

III. Design and Implementation

A. Introduction to Current Monitoring Activities

In the following sections, current monitoring activities are documented in the form of narrative descriptions for each monitoring program in which DEQ participates. This documentation includes the purpose (objectives) and priority of each activity, its monitoring design (selection of monitoring sites), parameter selection, and the frequency of sample collection. Quality assurance procedures, data management activities, data assessment procedures, and reporting mechanisms are summarized when specific to a given program; otherwise, they are discussed generically in Sections IV through VI, and not program by program. Agency contacts are listed specifically at the end of the discussion for each activity. The entire DEQ Water Quality Monitoring Program is subject to continuous review, adaptation, and planning followed by periodic (six-year) major revisions and updates of the Strategy text document. In the interim, minor changes in program design, guidance, etc. are integrated into the strategy primarily by updating the WebPages and documents linked to the mainstream text. Specific auditing, review and evaluation procedures are consequently not described for all individual activities and subprograms (see **Chapter VII – Programmatic Evaluation**).

1. Subprograms

For most current monitoring activities, the monitoring station locations, frequencies of sample collection and the specific water quality variables analyzed at each site are included in the annual DEQ Monitoring Work Plan (MonPlan). In the past the annual MonPlan was elaborated individually by each of the seven Regional Office Monitoring Coordinators and was subsequently integrated into a single plan by the Central Office Monitoring Coordinator. With the advent of DEQ’s centralized Comprehensive Environmental Data System (CEDS) database, regional coordinators now are able to develop and set up their annual plans directly in the database. Once all of the regional annual monitoring run schedules have been entered via the CEDS Water Quality Monitoring database application, a consolidated statewide monitoring plan can be produced by structured queries of the database at the Central Office. The query outputs are first exported and edited into a Microsoft Excel® workbook, where counts and costs can be calculated and summarized. The final MonPlan is subsequently exported into a Portable Document Format (PDF file) for posting on DEQ’s public WebPages along with the Microsoft Excel® workbook.

An example of an integrated statewide MonPlan, covering the 2013 Monitoring Year¹⁸ from 1 January 2013 through 31 December 2013, is provided both as a PDF and Excel files linked to this document: “Virginia Department of Environmental Quality 2013 Water Quality Monitoring Plan” [[III-A-0aa.pdf](#) and [III-A-0aa.xls](#)]. A descriptive summary of the MonPlan contents is provided as a Microsoft Word® document: [Introduction to Water Quality Monitoring Plans](#) [III-A-0aa.doc]. The page references in this descriptive introductory document refer to the [MonPlan in Portable Document File \(PDF\) format](#) [III-A-0aa.pdf]. A summary of the number of stations associated with individual monitoring activities (subprograms) and estimated analytical costs associated with each subprogram are provided as a “[Summary of Monitoring Stations](#)” [III-A-0ab.xls] in the MonPlan. A “[Matrix of Parametric Coverage](#)” [III-A-0b.xls] is provided to document the water quality field parameters and analytes that are normally measured at each

¹⁸ In the past, DEQ’s ‘monitoring year’, significant changes in ambient monitoring activities, and the associated annual Monitoring Plan (MonPlan) were based on the state fiscal year (1 July – 30 June). Beginning in January of 2007, changes in monitoring activities and the associated annual MonPlan have been synchronized with the calendar year.

site during the monitoring year. The contents of these supplementary files are extracted directly from the MonPlan itself. The most recent annual Monitoring Plans are made available to the general public on the [DEQ-Water Quality Monitoring WebPages](#).

Among the major monitoring activities (subprograms) included in the annual MonPlan are:

- (1) Ambient Water Quality Monitoring
 - a. Watershed Network (AW)
 - b. Probabilistic Networks
 - i. Freshwater ProbMon (FP)
 - Monthly FP monitoring for physical, chemical parameters (PA)
 - ii. Estuarine ProbMon (C2)
 - c. Trend Network (TR)
- (2) TMDL Support Program (TM)
 - a. Post Implementation Monitoring (IM)
- (3) Special Studies Program (SS)
 - a. Shenandoah Mercury Study (HG)
 - b. Potomac Embayment Network (PE)
 - c. Dominion Virginia City Hybrid Energy Center (DM)
 - d. Lafayette River Bacteriological Sampling (LB)*
 - e. Observed Effects (3C Waters with Observed Effects / Insufficient Data) (OE)*
 - f. *Pfiesteria* Special Study (PF)*
 - g. Shenandoah Fish Disease Task Force (SH)
 - h. Waters of Concern (TW)*
- (4) Program Specific Monitoring
 - a. Chesapeake Bay Program ¹⁹
 - i. Water Quality and Habitat Monitoring (CB)
 - ii. Non tidal network (BN)
 - b. Regional Lakes/Reservoir Monitoring (RL)
 - c. Citizens Monitoring Requests (CM)
 - d. Regional Biological Monitoring (RB)
 - e. Targeted Fish Tissue and Sediment Monitoring (FT)
 - f. Groundwater Characterization Monitoring (GW)*
- (5) Quality Assurance (QA)
- (6) Facilities Inspections (FI)
- (7) Incident Response (IR)
- (8) Pollution Complaints/Spills – PREP (PC)

* Programs and sub-programs identified with an asterisk have as yet not identified sampling sites for the 2013 MonPlan.

The DEQ staff members responsible for each of these programs and sub-programs are identified on the “SURVEY PROGRAM CODES” Tab of the linked annual [MonPlan](#) [III-A-0aa.xls].

The table “[Summary of Monitoring Stations](#)” [III-A-0ab.xls] summarizes subprogram activities (1) through (8) for the calendar year 2013. A complete list of the stations associated with each subprogram, along with

¹⁹ Various other Chesapeake Bay Monitoring sub-Programs are contracted out to Old Dominion University (ODU), the Virginia Institute of Marine Science (VIMS), and the U.S. Geological Survey (USGS), and are not listed here. See the descriptions in Section III-C “Program Specific Monitoring” later in this Chapter.

ancillary information, can also be extracted from the annual MonPlan. DEQ's monitoring year now corresponds to the calendar year and annual MonPlans are completed in December of each year for implementation the following January 1st. The actual numbers of active monitoring stations may vary slightly from the estimates by the time the new monitoring year begins.

Those stations sampled in the past year by the Targeted Fish Tissue and Sediment Monitoring Program are always listed along with analytical results on the DEQ [Fish Tissue](#) and [Sediment](#) WebPages. A tentative list of fish tissue and sediment stations for this program is also produced in advance for the summer of each year, and is usually posted on the same WebPages as the "[Fish Tissue and Sediment Sampling Plan](#)" by April, but the list is not definitive until sites have been confirmed in the field. A complete, consolidated station list of all active WQM stations is not included here because of its size (over 1300 stations annually), but is available within the "[Stations](#)" tab of the [DEQ MonPlan](#) [III-A-0aa.xls] or upon request to the agency (Roger.Stewart@deq.virginia.gov or (804) 698-4449).

2. Resource Allocation

During late 2002 and early 2003, concerned with the possibility of declining resources, DEQ evaluated the costs, benefits and consequent priorities of all components of its active monitoring program. On 10 February 2003, the Director of DEQ's Water Division issued Guidance Memorandum No. 03-2004, "Managing Water Monitoring Programs While Under Reduced Resources" [[III-A-0f.pdf](#)], which at that time provided prioritization of the agency's various monitoring activities into two primary groups:

- Group 1 - Limited Discretion to Reduce Activities

The agency recognizes there is little management discretion to reduce resources dedicated to these monitoring activities due to the need to: 1. Minimize environmental damage from pollution incidents, 2. Provide key agency programs with needed data in a timely fashion, 3. Meet commitments made by the Commonwealth, and/or, 4. Ensure consistency and usefulness for statewide application of data. Every effort should be taken to fully implement the monitoring plans for these activities, including reduction in monitoring resources for activities listed in Group 2.

- Group 2 - Management Discretion to Reduce Activities

These monitoring activities are considered important in providing a broad-based, comprehensive monitoring program for the Commonwealth. The goal is to conduct as much monitoring in these areas as resources allow, in order to achieve the objectives in the Monitoring Strategy. However, management discretion exists to reduce resources dedicated to these activities based on budgetary constraints, either at the statewide or regional level. Any reduction in resources should be designed to maintain a balanced investment in each of these monitoring activities. No monitoring component should be entirely eliminated in any year without consultation among CO and RO staffs.

This Guidance document was subsequently revoked in June of 2009, when rapidly declining resources and changing priorities countermanded its provisions. Further deliberations on prioritization of monitoring programs occurred between 2009 and 2012, as a result of further precipitous declines in resource availability and the increasing emphasis on TMDL development and implementation. Final discussion among the DEQ Regional Offices' and Central Office's monitoring staffs identified the three programs with the highest and the three with the lowest priorities in terms of current needs [[III-A-0g.xls](#)]. TMDL development monitoring, trend monitoring, and ambient watershed monitoring (for assessment purposes) were given the three highest priorities, with ambient probabilistic monitoring (freshwater and saltwater) a close fourth, while some lake monitoring (limited public access or of low recreational value), follow-up

monitoring of citizen requests and observed effects (Assessment Category 3C), and TMDL implementation follow-up monitoring were considered to be of the lowest priority.

The inclusion of specific program and special studies codes linked to all ambient information in the CEDS WQM database facilitates the documentation of total analytical costs for each water quality monitoring project. This procedure is carried out during the development of the agency's [Annual Monitoring Plan](#) and provides the basis for the allocation of available analytical resources among the monitoring activities on an annual basis. Similar database queries can be utilized to evaluate trends in analytical resources related to various programs (e.g., Chesapeake Bay Program, Freshwater ProbMon, etc.) or to various groups of parameters (e.g., toxic metals and/or organics in sediment, etc.). They can also be used to estimate future analytical costs, based on judgmental projections of increasing monitoring efforts required for specific programs.

Because of the agency's efforts to efficiently integrate its numerous monitoring activities in a cost-effective manner, logistical and human resources are much more difficult to quantify for specific subprograms. For example, a single monitoring run may include the sampling of sites related to watershed, trend and Chesapeake Bay Program monitoring. Regional Office Monitoring Coordinators carry out this logistical integration during the elaboration of their annual monitoring Run Schedules. It serves to maximize the efficiency of resource application on a regional basis by minimizing the number of monitoring runs required to sample a predetermined number of sites, as well as the travel distance (by car or boat) required for each. In a similar manner, the use of field equipment (vehicles, boats, multi-meter WQM sensors, etc.), acquired under the auspices of agency general funds or with grants related to specific subprograms, is also integrated into a general pool of ambient monitoring resources. Consequently, documenting the specific resources belonging to, or expended for individual monitoring activities or subprograms is very difficult. The complexity of this resource allocation problem is discussed further in **Chapter VIII – General Support and Infrastructure Planning**.

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