boiler or turkey litter are provided on pages 212-213 of this publication. DCR provides sampling bags and bottles for collection of manure samples. Samples are collected in zip-lock bags for solid samples and plastic bottles for liquid samples. Each sample is less than 1 pint.

Soil nitrate test. The pre-sidedress soil nitrate test is used on select fields where organic sources of nitrogen rates have been applied in accordance with the appropriate timing criteria to supply nitrogen to the present corn or small grain crop along with certain horticultural crops. Samples are taken when corn height is 10 to 15 inches tall at the whorl as it stands, not to the tallest part of the plant or just before horticultural crops flower for begin to send out runners. The sample collection procedure involves taking 10 to 20 cores from across the field to a depth of 12 inches. Samples are taken between rows to avoid starter fertilizer bands and areas where roots have depleted nitrogen. The samples are combined, mixed, and crumbled and then a test kit is used to determine the soil nitrate-nitrogen concentration.

B3 – Sample Handling and Custody

Soil test samples. Currently DCR approved soil test laboratories that are correlated to the Virginia Tech soil test lab using the Mehlich III procedure for phosphorus analysis include A & L Eastern Agricultural Laboratories, Brookside Laboratories, and Spectrum Analytical

Laboratories, Agri Analysis Testing Laboratories, Agro Lab, Inc., Logan Labs, LLC. And Midwest Laboratories. Waters Agricultural Laboratories uses the Mehlich I procedure and therefore the phosphorus soil test results can be interpreted the same as Virginia Tech phosphorus soil test results. Additional details on required soil test procedures that related to handling are in the sections that follow.

Manure samples. Manure storage and handling facilities and equipment results in moderate variability in both manure consistency and actual rate of material applied. Accepted manure sampling, handling and storage techniques are outlined on pages 212-213 in *The Mid-Atlantic Nutrient Management Handbook* (February 2006). Currently the DCR approved laboratory for analysis of manure samples is the Clemson University Agricultural Service Laboratory (Lab). The Lab must maintain a maximum sample turn around time of 12 working days measured from the date a sample is received by the laboratory until the complete analysis is mailed out. If unforeseen circumstances are expected to delay sample analysis beyond the 12-day time, the project manager of DCR must be notified.

All samples submitted to the Lab by certified nutrient management planners must include a sample submission form. The Lab must log each sample with a unique lab number, adding this information to the sample submission form. One sub sample of each sample must be stored in a refrigerator at 5 degrees C and a second sub sample must be weighed, dried at 80 degrees C overnight, then weighed and ground through a Tecator Mill to pass through a 0.5 mm screen. The moisture will be determined from the weighings. The laboratory staff involved in the sample analysis and their roles includes: laboratory technician logs and grinds the samples, a lab chemist prepares and analyzes samples and lab director reviews and sends analysis reports.

The sample results are mailed to the individual listed on the form if a mailing address is included. If an email address is listed on the form, an email notification will be sent so that the results can be viewed on the web. DCR has access to all results. The Lab must notify DCR by email to seek pre-approval if any single farm appears to have submitted more than two samples that arrive at the Lab in the same year unless the samples were submitted by DCR staff.

B4 – Analytical Methods

Soil test samples. The analytical method to be followed for soil test samples is found in Virginia's *Nutrient Management Training and Certification Regulations, 4 VAC 50-85 § 10.1 – 104.2* of the Code of Virginia (Effective: March 13, 2014). Soil test analysis includes information on soil fertility levels for phosphorus and potassium, and pH levels. The excerpt below regarding the required analytical method is from the "Required nutrient management plan procedures" section of the regulations:

"... Representative soil analysis results for fields shall be determined by using standard soil sampling and analysis methods according to *Methods of Soil Analysis, Part 3, Chemical Methods, 1996* utilizing the Mehlich I extraction procedure for phosphorus or other methods and laboratories approved by the department and correlated to Mehlich I and utilizing correlation procedures contained in Virginia Nutrient Management Standards and Criteria, revised June 2014."

Manure samples. Manure test analysis includes percentage of moisture, total nitrogen or total Kjeldahl, ammonium nitrogen, total phosphorus, total potassium, calcium, magnesium, sulfur, zinc, manganese, copper, aluminum and sodium. Manure test results must be reported on

an as sampled basis in pounds per ton for dry manure and pounds per 1,000 gallons for liquid manure. Manure analysis must be performed using laboratory methods consistent with *Recommended Methods of Manure Analysis*, 2003 publication # A3769 of the University of Wisconsin. Guidelines from this publication and additional analytical methods and reporting requirements are described below.

- a. Results will be reported on an “as-is” basis and also calculated to lbs/ton for solid samples of lbs/1000 gallons for liquid samples.
- b. Laboratory Procedure 3.2 Total Kjeldahl Nitrogen will determine TKN for liquid manure.
- c. Laboratory Procedure 3.3 Total Nitrogen by Combustion will determine nitrogen for solid and semi-solid manure (greater than 15% solids).
- d. Laboratory Procedure 4.1 Ammonium-N Determination by Distillation will determine ammonium nitrogen, except that KCl will be used as a reagent instead of MgO.
- e. Laboratory Procedure 5.4 Nitric and Hydrochloric Acid Digestion with Peroxide will determine Phosphorus, Potassium, Calcium, Magnesium, Zinc, Copper, Manganese, Sulfur, and Sodium, and then analyzed on inductively coupled plasma (ICP).

Laboratories are required to provide a suitable report approved by DCR that utilizes the mineralization rates and ammonium nitrogen availability coefficients, which have been agreed to by DCR as currently listed in the Virginia Nutrient Management Standards and Criteria (June 2014). The laboratory will print expected nitrogen availability based on immediate incorporation and no incorporation along with the manure analysis results on the approved report. The initials of the appropriate lab analyst must be printed on the approved report for the nitrogen,

phosphorus, potassium, calcium and magnesium results as well as a brief reference to method of analysis for those parameters.

Soil nitrate tests. Merckoquant 10020 Nitrachek meters are utilized to read color metric test strips which are exposed to soil solutions extracted with 0.025 molar aluminum sulfate-solution. The test meters are standardized daily using a 10 ppm nitrate-nitrogen standard solution. The extracted soil solution is analyzed at least two times to ensure consistent results.

B5 – Quality Control

Manure samples. DCR requires that the laboratory used for manure samples hold a Manure Testing Laboratory Certification by the Minnesota Department of Agriculture. The laboratory is also requested to participate in sample exchange programs including: North American Proficiency Testing Program, Manure Analysis Program, National Forage Testing Association, and Association of American Feed Control Officials, Inc. All analysis reports of results must include the initials of the lab analyst that performed the analysis for percent moisture, total nitrogen, ammonium nitrogen, total phosphorus, calcium, and magnesium. The laboratories are required to provide DCR with monthly and annual reports including a summary of the total manure samples analyzed, and average test values for all parameters analyzed each quarter for each category of manure type.

B6 – Instrument / Equipment Testing, Inspection, and Maintenance

The individual laboratories performing soil test and manure analysis are responsible for meeting appropriate operating standards for equipment testing, inspection, and maintenance.

Soil nitrate tests. Merckoquant Nitrate Test, test strips are used for the detection and semi-quantitative determination of nitrate ions. Unopened Merckoquant Nitrate Test packs are stored in a refrigerator. After opening, the kits are stored in a dry and cool area, but not in a refrigerator to avoid too much atmospheric moisture condensation in the tube. Test strips are dipped into the solution for 1 second to allow the reaction zones to be fully wetted. The test strip is removed and excess liquid shaken off. After 1 minute has passed the test strip is compared to the reaction zones on the color scale provided on the test kit tube / container. All field nitrate test kits are carefully maintained in order to obtain reliable results. The test meters are checked daily during the use season, using a 10-ppm nitrate-nitrogen standard solution, and standardizing the results with the fixed color strip to ensure proper functioning of the meter.

B7 – Instrument / Equipment Calibration and Frequency

Manure samples. The LECO combustion units used by the DCR approved laboratory must be calibrated with certified EDTA and checked with NIST peach or orchard leaf reference materials. The inductively coupled plasma (ICP) is standardized with standards made in house from stock solutions purchased from High Purity. The ICP standardization is checked with the NIST peach reference material. The reference materials for the LECO combustion unit and standard for the ICP are to be rechecked by the laboratories after every 15 samples.

B8 – Inspection / Acceptance of Supplies and Consumables

This section does not apply to this QAPP.

B9 – Non-direct Measurements

Internal NPS data. DCR obtains NPS tracking data from internal sources. The primary internal source of data is the VACS Tracking Program. Other data provided internally is for nutrient management planning acreage.

Agricultural BMPs. Data in the VACS database originates from the 47 swcds and reflects the implementation of Agricultural and CREP BMPs installed and funded through VACS, state tax credits, and CREP incentive programs. Specifications for all DCR approved BMPs are in the *Virginia Agricultural BMP Manual*. Each swcd has internet access to a secured server to access the VACS tracking program. The DCR central office staff maintains and updates the program data reporting for each program year. The VACS tracking program is used to track and report data associated with BMP implementation. The VACS tracking program application and database are stored on remote servers accessed through the internet to allow for all information associated with BMP implementation to be entered and maintained in an enterprise database. The database web application provides printable contract forms to obtain participant signatures. These paper files are archived by the swcd and retained for three years beyond the lifespan of the practice.

Nutrient management. Agricultural nutrient management plan implementation and urban nutrient management acres are supplied by the DCR nutrient management staff, which includes plans developed by certified private nutrient management planners as well as DCR's certified nutrient management specialists. As required in Virginia's *Nutrient Management Training and Certification Regulations* all certified nutrient management planners must submit an annual activity report including number of nutrient management plans completed; acreage covered by plans and planned acreage by county and state watershed codes; breakdown of planned acreage

by cropland, hay, pasture, specialty crops, and turf/landscape by county and watershed code; and other information indicating number of practices facilitated by the planner such as manure testing and use of the pre-sidedress nitrate test.

B10.1 – Data Management: Agricultural BMP Cost Share Data

Automated quality assurance. Beginning July 1, 2009 at the start of the 2010 state fiscal year, the VACS tracking program was redesigned and implemented as a web-based application using MS SQL Server. Highly relational database schema and application logic, coded in ASP.NET, allows very strict control of data entry to ensure data quality. At the start of each program year, the database is setup to restrict entries to allowable practices for allowable funding sources in specific geographic areas. BMP installations cannot be marked as completed and paid without a minimum set of fields entered. A mapping component, utilizing ArcGIS Server, incorporates recent high resolution aerial imagery that helps ensure the quality of spatial attributes as well.

Regional review. Data in the VACS database originates from the 47 swcds. Data entries from swcds are initially screened by a DCR regional office CDC for a local knowledge review. After the end of each quarter, swcd records are reviewed by the assigned CDC for completeness and accuracy of financial reporting. Any irregularities are brought to the attention of the appropriate swcd staff for corrections.

B10.2 – Data Management: Nutrient Management Data

Nutrient management implementation and urban nutrient management acres are not derived from the agricultural cost share database. This data is supplied separately by DCR

nutrient management staff and is reported to the data management staff using MS Excel spreadsheets, and MS Access database files. The data is at the 12-digit hydrologic unit spatial scale for agricultural nutrient management and at the county or jurisdiction scale for urban nutrient management. The nutrient management data is provided to DEQ and mapped to the established NEIEN XML schemas and reported via established NEIEN protocols to CBPO.

DCR currently builds, compiles and tracks state written NMPs in the NutMan software versions three and four. NutMan v4 employs a client-server architecture whereas NutMan v3 was a stand-alone PC application. In brief, the version 3 program has been modified to connect to two servers in version 4, one that functions as a central storage repository and reporting hub, and the other that provides map services. By linking the planning on the PC with central functions for reporting and mapping on the server side, the NutMan 4 system helps to eliminate the chance of duplicate reporting in several ways. First, all plans are stored in the same central database whereas in the past, plans were stored as individual files. Comparison is now possible immediately and across several reporting categories (county, watershed code, client) as soon as the plan is saved. Also, as users access the map server to digitize their plan maps, they see other active planned acreage so have live visual feedback to avoid any possible overlap or duplication.

NutMan's client system is written in Microsoft Visual Basic. The Web server is a Linux/Apache2/PostgreSQL/PHP system, and the Map Server runs Windows Server 2008 R2 and ArcGIS 10.2. The web system and all transactions are encrypted.

B10.3 – Data Management: External Data

This section does not apply to this QAPP.

B10.4 – Data Management: Reporting to EPA-CBPO

This section does not apply to this QAPP.

Group C – Assessment and Oversight

C1 – Assessments and Response Actions

BMP spot checks. A primary form of QA of the BMP data occurs during the spot check process, where records are randomly pulled from the database and the practices described are visited to assure that the BMPs that were recorded have actually been installed and are in compliance with the BMP's specifications.

Number of BMPs. It is important to note that the VACS tracking program can track voluntary BMP installations if the swcd personnel are willing to verify the BMP meets specifications and report on the installations. However, at this time there are only 202 of over 71,000 records of voluntary BMP installations. This figure does not adequately reflect the actual level of voluntary agricultural BMP installations. Therefore, the BMPs reported to any EPA program based on the VACS tracking program are conservative overall estimates of agricultural BMP implementation in the Commonwealth of Virginia.

A Virginia Polytechnic Institute & State University report, *Factors Influencing Implementation of Best Management Practices in Virginia's Chesapeake Bay Drainage Basin*, confirmed that 81% of farmers in the Chesapeake Bay watershed implemented BMPs, 31% implemented BMPs using cost share funds, and 75% implemented BMPs without cost share

assistance. The overlapping 6% is associated with farmers reporting both cost share and voluntary implementation of BMPs. This report also showed that on an average, each farmer adopted four non-cost share BMPs for every cost share BMP implemented in the basin (Mostaghimi, Lowery, Gupta, McClellan, 1996). A follow-up report, *An Assessment of the Quality of Agricultural Best Management Practices Implemented in the James River Basin of Virginia*, shows that there is no statistically significant difference between the quality of cost share and non-cost share practices. This report concludes “non-cost share practices should be treated equally when accounting for NPS pollution reductions due to BMPs in watershed management and computer modeling” (Cunningham, 2003).

Assessment responsibility. In early spring of each year, after the 4th quarter (program year) data is processed for the previous program year (July 1 through June 30), the Agricultural BMP implementation records of the practices funded through the VACS program and CREP are randomly selected for spot check during the following summer and fall. The swcd and CDC typically schedule the spot check visits during the parts of the year when the producers are not so busy. Mostly structural agricultural BMPs are eligible for spot checks. CREP installations are also spot checked by USDA-NRCS staff under guidelines developed and followed by USDA NRCS and FSA personnel.

Frequency and type of assessment. At least five percent of the practices installed during the previous program year are spot checked, as well as another five percent of all practices within their lifespan. Eligible BMPs are randomly selected for spot check. A spot check data table is generated and a spot check form printed for each practice selected. The swcd conservation specialist and the DCR CDC cannot remove BMPs from the spot check table. However, based on local knowledge they can, and frequently do, add additional BMPs or sites to

the spot check table. The CDC and the swcd conservation specialist (sometimes accompanied by District directors or Richmond Central office staff) notify the producers of the spot check visits and then go to the respective agricultural BMP implementation sites and inspect the installation. The staff then fills out the spot check form for that BMP and sends a copy to the DCR Richmond Central office in the late fall.

Spot check status and actions. The spot check BMP statuses are: *OK*, *Not Maintained Properly*, *Not Functioning Properly* and *Needing Re-inspection After Maintenance*, and *BMP Requiring Follow Up* (more than maintenance request, for instance a request for reimbursement of cost-share funds). A status of *OK* indicates the BMP was in technical compliance with the specific standard(s) for that BMP at the time of the spot check. A status of *Not Maintained Properly* indicates that the BMP at the time of the spot check had one or more technical defects needing to be addressed by the producer for the BMP to be fully in compliance with the specific BMP standard(s). The majority of BMPs in this status need gravel added to heavy use areas associated with watering troughs or stream crossings. The water quality benefit is not compromised yet the practice is not being maintained as specified. For these status BMPs the swcd staff issue a letter to the producer detailing the specific action(s) needed to bring the BMP installation into full compliance. If the participant is unwilling to bring the practice into compliance a request is made to refund a pro rata share of the VACS funds received by the producer for that specific BMP installation. This provides a financial incentive for the producer to correct any defects found during the spot check process. When the participant completes the maintenance required to bring the practice into compliance, the site is revisited to confirm compliance. Participants that refuse to bring the practice into compliance or return cost share funds are referred to the Office of the Attorney General for legal action to recover the cost share

funds. When BMPs are cancelled or destroyed regardless of the recovery of VACS funds the BMP is removed from the data base.

A status of *Not Functioning Properly* indicates that the BMP was not working as designed at the time of the spot check. There are many reasons that this status might be assigned such as a spring that was developed to supply water for an off-stream watering system and due to drought the spring has stopped flowing. These practices also receive follow up site visits to verify compliance when the reason for the *Not Functioning Properly* designation has been resolved. A status of *Practice Destroyed* are typically instances where the property has been sold and the new owner has removed the practice not knowing the linkage of the BMP to the property and the agricultural cost share program. The swcd follows a written procedure for requesting the return of a pro rated share of the cost share funds. This calculation is based upon the number of months that the practice was functioning before receiving a Not Function Properly status when the program participant is unwilling to return the calculated pro rated cost-share amount. Participants may have a maximum grace period of 6 months to restore the BMP to its intended function of repay the pro-rated cost share amount. After sixty additional days the delinquency is turned over the Office of the Attorney General for assistance in reclaiming the state funds.

C2 – Reports to Management

Compiling results. A spot check report is entered into the VACS tracking program by swcd staff for each BMP installation visited. This information can be used to filter data extraction. Of the 70 BMPs tracked in the VACS tracking program database 55 or 79% are considered spot check eligible. Of the 70 BMPs tracked in the VACS tracking program database

30 or 43% are recognized and modeled by EPA-CBPO. Of these 30 EPA-CBPO recognized BMPs 23 or 77% are spot check eligible.

Group D – Data Validation and Usability

D1 – Data Review, Verification, and Validation

Acceptance criteria. Criteria for accepting or rejecting agricultural BMP cost share practices for the resulting data can be found under the individual practices in the most recent version of the *Virginia Agricultural BMP Manual*. SWCDs are responsible for the verification of all installations paid for through the VACS program. For example even though cover crops are not considered a spot check eligible BMP before a participant can receive funds for this practice the swcd conservation specialist verifies planting dates at or near the time of planting and verifies crop plant density at time of crop kill dates. These verification inspections insure that the farmer is planting the crop in a timely manner and that the crop was of sufficient density to provide the desired water quality benefit. This is a recent modification in the tracking of this BMP and will allow DCR to report to EPA-CBPO acreage of cover crops as early or normally planted. Additional details regarding the verification and validation criteria for individual BMPs can be found under the previous section C1 – Assessments and Response Actions.

BMP verification and validation. Agricultural BMPs implemented require the signature of the producer and the swcd conservation specialist (who is required to have job approval authority on that agricultural BMP type), certifying that the BMPs were implemented according to the applicable technical specifications. The signature form is a legal document that, for structural BMPs, typically requires maintenance and proper usage of the implemented BMPs

during the design life spans. These are also typically the types of agricultural BMPs that are later eligible for spot checks during the design life span time window.

Tracking program QA. The specific types of QA conducted on the VACS tracking program and resulting cost share BMP data include:

- BMP location coordinate pair and other spatially determined fields are populated using a web-based mapping application. SWCD personnel locate BMP installation using a variety of base maps including; USGS 7.5 minute quads, recent high resolution aerial imagery and high resolution road centerlines.
- Many fields of data are populated from drop down lists so that those items are uniformly entered (for example, County names, Agricultural BMP codes, Funding Source Types [Program Types], Practice status, Animal Type [on applicable Agricultural BMPs], etc.).
- Each swcd personnel login is associated with a particular swcd and data entry is limited to funding sources, practices and other variables approved for each swcd.
- The cost share payment amount approved by the swcd board cannot be greater than the estimated cost share payment.
- The cost share payment amount cannot be greater than the approved cost share payment amount (which in turn, can not be greater than the estimated cost share payment).

D2 – Verification and Validation Methods

General content regarding data verification and validation is provided in section C1, Assessments and Response Actions. Information pertaining to the validation of data based on the tracking program is provided above in section D1, Data Review, Verification, and Validation.

These sections identify who is responsible for verifying and validating the different components of the cost-share data.

All swcd employees sign 1619 Agreements at the local level with their NRCS District Conservationist. This signed agreement is required before the employee can be set up in the DCR VACS tracking program with a username and password. All DCR staff that have access to the VACS and data reporting have a signed 1619 Agreement with the NRCS State Office.

Report of Spot Check Results. At any time, DCR can generate a report of the spot check results for a specific time period.

D3 – Reconciliation with User Requirements

There are various factors related to possible uncertainty during the collection of historic NPS BMP implementation data from the 47 swcds and historically the majority of data quality issues have been data input errors with these errors primarily being the entering of invalid data in the VACS tracking program. The redesigned VACS tracking program, implemented July 2009, has a great number of features to ensure the quality of data entered and avoid common types of data entry errors that the previous tracking application could not address.

Another source of potential uncertainty in the historic data is in the field collection of the data. An example of this type of uncertainty is variable interpretations on where to collect representative location coordinates. This arises in part due to the type of BMP(s) being installed on various farms. Cover crops may have coordinates taken at a representative point near or in the field(s) where the crops are planted such as the middle of the farm or middle of the individual fields. Stream exclusion fencing may have these coordinates collated at a central point along a linear feature (the fence) near the stream or could be collected in the upland pasture if rotational

grazing of the upland acres benefiting from the exclusion/rotational grazing system BMP is installed. These types of collection uncertainty are significant if very fine scale modeling is of concern since they could induce error of plus or minus tens to hundreds of meters between the BMPs actual location coordinates and that of those reported. These types of inaccuracies cannot be programmed away with any soft ware type fixes.

It is possible that a conservation specialist with a swcd picks a point of convenience for collecting the data (the center of the farm, near the front gate, at the farmhouse) that is not actually reflective of the individual BMP installation point. For a practice such as stream exclusion without rotational grazing a swcd conservation specialist according to the BMP manual is required to report linear feet of streambank excluded not the linear feet of fencing installed. However, it is possible that the fence is what is measured and reported. These types of collection uncertainty are significant if medium scale modeling is of concern since they could induce errors of plus or minus hundreds to thousands of meters between the BMPs actual location coordinates and that of those reported.

For all data collected for program years 2009 and forward utilizing the location selection associated with the mapping function of the new tracking program will significantly reduce locational inaccuracies. For the EPA-CBPO phase 5.x watershed model the level of uncertainty described above should be acceptable since the confidence that the data exists within a given watershed model segment is very high due to the very large scale of the models segmentation and the very high probability that the reported coordinates are valid for the topographic quadrangle reported and that those quadrangles are in a given hydrologic unit or county contained within a model segment. Additionally, DCR provides training on correct data collection and input in order to minimize this type of uncertainty. The previous sections provide

details on the multiple quality assurance measures that DCR undergoes to develop, track, and report quality BMP implementation data to the citizens of Virginia, Executive and Legislative branches of state government, and to the EPA.

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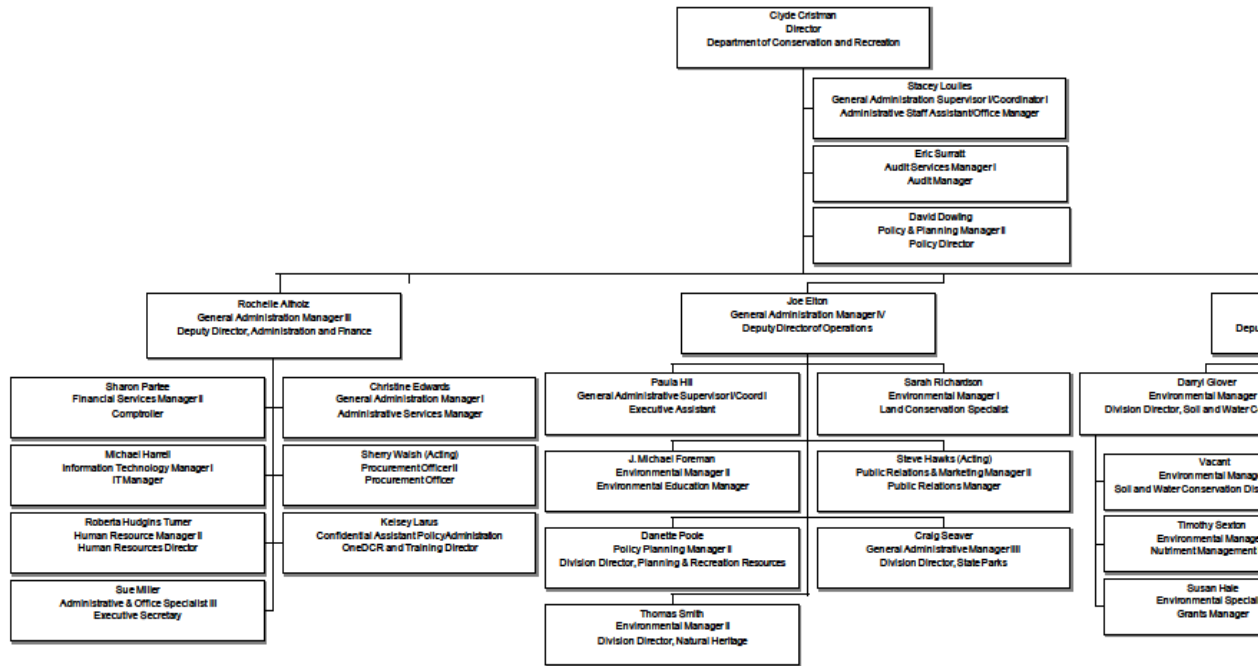
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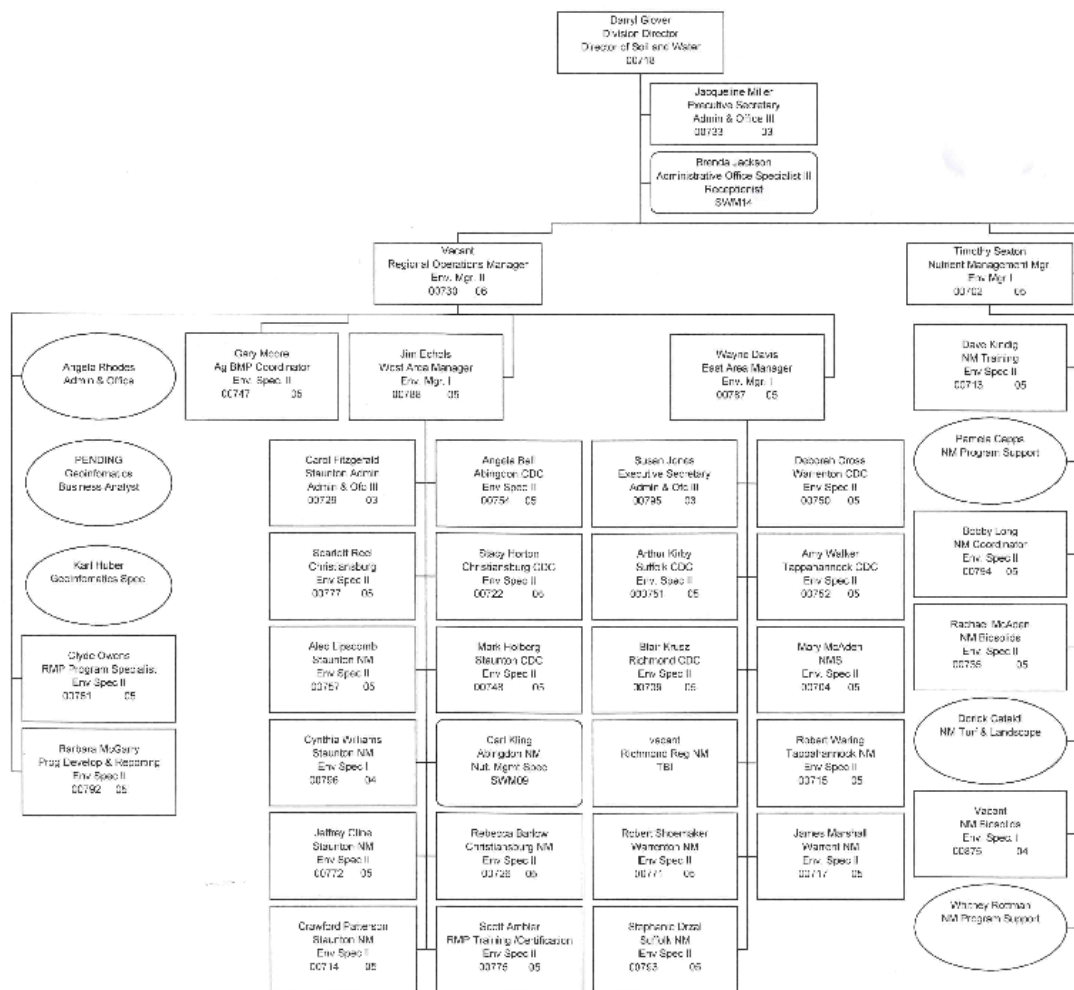
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Appendix 1 – DCR Organizational Charts

VA Department of Conservation and Recreation Agency Chart December 2014



VA Department of Conservation and Recreation
 Division of Soil and Water
 January 2013



Legend:
 18 Hrs. or Fulltime (Last #)
 Rectangle - Classified
 Rectangle rounded - Wage
 Circle - Contract

Last Modified: 1/22/13

Appendix 2 DCR NEIEN Crosswalk

Source Agency	Practice Code	Sector	NEIEN BMP_NAME	Measure_Name	Target_Unit	SB_Name	Note
VADCR	CCI-CNT	AGRICULTURE	High Residue Tillage Management	Acres	ACRE	HRTill	CCI BMPs need to be tied to a previously reported installation so that record does not get removed at the end of lifespan not reported as new
VADCR	CCI-FRB-1	AGRICULTURE	Riparian Forest Buffer	Acres	ACRE	ForestBuffers	CCI BMPs need to be tied to a previously reported installation so that record does not get removed at the end of lifespan not reported as new
VADCR	CCI-HRB-1	AGRICULTURE	Grass Buffers	Acres	ACRE	GrassBuffers	CCI BMPs need to be tied to a previously reported installation so that record does not get removed at the end of lifespan not reported as new
VADCR	CCI-SE-1	AGRICULTURE	Streambank Protection (Fencing)	Area Improved and Protected	ACRE	PastFence	CCI BMPs need to be tied to a previously reported installation so that record does not get removed at the end of lifespan not reported as new
VADCR	CRSL-6 (upland portion)	AGRICULTURE	Prescribed Grazing	Acre	ACRE	PrecRotGrazing	Remaining acres after buffer acres removed from total acres benefitted.
VADCR	CRSL-6 (fencing portion)	AGRICULTURE	Streambank Protection (Fencing)	Area Improved and Protected	ACRE	PastFence	Either the length of streambank protected or the area between the fence and streambank needs to be reported not both. If both are reported SB will end up double counting the area excluded.
VADCR	CRSL-6 (buffer portion)	AGRICULTURE	Grass Buffers	Acres	ACRE	GrassBuffers	Either the length of streambank protected or the area between the fence and streambank needs to be reported not both. If both are reported SB will end up double counting the area excluded.
VADCR	CRWP-2	AGRICULTURE	Streambank Protection (Fencing)	Area Improved and Protected	ACRE	PastFence	Converted to acreage by SB.
VADCR	CRWQ-1	AGRICULTURE	Grass Buffers	Acres	ACRE	GrassBuffers	
VADCR	CRWQ-6B	AGRICULTURE	Wetland Restoration	Area Restored	ACRE	WetlandRestore	

VADCR	FR-1	AGRICULTURE	Tree Planting	Area Planted	ACRE	TreePlant	
VADCR	FR-3	AGRICULTURE	Riparian Forest Buffer Prescribed Grazing	AC Acre	ACRE ACRE	ForestBuffers	
VADCR	LE-1T (upland portion)	AGRICULTURE				PrecRotGrazing	Remaining acres after buffer acres removed from total acres benefitted. Either the length of streambank protected or the area between the fence and streambank needs to be reported not both. If both are reported SB will end up double counting the area excluded.
VADCR	LE-1T (fencing portion)	AGRICULTURE	Streambank Protection (Fencing)	Area Improved and Protected	ACRE	PastFence	Either the length of streambank protected or the area between the fence and streambank needs to be reported not both. If both are reported SB will end up double counting the area excluded.
VADCR	LE-1T (buffer portion)	AGRICULTURE	Grass Buffers	Acres	ACRE	GrassBuffers	Converted to acreage assume 10' setback for calculation.
VADCR	LE-2	AGRICULTURE	Streambank Protection (Fencing)	Area Improved and Protected	ACRE	PastFence	Converted to acreage assume 10' setback for calculation.
VADCR	LE-2T	AGRICULTURE	Streambank Protection (Fencing)	Area Improved and Protected	ACRE	PastFence	
VADCR	RB-1	SEPTIC	Septic Tank Pumpout	No. Systems	COUNT	SepticPump	
VADCR	RB-2	SEPTIC	Septic Connections	Hookups	COUNT	SepticConnect	
VADCR	SE-1	AGRICULTURE	Streambank Stabilization	Stream Bank Length	FEET	NonUrbStrmRest	
VADCR	SE-2	AGRICULTURE	Ag Shoreline Management	Length Restored	FEET	shoreag	
VADCR	SL-1	AGRICULTURE	Land Retirement	Area Retired	ACRE	LandRetireHyo	
VADCR	SL-11	AGRICULTURE	Land Retirement	Area Retired	ACRE	LandRetireHyo	
VADCR	SL-15A	AGRICULTURE	High Residue Tillage Management Prescribed Grazing	Acres Acre	ACRE ACRE	HRTill	
VADCR	SL-6 (upland portion)	AGRICULTURE				PrecRotGrazing	Remaining acres after buffer acres removed from total acres benefitted. Either the length of streambank protected or the area between the fence and streambank needs to be reported not both. If both are reported SB will end up double counting the area excluded.
VADCR	SL-6 (fencing portion)	AGRICULTURE	Streambank Protection (Fencing)	Area Improved and Protected	ACRE	PastFence	

VADCR	SL-6 (buffer portion)	AGRICULTURE	Grass Buffers Prescribed Grazing	Acres Acre	ACRE ACRE	GrassBuffers	Either the length of streambank protected or the area between the fence and streambank needs to be reported not both. If both are reported SB will end up double counting the area excluded.
VADCR	SL-6T (upland portion)	AGRICULTURE				PrecRotGrazing	Remaining acres after buffer acres removed from total acres benefitted. Either the length of streambank protected or the area between the fence and streambank needs to be reported not both. If both are reported SB will end up double counting the area excluded.
VADCR	SL-6T (fencing portion)	AGRICULTURE	Streambank Protection (Fencing)	Area Improved and Protected	ACRE	PastFence	Either the length of streambank protected or the area between the fence and streambank needs to be reported not both. If both are reported SB will end up double counting the area excluded.
VADCR	SL-6T (buffer portion)	AGRICULTURE	Grass Buffers	Acres	ACRE	GrassBuffers	Either the length of streambank protected or the area between the fence and streambank needs to be reported not both. If both are reported SB will end up double counting the area excluded.
VADCR	SL-6B	AGRICULTURE	Alternative Water System	Area Improved	ACRE	OSWnoFence	
VADCR	SL-6A	AGRICULTURE	Horse Pasture Management	Acres	ACRE	HorsePasMan	
VADCR	SL-6AT	AGRICULTURE	Horse Pasture Management	Acres	ACRE	HorsePasMan	
VADCR	SL-7	AGRICULTURE	Alternative Water System	Area Improved	ACRE	OSWnoFence	
VADCR	SL-7T	AGRICULTURE	Alternative Water System	Area Improved	ACRE	OSWnoFence	
VADCR	SL-8	AGRICULTURE	Cover Crops	Cover Crop Standard Other Rye	ACRE	CoverCropSOW	
VADCR	SL-8B	AGRICULTURE	Cover Crops - Early Planted Rye	Area Planted	ACRE	CoverCropEOR	If rye is reported as species planted If early planting is recorded but no indication of rye being planted
VADCR	SL-8B	AGRICULTURE	Cover Crops - Early Planting	Area Planted	ACRE	CoverCropEOW	
VADCR	SL-8H	AGRICULTURE	Cover Crops - Harvestable	Area Planted	ACRE	ComCovCropEOW	
VADCR	SL-9	AGRICULTURE	Prescribed Grazing	Area Treated	ACRE	PrecRotGrazing	
VADCR	SL-10T	AGRICULTURE	Prescribed Grazing	Area Treated	ACRE	PrecRotGrazing	
VADCR	WL-1	AGRICULTURE	Grass Buffers	Acres	ACRE	GrassBuffers	
VADCR	WP-2	AGRICULTURE	Streambank Protection (Fencing)	Area Improved and Protected	ACRE	PastFence	
VADCR	WP-2T	AGRICULTURE	Streambank Protection (Fencing)	Area Improved and Protected	ACRE	PastFence	
VADCR	WP-2A	AGRICULTURE	Stream Restoration Ag	Length Restored	FEET	NonUrbStrmRest	
VADCR	WP-2C	AGRICULTURE	Stream Restoration Ag	Length Restored	FEET	NonUrbStrmRest	
VADCR	WP-2	AGRICULTURE	Streambank Protection (Fencing)	Area Improved and Protected	ACRE	PastFence	
VADCR	WP-3	AGRICULTURE	Land Retirement	Area Retired	ACRE	LandRetireHyo	
VADCR	WP-4	AGRICULTURE	Waste Storage Facility	no	COUNT	AWMS	

VADCR	WP-4B	AGRICULTURE	Barnyard Runoff Controls	Systems	COUNT	BarnRunoffCont
VADCR	WP-4C	AGRICULTURE	Composting Facility	No. Systems	COUNT	MortalityComp
VADCR	WQ-1	AGRICULTURE	Grass Buffers	Acres	ACRE	GrassBuffers
VADCR	WQ-4	AGRICULTURE	Cover Crops - Annual Legume	Area Planted	ACRE	CoverCropSOL
VADCR	WQ-5	AGRICULTURE	Water Control Structure	Structures	COUNT	WaterContStruc
VADCR	WQ-6	AGRICULTURE	Constructed Wetland	ac	ACRE	WetPondWetland
VADCR	WQ-6B	AGRICULTURE	Wetland Restoration	Area Restored	ACRE	WetlandRestore
VADCR	WQ-7	AGRICULTURE	Irrigation Water Management	Acre	ACRE	ConPlan
VADCR	NM-1A	AGRICULTURE	Nutrient Management	Tier 1 Acres	ACRE	EffNutMan
VADCR	WL-1	AGRICULTURE	Field Border	ac	ACRE	GrassBuffers
VADCR	WL-2	AGRICULTURE	Land Retirement	Area Retired	ACRE	LandRetireHyo
VADCR	WL-3	AGRICULTURE	Land Retirement	Area Retired	ACRE	LandRetireHyo
VADCR	SL-3	AGRICULTURE	Stripcropping	AC	ACRE	ConPlan
VADCR	SL-3B	AGRICULTURE	Stripcropping	AC	ACRE	ConPlan

NM reporting comes from DCR NM staff and VACS records are excluded from CBP reporting.

Other BMPs that might be considered for CBP reporting

VADCR	WP-5	AGRICULTURE	?	?	?	?
VADCR	WP-7	AGRICULTURE	?	?	?	?
VADCR	WQ-11	AGRICULTURE	?	?	?	?

AGWG has as future BMP panel agricultural SWM BMPs.
 AGWG has as future BMP panel agricultural SWM BMPs.
 AGWG has as future BMP panel for sinkhole protection practices.

Appendix 3 Commonwealth of Virginia General Flow of Agricultural BMP Data Deployment

