

Wellhead Protection Plan  
Commonwealth of Virginia

Department of Environmental Quality  
April 15, 2005

## Acronyms

AST Above ground Storage Tank  
CDBG Community Development Block Grant  
CFU Carbon Filtration Unit  
DBA Virginia Department of Business Assistance  
DCLS Division of Consolidated Laboratory Services  
DCR Virginia Department of Conservation and Recreation  
DEQ Virginia Department of Environmental Quality  
DHCD Virginia Department of Housing and Community Development  
DMME Virginia Department of Mines, Minerals, and Energy  
DOD Department of Defense  
EPA United States Environmental Protection Agency  
EPCRA Environmental Planning and Community Right-To-Know Act  
FIFRA Federal Insecticide, Fungicide, and Rodenticide Act  
GIS Geographic Information System  
GSMP Generic State Management Plan  
LDF Land Disposal Facilities  
LEPC Local Emergency Planning Committees  
PSMP Pesticide State Management Plan  
RCRA Resource Conservation and Recovery Act  
RUCAC Regulated Unit Corrective Action  
SARA Superfund Amendments and Reauthorization Act  
SDWA Safe Drinking Water Act  
SERC State Emergency Response Council  
SWAP Source Water Assessment Program  
SWPP Source Water Protection Plan  
TAC Technical and Citizens Advisory Committee, VDH  
UST Underground Storage Tank  
VDACS Virginia Department of Agriculture and Consumer Services  
VDEM Virginia Department of Emergency Management  
VDH Virginia Department of Health  
VERC Virginia Emergency Response Council  
VPI&SU Virginia Polytechnic and State University  
VRP Voluntary Remediation Program  
WAC Waterworks Advisory Committee, VDH  
WHPP Wellhead Protection Plan  
USGS United States Geological Survey

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## **Executive Summary**

The 1986 Amendments to the Safe Drinking Water Act (SDWA) established a federal Wellhead Protection Program to protect ground waters that supply wells and wellfields contributing to public water supply systems. The federal legislation called on States to develop protection programs for EPA approval that would protect ground water based public water supplies from contaminants that may adversely affect human health. Funding was not allocated in the SDWA to establish State programs. At that time, the Commonwealth of Virginia did not pursue an Environmental Protection Agency (EPA) approved State program due to lack of funding and concern that prescriptive language in Federal regulation would dictate implementation of protection measures for which State government has no authority.

In 1990 the Virginia Ground Water Protection Steering Committee, a multi agency committee with ground water protection interests chaired by the State's lead environmental agency, created an ad hoc committee to investigate local government's perspective on wellhead protection. Since that time the Steering Committee has focused much of their energy and resources on promoting wellhead protection to local governments. Funding for these efforts has been limited and has come from an EPA Clean Water Act grant to the Department of Environmental Quality (DEQ).

The 1996 Amendments to the SDWA required states to develop a source water assessment program (SWAP) and submit the plan to EPA for approval. One-time funding was set-aside in 1996 to complete the required assessments and encourage protection programs. The Virginia Department of Health (VDH) received EPA approval for their plan and completed assessments and susceptibility evaluations on all public water supply systems in the Commonwealth in 2003 (VDH continues to perform assessments as needed).

DEQ has elected to move forward with the submittal of an EPA approved State wellhead protection program with the expectation of leveraging funds from the SDWA to assist localities in implementation of local plans.

The SDWA requires that each State WHPP address eight elements. These elements are addressed briefly below and in more detail within the body of the document, including identification of lead agency.

Program Summary and Purpose: The 1986 and 1996 Amendments to the SDWA require States to develop Wellhead Protection Programs and Source Water Assessment Programs. The SDWA goal for a State program that protects ground water resources from contaminants will be achieved through ongoing regulatory and non regulatory State programs and through voluntary participation by local governments with land use management authorities. Establishment of an EPA approved State Wellhead Protection Program in Virginia may result in the allocation of funds within the Drinking Water State Revolving Fund

Program specifically for implementation of local protection programs. Local programs often lack funding for protection measures. There is a documented need for small grants (to purchase educational materials for Supervisors and planning staff) and large grants (to hire consultants for characterization of source waters) and everything in between. VDH will continue to support source water protection programs and implementation activities by establishing an “Implement Local Wellhead Protection Programs” category as part of the Drinking Water State Revolving Fund Program Intended Use Plan for the future. DEQ will request \$50,000 of the set-aside funds in the Drinking Water State Revolving Fund Program be available to local governments for implementation of protection measures. DEQ’s Clean Water Act grant for ground water protection will be another funding mechanism. DEQ and VDH will work cooperatively to establish criteria for grant fund distribution. DEQ will continue to promote ground water protection, including implementation of wellhead protection measures, for consideration in GWPSC member agencies.

DEQ does not intend to create a schedule for revisiting the components of this voluntary plan. Major changes in protection initiatives, statute or regulation development, or a substantial influx of federal funding that affect ground water protection will be cause for revisiting the components of this voluntary plan. Maintaining the document on the GWPSC web site provides an avenue for updates on new initiatives.

Duties of State agencies, local governments and public water supply systems (Roles and Responsibilities):

DEQ will serve as the lead agency for coordination of this voluntary protection program. VDH will continue as the Commonwealth’s regulatory authority for public water supplies, including ongoing oversight of the Drinking Water State Revolving Fund Program. DEQ and VDH will continue to coordinate protection activities to increase funding opportunities for local program implementation and to evaluate progress in the submittal of the EPA Annual Source Water Protection Measures Tables.

Local governments will have the primary responsibility for protection program implementation. The land use authority needed for wellhead protection is part of the Code of Virginia, Title 15.2 Chapter 22. This language is included in Appendix D. Local protection plans will not be approved by the Commonwealth however there will be minimum program elements required for dispersal of State or Federal funds for wellhead protection activities. Public Water Supply System owners and operators are responsible for meeting all applicable rules and regulations under the VDH and SDWA.

The Virginia Waterworks Regulations (12VAC5-590-10) define a public waterworks as one of the following: Community water system, Noncommunity water system, or Nontransient noncommunity water system. Definitions are included in Appendix D.

Delineation (Define Protection Areas): Zone 1 Ground Water Source Assessment Areas, defined in the Virginia Source Water Assessment Program and approved by EPA as 1000 foot fixed radius, will be accepted as an initial delineation. The Commonwealth does not intend to revisit or revise the method established in the SWAP nor does the Commonwealth intend to approve more technical delineations as being more protective of the resource. The Commonwealth will encourage localities to explore tools for managing contaminants within protection areas that are best suited to local hydrogeologic and political conditions. Financial assistance for advanced delineations may be available through set-aside funds in the Drinking Water State Revolving Fund Program (VDH) and the Clean Water Act Section 106 Ground Water Protection grant (DEQ).

Source Identification: The VDH completed contaminant source inventories for all public water supplies wells as outlined in the Virginia Source Water Assessment Program. The VDH will continue to meet their regulatory commitment by completing contaminant source inventories for all new public water supply systems. Information obtained through the inventories is provided to the owner of the public water supply system; information on susceptibility rankings is provided to the public served by each system. VDH staff may update inventories as part of their scheduled sanitary surveys. DEQ and GWPSC member agencies will make electronic data relating to permit issuance available upon request by VDH for updates to their Zone 2 information (Zone 2 Ground Water Source Assessment Areas are defined in the Virginia Source Water Assessment Program and approved by EPA as 1 one mile fixed radius). Financial assistance for more extensive contaminant source inventories may be available through set-aside funds in the Drinking Water State Revolving Fund Program (VDH) and the Clean Water Act Section 106 Ground Water Protection grant (DEQ).

Management Approaches: §15.2-2223 and §15.2-2283 of the Code of Virginia include ground water protection provisions for local governments to consider when developing Comprehensive Plans and/or zoning ordinances. These chapters are included in Appendix D. Because local governments have the authority for land use decisions, selection of management methods to protect ground water will be determined at the local level. The Commonwealth will encourage local governments to select a management method that will be supported by their constituents and protective of the resource. Financial assistance may be available through set-aside funds in the Drinking Water State Revolving Fund Program (VDH) and the Clean Water Act Section 106 Ground Water Protection grant (DEQ). Additional information on support from DEQ and other state agencies is available on page 26.

Contingency Plan (Contingency Planning): Regulations promulgated by VDH, 12VAC5-590-690, establish criteria for minimum capacity for waterworks. § 44-146.19, § 44-146.20, and § 44-146.24 of the

Code of Virginia establishes the legal basis for emergency planning and response in the Commonwealth. These regulations and statutes are included in Appendix D.

The provisions from the Superfund Amendments and Reauthorization Act (SARA) of 1986, Title III statute are also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). The purpose behind SARA Title III/EPCRA has been to create a cooperative relationship among government, business, and the public involving all of them in the effort to prevent, to plan, to prepare for, and to manage chemical emergencies. The law sets the requirements for facilities that manufactured, processed, or stored certain hazardous or toxic chemicals, of certain threshold level, on-site to report annually to the state and local governments and to report any accidental releases on a timely basis. The information submitted by facilities provides the basis for community right-to-know and local emergency planning and preparedness.

EPCRA requires the states to promote outreach for developing local emergency preparedness programs to respond to chemical releases; receive reports from the regulated community; organize, analyze and disseminate the resulting information on hazardous chemicals to local governments and the public.

EPCRA required the establishment of State Emergency Response Council (SERC) and granted certain responsibilities and authorities to the state and local governments. This act was promulgated without the usual incentive of massive federal funding -leaving the burden of implementation to state and local governments. The Virginia SERC - Virginia Emergency Response Council (VERC) was created in 1987. [Commonwealth of Virginia, Emergency Services and Disaster Laws, Chapter 3.5 - Virginia Hazardous Materials Emergency Response Program - Code of Virginia, Section 44-146.40, Virginia Emergency Response Council created; membership; responsibilities] The VERC was established as a policy, rule-making body, while DEQ received state funding to administer a majority of the day to day activities of SARA Title III program. In accordance with the federal laws, as its first responsibility, the VERC established and appointed members to 111 Local Emergency Planning Committees (LEPCs) in Virginia. The formation of VERC also designated the Virginia Department of Emergency Management (VDEM) to serve as the contact for facility immediate/emergency notification in the event of a release, spill, etc. The VDEM also serves as the lead agency in facilitating communication among local emergency planning committees and providing technical assistance.

Because of this activity businesses have reassessed their chemical inventories and their manufacturing processes. In addition, more businesses are working cooperatively with local governments to plan for and try to prevent an accidental chemical release. Water purveyors and local government officials will be the

lead in establishing cooperative relationships with local emergency planning committees for protection program preparation.

New Wells: VDH and DEQ will continue to cooperate in permit issuance. VDH will maintain regulatory authority in the development, contaminant source inventory/assessment, and permitting of new public water supplies. VDH ensures new wells meet the quantity demands placed on the system by the consumer. VDH copies DEQ on well site authorization letters when the well is within a Ground Water Management Area. DEQ issues ground water withdrawal permits in Ground Water Management areas to minimize adverse impacts to the ground water resource. DEQ ground water withdrawal permits are not restricted to public water supplies. DEQ requires water supply applicants to provide their waterworks permit number, issued by the VDH, as part of their ground water withdrawal application.

Conduct Ongoing Public Education and Outreach (Public Participation): VDH developed the SWAP using three separate committees, the Waterworks Advisory Committee, the Source Water Protection Team, and the Source Water Assessment Technical and Citizens Committee. The last committee was established specifically to meet Section 1428(b) of the SDWA public participation requirements. Because participation in wellhead protection activities in the Commonwealth will be voluntary and because so much of this document is defined by or taken from the Virginia Source Water Assessment Program document, neither VDH nor DEQ felt an exhaustive public participation process was necessary. However to meet EPA demands for public input, DEQ will post a public notice on [www.deq.virginia.gov](http://www.deq.virginia.gov) concurrent with the April 15, 2005 submittal of this revised plan for approval. The notice will request written comments by May 13, 2005. The public notice will be published in six newspapers throughout the Commonwealth as well. Any comments received will be addressed and copies of comments and DEQ responses will be provided to EPA within one week of the close of comments (no later than May 20, 2005).



## Introduction

The 1986 Amendments to the Safe Drinking Water Act (SDWA) established a federal Wellhead Protection Program to protect ground waters that supply wells and wellfields contributing to public water supply systems. 42 USC Section 300h-7 a and b requires each State to adopt and submit to the Environmental Protection Agency (EPA) a wellhead protection program that at a minimum specifies the duties of State agencies, local governmental entities, and public water supply systems, delineates wellhead protection areas, identifies sources of contamination within protection areas, develops management approaches, develops contingency plans for alternate water sources in the event of contamination, considers protection options when siting new wells, and ensures public participation in plan development (US EPA "Safe Drinking Water Act").

In response to this amendment Governor Wilder named the State Water Control Board (reorganized in 1993 as the Virginia Department of Environmental Quality) as the lead agency for wellhead protection in the Commonwealth. A copy of the designation letter is not available for inclusion. In December 1990 Virginia established an ad hoc committee to "offer a local government perspective on wellhead protection to the state's inter-agency Ground Water Protection Steering Committee, to local governments and to others" (Ad Hoc Wellhead Protection Advisory Committee 1). The Ad Hoc Wellhead Protection Advisory Committee was particularly interested in questions related to "the legal authority for localities to use planning, zoning and other tools for wellhead protection; obstacles which might impede the exercise of this authority; and recommendations for localities and for the state" (1-2). The Ad Hoc Wellhead Protection Advisory Committee made the following findings and recommendations:

"There is a need for wellhead protection in Virginia

Local governments in Virginia have the land use authority needed for wellhead protection

Overlay zoning is one of a number of tools available to Virginia's local governments for wellhead protection" (Virginia Ground Water Protection Steering Committee, "Handbook" 1)

Additional findings included a lack of public awareness and widespread support for protection activities, lack of knowledge on ground water occurrence for delineations, and an acknowledgement of the diversity in Virginia politics. The Ad Hoc Wellhead Protection Advisory Committee recommended development of technical assistance documents and investigation of funding sources to assist localities on development and implementation of protection activities (Ad Hoc Wellhead Protection Advisory Committee 3-4).

In 1991 the Virginia Ground Water Protection Steering Committee published their first technical assistance document entitled Wellhead Protection A Handbook For Local Governments In Virginia.

In 1992 two pilot projects were funded by the State Water Control Board through their federal Clean Water Act, Section 106 Ground Water Protection grant. Henrico County and Roanoke County were awarded funds to investigate sources of contamination, delineate protection areas, and explore management options for future protection activities.

In 1993 the Virginia Ground Water Protection Steering Committee published their second technical assistance document entitled Wellhead Protection: Case Studies Of Six Local Governments In Virginia.

In 1995 Virginia completed its first Biennial Wellhead Protection Report to the EPA and participated in the development of a map indicating 29 localities with some level of wellhead protection activity. In addition three wellhead protection educational workshops were held (Salem, Harrisonburg, and Newport News) for local government officials and water purveyors.

In 1997 Virginia completed its second Biennial Wellhead Protection Report to the EPA.

In 1998 the Virginia Ground Water Protection Steering Committee published their third technical assistance document entitled Implementing Wellhead Protection: Model Components For Local Governments In Virginia.

In 1999 Virginia completed its third Biennial Wellhead Protection Report and established committees to initiate source water assessment program development.

The 1996 Amendments to the SDWA required states to develop a source water assessment program (SWAP) and submit the plan to EPA for approval. The Virginia Department of Health, with regulatory authority over public water supplies, took the lead. 42 USC Section 300j-13 requires each State to develop a Source Water Assessment Program that will:

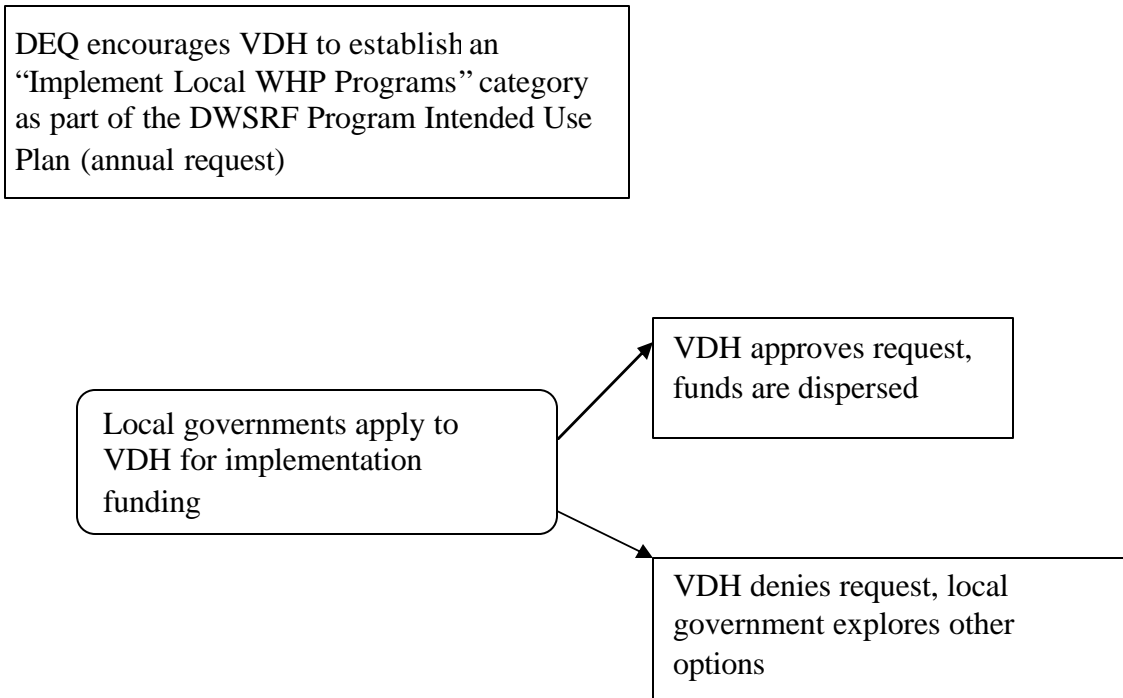
"delineate the boundaries of the assessment areas in such State from which one or more public water systems in the State receive supplies of drinking water, using all reasonably available hydrogeologic information on the sources of the supply of drinking water in the State and the water flow, recharge, and discharge and any other reliable information as the State deems necessary to adequately determine such areas; and identify for contaminants regulated under this title for which monitoring is required under this title (or any unregulated contaminants selected by the State, in its discretion, which the State, for the purposes of this subsection, has determined may present a threat to public health), to the extent practical, the origins within each delineated area of such contaminants to determine the susceptibility of the public water systems in the delineated area to such contaminants." (US EPA "Safe Drinking Water Act")

The 1996 amendments imply that states would promote protection as part of the assessment activities for all types of public water sources. So while a wellhead protection area can be defined as "land in the

vicinity of a public water supply well chosen for special protection to prevent pollution of the ground water by nearby surface and sub-surface activities" (Virginia Ground Water Protection Steering Committee, "Handbook" 1) a source water protection area can be defined as the ground and/or surface watershed area upland of a drinking water intake, through which contaminants are reasonably likely to move toward and reach an intake (Adkins 2004). Source water protection incorporates the management measures previously applied to ground water based systems to both ground and surface water based systems. This document will only address protection measures applied to ground water based systems.

## Program Summary and Purpose

The 1986 and 1996 Amendments to the SDWA require States to develop Wellhead Protection Programs and Source Water Assessment Programs. VDH, through the Source Water Assessment Program, completed pollution susceptibility assessments on drinking water sources serving all public water supply systems. Information gained through these assessments may be used to build voluntary, community based programs that prevent contamination of ground water based water supplies. DEQ, VDH, and other partners will support public water supply systems in their implementation efforts through a program of grants, loans, and technical assistance. Establishing a Statewide wellhead protection program may increase funding opportunities for pass through grants to local governments via the DWSRF program and the Clean Water Act Ground Water Protection grant program. It is our hope that implementation activities at the local level may prevent contamination of this valuable resource.



Participation in the Commonwealth's Wellhead Protection program is voluntary. Entities receiving funding for protection program implementation will cooperate in the exchange of information with relevant State programs, including but not limited to DEQ and VDH. A Geographic Information System (GIS) database for the VDH SWAP is available to support local governments as needed. Protection activities should be summarized in sanitary surveys as well. A questionnaire (Appendix C) will be provided to update changes to a system's land use activities inventory. The questionnaire will be forwarded to the VDH for inclusion in the SWAP GIS.

## **Roles and Responsibilities**

### Local governments and public water supply owners/operators:

"Local governments play a central role. First, local governments are unique in that they alone have the legal authority to employ tools such as the comprehensive plan, zoning and the capital improvement program. Since these tools are important components of wellhead protection, local governments are essential participants. Second, local governments have a responsibility to act as the protector of the overall community welfare by thinking ahead, anticipating problems and carrying out strategies to protect the public's interest. For these reasons, local governments are in the best position of all the local stakeholders to take the initiative to put wellhead protection on the community's agenda for study, discussion, and action" (Virginia Ground Water Protection Steering Committee, "Implementing" i).

"Local governments are essential participants in wellhead protection because of their authority over land use" (Virginia Ground Water Protection Steering Committee, "Case Studies" 1). §15.2-2223 and §15.2-2283 of the Code of Virginia include ground water protection provisions for local governments to consider when developing Comprehensive Plans and/or zoning ordinances. These chapters are included in Appendix D. Local governments are encouraged to investigate regulatory and non-regulatory tools for managing sources within wellhead protection areas. Local governments (cities, towns, counties, and planning district commissions) will be encouraged to participate in this voluntary program. GWPSC agencies will investigate avenues to promote the program; this will include web links, governmental publications, and conference opportunities. Local protection programs should include "public education and designation of an individual to take leadership responsibility for wellhead protection". (Virginia Ground Water Protection Steering Committee, "Implementing" 63). Public education will play an important role in acceptance of regulatory tools to protect water resources. Local governments should work with public water supply owners/operators in the selection of management tools, monitoring of control measures, and contingency plan develop. Local governments and water purveyors should become active in their local emergency planning committees. Public water supply system owners and operators have an added responsibility to provide a continual and safe water supply. Public water supply system owners and operators are responsible for meeting all applicable rules and regulations under the SDWA.

### State:

Ground water programs in Virginia strive to maintain existing high water quality through adopted statutes, regulations, and policies. Advancing ground water protection efforts is the goal of many state

programs in numerous state agencies. In late 1986 an interagency committee was formed to stimulate, strengthen, and coordinate ground water protection activities in Virginia. The Ground Water Protection Steering Committee (GWPSC) continues to meet bi-monthly with representation from the following agencies:

(Virginia Department of Environmental Quality, “2004 Assessment “, 5.1-1)

Department of Environmental Quality (DEQ)

Department of Health (VDH)

Department of Mines, Minerals, and Energy (DMME)

Virginia Polytechnic and State University (VPI&SU)

Department of Housing and Community Development (VDH&CD)

Department of Agriculture and Consumer Services (VDACS)

Department of Conservation and Recreation (DCR)

Department of General Services, Division of Consolidated Laboratories (DCLS)

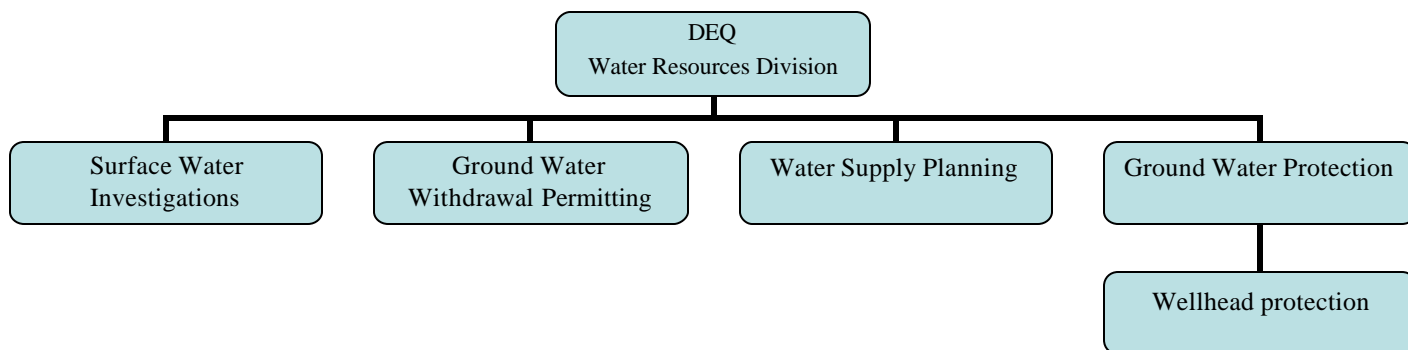
Department of Business Assistance (DBA)

US Geological Survey (USGS)

State agencies with regulatory responsibilities will continue to regulate point and non point sources; many are listed in Appendix D. While many of the agencies represented on the Virginia Ground Water Protection Steering Committee have programs with ground water protection interests, it should be noted that DEQ and VDH are the only State agencies with specific wellhead protection responsibilities. The other GWPSC agencies will continue to implement their regulatory and non regulatory programs with a renewed commitment to promoting this voluntary program in their day to day activities.

The following paragraphs briefly describe ground water protection activities at member agencies. This information is a compilation of information from the 2004 Virginia Water Quality Assessment Report and the GWPSC web page. Individual agency web pages are provided for additional information.

**DEQ:** The Department of Environmental Quality continues to support ground water protection education and outreach opportunities through the Clean Water Act Section 106 Ground Water Protection grant. Ground Water Festivals are one important education tool for ground water protection. Cooperation between agencies, federal, state, and local, at the Festivals continues to be extraordinary. Other protection activities are identified through an annual workplan and development of DEQ’s Performance Partnership Grant. Ground water protection, including but not limited to wellhead protection, will continue to be the focus of this annual grant.



The Storage Tank Compliance Program, Registration section, tracks ownership and technical information for owners of underground and above ground storage tank (UST and AST) facilities in the Commonwealth. Each year the Program receives registrations that report new tanks, tank closures, and amendments to existing tank information, such as changes of ownership. DEQ and the public use registration information to determine the identity of persons responsible for pollution prevention measures and cleanup of releases.

The AST Compliance Program regulates above ground storage tank facilities of 25,000 gallons or greater that store oil. Through facility inspections, the Program seeks to ensure that Virginia’s AST facilities have measures in place to prevent releases and to respond quickly and effectively when releases occur. Inspectors are able to inspect each AST facility once every five years.

The UST Compliance Program regulates USTs larger than 110 gallons that contain regulated substances, which include most petroleum products. Through tank inspections, the Program seeks to ensure that USTs in the Commonwealth have measures in place to prevent releases and to have immediate notice of actual releases. Inspectors are able to inspect each UST facility once every 5 years.

For more information on the tank program visit <http://www.deq.virginia.gov/tanks/>

The Storage Tank Remediation Program directs the investigation and cleanup of the petroleum contaminated sites managed by responsible parties. The DEQ ensures that appropriate emergency response, initial abatement measures, site investigation and site remediation are performed by the responsible party. The DEQ also authorizes activities eligible for reimbursement from the Virginia Petroleum Storage Tank Fund.

The DEQ will conduct investigation and cleanup of high-priority petroleum contaminated sites in instances where the responsible party is unknown or financially unable to undertake the required work. Through a number of contractors, the DEQ conducts emergency response, initial abatement measures, site investigation and site remediation. The DEQ also provides immediate, interim, and permanent relief to

individuals whose drinking water wells have been rendered unusable by petroleum contamination. Through a DEQ contractor, carbon filtration units (CFUs) are installed and maintained on contaminated wells until a permanent solution is implemented. Permanent solutions typically include extension of an existing public water supply or installation of a new well free from petroleum contamination.

Significant streamlining has been achieved as the program has gained experience in risk-based decision making and made reductions in administrative burden. Average cleanup time and average cleanup costs per site are among the lowest in the nation.

For more information on the remediation program visit <http://www.deq.virginia.gov/tanks/>

DEQ's Waste Permitting Program implements the Resource Conservation and Recovery Act (RCRA) Base Program which addresses groundwater quality issues at both permitted and unpermitted land-based units. The "Base Program Correction Action" sites or "Little C" sites are permitted regulated units required to perform corrective action (RUCA) if the ground water concentrations exceed established Ground Water Protection Standards. The second sector is "Unpermitted Land Disposal Facilities (LDF)" where continued operation of the facility is contingent upon removal or decontamination of contaminated media. In instances where the LDF is closed, groundwater monitoring is required to demonstrate that closure performance standards are met. When standards are not met, the site is issued a Post Closure Permit and corrective action is undertaken.

For more information on the waste program visit <http://www.deq.virginia.gov/waste/>

DEQ also manages the Federal Facilities Restoration and Superfund Office. The Federal Facilities Restoration activities include Department of Defense (DOD) installations (Army, Navy, Air Force, Defense Logistics Agency, and Formerly Used Defense Sites) and NASA installations. Federal funding from the Department of Defense supports the Federal Facilities Restoration program. The Superfund Program, funded with both Federal and State dollars, carries out activities required by law or legal agreements. Additional activities within this Office include DEQ's Voluntary Remediation Program (VRP) and the Brownfields Program. The Voluntary Remediation Program provides a mechanism for eligible participants to voluntarily clean up properties not mandated for remediation under existing environmental laws. This program serves as a mechanism for cleanup of Brownfields sites. EPA funding supports the Voluntary Remediation and Brownfields Programs. For more information on the waste program visit <http://www.deq.virginia.gov/waste/>

**VDH:** The Virginia Department of Health operates programs under the federal Safe Drinking Water Act and several state statutes that regulate public water supplies, many of which use ground water. The program includes construction-standards, monitoring, and compliance components. VDH also operates



regulatory programs governing homeowner and other individual wells and on-site waste water disposal (typically septic tanks). Visit the VDH web site at <http://www.vdh.virginia.gov>

**DMME:** The Department of Mines, Minerals, and Energy is focused on the geology of the state and the relationship between activities like coal mining and ground water. DMME is also a source for many different types of maps of geologic and hydrologic interest. Visit the DMME web site at <http://www.dmme.virginia.gov>

**VPI&SU:** Virginia Polytechnic Institute and State University's Cooperative Extension program helps people to shape their futures through research-based educational programs. One of the ways this has been addressed is county ground water testing in many locations around the state. Virginia Cooperative Extension (VCE) also administers the Farm\*A\*Syst program, which aids farmers in their ground water protection efforts. Visit <http://www.ext.vt.edu>

**DHCD:** The Department of Housing and Community Development (DHCD) provides technical and financial assistance and regulatory oversight for housing and community development. DHCD administers the Community Development Block Grant (CDBG) program that annually funds work such as improved water and waste-water capacity for needy communities. DHCD also provides liaison and technical assistance to planning departments and commissions. Visit <http://www.dhcd.virginia.gov> for more information on DHCD programs.

**VDACS:** The Virginia Department of Agriculture and Consumer Services (VDACS) promote the economic growth and development of Virginia agriculture, provides consumer protection, and encourages environmental stewardship. Agriculture is a major user of ground water in Virginia. Agriculture can also affect ground water as a result of activities involving pesticides, fertilizers, animal wastes, and other materials. VDACS, in cooperation with the Virginia Pesticide Control Board, has conducted a highly popular Pesticide Disposal Program since 1990. Unwanted pesticides have been collected from agricultural producers, pesticide dealers and commercial pest control firms. This program served all of Virginia's counties and independent cities by the end of 1998. A new maintenance phase, in which the State was subdivided into four regions, was initiated in 1999. The pesticide disposal program has benefited from a high level of interagency cooperation among the VDACS, DEQ, DCR, DCLS, and VCE. Funding to support this program has been pooled from Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Clean Water Act (Sections 319 Non Point Source and 106 Ground Water Protection) grants and the Office of Pesticide Services program fees. For more information on the disposal program visit <http://www.vdacs.virginia.gov/pesticides/index.html>

In response to the EPA Pesticides and Ground Water Strategy, the VDACS submitted a Generic State Management Plan (GSMP) for pesticides and ground water to EPA Region III in 1993 and received EPA concurrence in 1995. The GSMP established a graduated response plan for pesticides detected in ground water, a process for developing pesticide specific management plans (PSMP) should such be required by anticipated federal rule making and a graduated response approach for managing pesticides identified as potential threats to ground water.

**DCR:** The Department of Conservation and Recreation (DCR) Karst Ground Water Protection initiative is implemented by the Natural Areas Management Program in order to document, preserve, and restore the ground water habitats of sensitive species. Project implementation is shared with the Nonpoint Source Management program; an arrangement that highlights the integral connection between the preservation of natural heritage resources and the quality of the States waters and drinking water supplies. Staff focus on threats to water quality in a 33-county region underlain by cavernous and/or mined-out bedrock in western Virginia, and work in close cooperation with Soil and Water Conservation Districts, the US Geological Survey, and the State's Natural Area Preserves Systems. Karst ground water protection is promoted through a combination of technical assistance, data collection (monitoring, mapping, and tracer testing), and public outreach, which includes brochures, materials, and educational efforts coordinated through Project Underground and Project WET. With regard to ground water issues, the program facilitates coordination between the diverse group of agencies and institutions affecting nonpoint source management in each basin. As demand and reliance on ground water resources increase in agricultural areas undergoing unprecedented residential growth, state agencies are working to establish a karst ground water monitoring network in the vicinity of unstudied nonpoint sources, such as land application sites and rural subdivisions. In addition, the Karst Ground Water Protection Program is cooperating with the US Forestry Service on a karst resource inventory on Forestry Service owned lands. For more information on the Karst program visit <http://www.dcr.virginia.gov/dnh/karsthome1.htm>

**DCLS:** The Department of General Services, Division of Consolidated Laboratory Services (DCLS) provides diversified laboratory services for a wide variety of state needs. Water quality testing for state programs is one important example. For more information visit <http://www.dcls.dgs.virginia.gov>

**DBA:** The Department of Business Assistance (DBA) strengthens the Commonwealth's economy by providing value-added services (such as workforce training, financing, and small business development) to Virginia businesses. Through an industry visitation program, it serves as state government's principal point of contact for communications with business and industry. DBA can address the groundwater needs

of industry and explain the state's programs for conserving and protecting ground water. Visit <http://www.dba.virginia.gov> for more information.

**USGS:** The US Geological Survey is a federal agency under the Department of the Interior that provides maps, reports, and information. Familiar to many are their topographic "quad" maps. The USGS Water Resources Division, Virginia District, provides hydrologic information and scientific understanding to support the utilization and management of water resources in the Commonwealth of Virginia. A number of studies of ground water in Virginia have been completed by USGS, including reports on the Eastern Shore, Tidewater, and the northern Shenandoah Valley. Visit <http://va.water.usgs.gov/> for more information.

### **Ground Water Protection Program Conclusion**

The Virginia Ground Water Protection Steering Committee (GWPSC) continues to meet bi-monthly as a vehicle for sharing information, for directing attention to important ground water issues, and for taking the lead on ground water protection initiatives requiring an inter-agency approach. Wellhead protection activities will become a permanent agenda item for future meetings. This will allow members to exchange information on localities that may be interested in program participation and ensure that member agencies are aware of implementation progress throughout the Commonwealth.

### **Federal:**

EPA will continue to manage programs or sources for which Virginia does not accept primacy. This includes the underground injection control program and sole source aquifer designation. For more information on programs at EPA visit <http://www.epa.gov>

## **Define Protection Areas**

These guidelines were developed and approved for the Virginia Source Water Assessment Program (SWAP) in November 1999 by U.S. EPA.

### Ground Water Sources

VDH through the [Source Water Protection Team] SWAP TEAM, [Source Water Assessment Technical and Citizens Committee] TAC, [Waterworks Advisory Committee] WAC and Public Participation has determined that a fixed radius delineation approach for groundwater sources is the approach of choice for Virginia. The advantages and disadvantages of the six methods suggested by EPA in the June 1987, *Guidelines for Delineation of Wellhead Protection Areas* were considered. The basis for choosing the fixed radius approach, as outlined in the Federally approved VA SWAP document, is:

Virginia's regulatory permitting systems for contaminant releases to the environment, which locates sources of potential pollutants. These sources of contaminant releases will be utilized in the source water assessments.

VDH's public water supply well construction and abandonment regulations.

VDH's sanitary surveillance program for drinking water supplies where VDH staff performs surveys every 12 to 18 months.

VDH's chemical and bacteriological monitoring requirements for public water supplies per the SDWA and a Virginia program for routine raw water bacteriological monitoring to detect changes in microbiological quality.

VDH's completion of the GUDIS assessments has already identified those sources experiencing microbiological contamination resulting from surface water influence.

VDH's completion of vulnerability assessments for synthetic organic chemicals under the Safe Drinking Water Act Phase II/V Rule Waiver Program based on 1000 foot fixed radius assessment zones.

VDH's contract with the United States Geological Survey (USGS) to perform a statewide aquifer study which may identify areas where a more detailed delineation may be beneficial.

VDH's contract with the Virginia Department of Conservation and Recreation (DCR) to perform detailed studies in Karst areas where detailed delineation may be beneficial.

The costs of the other delineation methods exceed the incremental improvement of data quality expected for the other methods.

Neither the waterworks owners or VDH have adequate staff and financial resources to complete more complex delineations in the allotted time frame.

The reality that future assessments will be required due to new EPA Regulations.  
(Virginia Department of Health, "Source Water Assessment Program" 5)

Public water supply owners, operators, and local governments are encouraged to investigate alternative delineation methods when developing and implementing protection programs. "Along with choosing the most acceptable planning, regulatory, or voluntary approaches, a locality must also make decisions about the area to be protected, the area to be called the 'wellhead protection area.' A variety of factors enter into such decisions but ultimately they are a matter of policy choice. While there is a wealth of technical writing about the topic of delineating zones of contribution, it is a policy choice whether a locality feels it desirable, or even feasible, to protect that whole area or only its central portion, and to what degree and how" (Virginia Ground Water Protection Steering Committee, "Handbook" 39).  
VDH will continue to use these guidelines in future assessments for new wells.

## **Source Identification**

These guidelines were developed and approved for the Virginia Source Water Assessment Program (SWAP) in November 1999 by U.S. EPA.

### **Ground Water Source Assessment Areas**

Zone 1– 1000 foot fixed radius – inventory land use activities (LUA) listed in Tables 1 and 2 including PSC sites as described for Zone 2 and potential conduits to groundwater listed in Table 3 (see Appendix F of VA SWAP). Appendix F

Zone 2 – 1 mile fixed radius – identify potential sources of contamination (PSC) sites shown on GIS layers available from other regulatory authorities or other sources (Virginia Pollutant Discharge Elimination System (VPDES) discharges, tire piles, landfills, superfund sites, etc.).

(Virginia Department of Health, "Source Water Assessment Program" 6)

### **Conjunctive Delineation**

VDH through its SWAP TEAM, TAC, WAC and Public Participation has evaluated the factors regarding the interaction of groundwater and surface water relative to public water supply sources in Virginia. Conjunctive delineation concerns are adequately addressed by the proposed groundwater and surface water assessment strategies.

(Virginia Department of Health, "Source Water Assessment Program" 8)

VDH will continue to use these guidelines for future contaminant source inventories.

## Management Approaches

"Local governments in Virginia have the authority to employ a range of planning, regulatory, and other techniques in order to achieve wellhead protection goals. Tools, such as overlay zoning and easements, for example, are well suited to achieving land use and source controls to protect wellhead areas.

A locality's decision about which methods to employ is really two decisions. One has to do with the size and extent of the area to be protected. The other has to do with the degree of restrictiveness of the protections. If the wellhead protection area is to be of minimal size and limited to the immediate vicinity of the well, the controls may need to be relatively stringent. The protection approach for a large wellhead protection area, however, may include tiers where the restrictions reflect progressively reduced levels of control. The most restrictive controls might be placed near the wellhead, with graduated zones phasing to less restrictive provisions further from the well" (Virginia Ground Water Protection Steering Committee, "Handbook" 27).

References to Virginia's enabling legislation, §15.2-2223 and §15.2-2283 of the Code of Virginia, can be found in two of the three wellhead protection publications ("Handbook" and "Implementing") developed by the Virginia Ground Water Protection Steering Committee. These documents are available in electronic format on the Department of Environmental Quality's web page at [www.deq.virginia.gov/gwpsc/publications](http://www.deq.virginia.gov/gwpsc/publications)

Templates or model text for management options can be found in the 1998 publication developed by the Virginia Ground Water Protection Steering Committee Implementing Wellhead Protection Model Ordinances For Local Governments In Virginia. "These model texts should be viewed as starting points. While it is possible to use these model texts 'as is', it is hoped instead that they will serve as a launching pad for custom fitting provisions to each local situation. Communities should work closely with their attorney and be attentive to the concerns of property owners and citizens. No model can guarantee an absence of challenge. Laying of local political and legal ground work is essential" (5).

## **Contingency Planning**

"In deciding how big an area to protect and what protections should be applied, a locality must evaluate how dependent it is on the current supply from a given water well. A contingency plan deals with this issue, identifying how a jurisdiction would deal with a water supply disruption, as well as addressing prevention methods and mitigation measures to avert threats.

In developing a contingency plan, potential threats to ground water should be classified along with appropriate response and remediation actions. This should include specific information on the individuals responsible for coordinating and taking response action. Plans for obtaining replacement water sources should be determined and means of funding identified in the event that a problem occurs" (Virginia Ground Water Protection Steering Committee, "Handbook" 28-29).

Local protection plans should include contact information for local emergency management staff, the Virginia Department of Emergency Management, the VDH Office of Drinking Water field office, and county administrative staff.

Community waterworks serving populations over 3,300 are required to develop emergency response plans within 6 months of completion of their vulnerability assessments as required by the Public Health Security and Bioterrorism Preparedness and Response Act of 2002.

Under the Virginia Waterworks Regulations, community waterworks are required to provide a minimum of ½ day of reserve capacity in the event of source contamination and outage. Additionally, Community waterworks serving populations over 3,300 were required to develop emergency response plans within 6 months of completion of their vulnerability assessments as required by the Public Health Security and Bioterrorism Preparedness and Response Act of 2002.

Local officials should coordinate with the local emergency planning committee and the Virginia Department of Emergency Management. All emergency situations that would impact and release contaminants to the wellhead protection area should be defined by the waterworks, emergency management officials and the responsible parties of any potential sources of contamination. Response plans to mitigate the emergency in the wellhead protection area need to stress protection of water resources from contamination by released substances. These situations may include transportation accidents, tank ruptures, and spills. To assist in the coordinating activities, a GIS database of source water assessment areas and waterworks facilities has been developed and is maintained by the VDH Office of Drinking Water. This GIS database will be made available to other state agencies and local governments as needed or requested.



## **New Wells**

The VDH has established the following steps for developing new ground water based systems. VDH Office of Drinking Water, Working Memo 813 (Revised April 7, 2004)

### SEQUENCE FOR DEVELOPMENT OF A GROUNDWATER SUPPLY

- 1) Owner submits a written request to the field office.
- 2) Provide Waterworks Permit Application package. (When applicable the requirement for a Comprehensive Business Plan shall be forwarded with the permit application since it is required to be completed before drilling a well at either a proposed new waterworks or at some existing waterworks due to significant noncompliance.)
- 3) District Engineer schedules a preliminary engineering conference.
- 4) Site Approval
  - a) An Office of Drinking Water (ODW) representative conducts on-site inspection.
  - b) Well site approval/disapproval letter is forwarded to the owner.
- 5) Well Drilling
  - a) Owner contracts with a licensed well driller.
  - b) Driller completes water well completion report following well construction.
  - c) Yield and drawdown test performed by driller or owner and documented.
  - d) Chemical developmental samples for physical, chemical, and radiological analyses collected during yield and drawdown test submitted and sent to state lab or private certified lab.
  - e) Microbiological developmental samples for bacteriological analyses collected during yield and drawdown test submitted and sent to state lab or private lab.
- 6) Preliminary Engineering Report submitted (Business Plan if applicable)
- 7) Submission of Documents for Review and Approval
  - a) Three copies of detailed plans and specifications prepared by a P.E. licensed in Virginia.
  - b) Information described in 5b, 5c, 5d, and 5e.
  - c) Design information and calculations.
  - d) Recorded plat of well lot showing access road.
  - e) Recorded well lot dedication document.
  - f) Cross connection control and backflow prevention program.
- 8) Construction Permit

- a) Project approval letter and construction permit issued prior to construction.
  - b) Following construction, owner has bacteriological samples collected to verify disinfection of facilities.
- 9) Operation Permit
- a) A professional engineer (P.E.) licensed in Virginia submits a statement of construction completion to District Engineer.
  - b) An ODW representative conducts a final inspection.
  - c) If required, owner verifies that licensed operator is available.
  - d) An operation permit is prepared and forwarded to owner.

(VDH, "Working Memo 813" 5)

New ground water based systems are strongly encouraged to establish protection areas as part of well development. VDH maintains the regulatory authority for new public water supply well development.

## **Conduct Ongoing Public Education and Outreach**

The Commonwealth has a long history of promoting ground water protection through the Virginia Ground Water Protection Steering Committee. Wellhead protection has been of particular interest to the Committee since 1990. Committee members participated in publication development and workshops held throughout the 1990s. Committee members or their agencies were represented on the three committees with insight and review responsibilities for the VDH SWAP development (Waterworks Advisory Committee, Source Water Protection Team, and Source Water Assessment Technical and Citizens Committee). Source water assessment guidelines, incorporated within this document, were subject to public comment. The Virginia Ground Water Protection Steering Committee commented on the program document prior to submittal to the EPA.

DEQ staff will investigate opportunities to present the Virginia program guidelines to the general public at conferences and workshops.

Citizen input will be an integral part of implementing protection measures at the local level. "Wellhead protection is at its root a partnership - a partnership that includes consumers, land owners, water suppliers, tax payers, and other citizens as well as local staff and elected and appointed officials. To have an effective partnership, it is necessary that all the participants share at least a minimum understanding of ground water, its vulnerabilities and limits, and their own role in its use, conservation and protection" (Virginia Ground Water Protection Steering Committee, "Implementing" 63). Localities are encouraged to establish local committees for outreach and education activities as well as to provide input on management options for implementation.

## **Implementation Assistance**

DEQ and VDH will work cooperatively to make funding available to localities interested in wellhead protection activities. DEQ staff will lobby for wellhead protection activities to be eligible for funding under alternative sources (CWA Section 319, CWA SRF, etc.)

Opportunities for funding assistance will be posted to the Virginia Ground Water Protection Steering Committee's web page ([www.deq.virginia.gov/gwpsc](http://www.deq.virginia.gov/gwpsc)).

At a minimum a local protection program should:

1. Establish a local advisory committee, designate a primary contact or lead person, and allow for appropriate public participation. Representation from the local administrator's office, the locality's attorney, the local planning office and planning board, the appropriate VDH field office, the waterworks operator, and the Board of Supervisors are strongly encouraged. Local advisory committees should consider developing wellhead protection areas for water systems not owned/operated by the locality as well. Local advisory committees should encourage development of countywide protection programs. This local team serves several important functions: (1) ensuring that the concerns of different segments of the community are addressed on an ongoing basis during the planning process; (2) serving as a focal point for public input during the process of evaluating alternative management options for wellhead protection; and (3) providing a core of leadership for educating the wider public and implementing the wellhead protection program. (US EPA Handbook, 145)
2. Include ground water and wellhead protection interests in the Comprehensive Plan. The Comprehensive Plan should include a list of all ground water based public water supply systems. A map noting the system locations and designated protection areas when applicable should be included.
3. Define protection areas and manage land use activities within these areas. Local officials with land use authorities will select and implement the necessary steps to protect the water supply or supplies. This may be accomplished through strong educational programs, non-regulatory initiatives, and/or regulatory initiatives.
4. Establish a schedule to update potential sources of contamination within Zone 1 and 2 (as defined by VDH Source Water Assessment Program 1,000 ft. fixed radius and 1 mile fixed

radius respectively). At a minimum waterworks should submit contaminant source inventory updates for Zone 1 with their sanitary survey. See Appendix C.

5. Identify alternate water supply sources in the event of a contamination incident or other service disruptions. Emergency response plans should be filed with local emergency responders, include important contact information, and be reviewed semi annually.
6. Plan for the future. Discussions should be included for site selection of new sources and management tools for resource protection.

#### Support from DEQ

Water systems or local governments with defined protection areas through overlay or equivalent zoning may request priority inspections of facilities with regulated above and underground storage tanks (AST and UST). At a minimum the defined protection areas must relate to the SWAP Zone 2 (one mile radius around the well). DEQ will consider requests when establishing inspection schedules.

Consideration will be given to expanding this inspection prioritization scheme for all DEQ permitted activities.

#### Support from VDH

VDH will continue to maintain and update the SWAP GIS. Water systems or local governments requesting funding will share locational information (protection area coordinates, potential sources of contamination, etc) with the VDH SWAP GIS coordinator. VDH will update the source inventories within Zone 2 biannually; this will be accomplished through data transfer of GIS layers available from regulatory agencies. VDH will provide updated maps to water systems or local governments upon request. VDH intends to continue funding their source water protection contracts.

#### Support from other State Agencies

DEQ, through the Virginia Ground Water Protection Steering Committee, will work cooperatively to ensure that local protection areas established through overlay or equivalent zoning receive greater consideration and preferably increased prioritization as State regulatory and non regulatory programs are implemented on a day to day basis.

The Virginia Ground Water Protection Steering Committee will continue to promote ground water protection activities throughout the Commonwealth.

## References Cited

Ad Hoc Wellhead Protection Advisory Committee. Report of the Ad Hoc Wellhead Protection Advisory Committee, 1991

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Virginia Ground Water Protection Steering Committee. Implementing Wellhead Protection: Model Components For Local Governments In Virginia, 1998

United States Environmental Protection Agency. Handbook Ground Water and Wellhead Protection, 1994

United States Environmental Protection Agency. Safe Drinking Water Act, Title 42, Chapter 6A, Subchapter XII, Part E Section 300j-13 (a) (2) (A) and (B), 200

## Appendix A

### Members of the Ad Hoc Wellhead Protection Advisory Committee December 1990 - June 1991

Chris Dawson, James City County  
Robert Dowd, West Piedmont Planning District Commission  
Terry Harrington, Roanoke County  
Ron Hachey, Botetourt County  
Doug James, Prince William County  
Bill Veno, Rockingham County  
Wayne Weikel, Town of Fincastle  
Haywood Wigglesworth, Henrico County  
Terry Wagner, State Water Control Board  
Bob Taylor, Department of Health  
John Knight, Department of Housing and Community Development  
John Marling, Council on the Environment  
Ray Utz, Chesapeake Bay Local Assistance Department  
Staff assistance by Institute for Environmental Negotiation, UVA

## Appendix B

Review team for *Implementing Wellhead Protection: Model Components For Local Governments in Virginia*, 1998

Ken Coffman, Virginia Rural Water Association

Terry Harrington, Planning Director, Roanoke County

David Hirschman, Water Resource Manager, Albemarle County

Greg Kamptner, Assistant County Attorney, Albemarle County

Larry Land, Virginia Association of Counties

Doug Moseley, Central Shenandoah Planning District Commission

Jerry Peaks, Virginia Department of Health

Terry Wagner, Virginia Department of Environmental Quality

Mary Ann Massie, Virginia Department of Environmental Quality



Appendix C  
Protection Activity Summary and Source Water Assessment Update

Page one of two

Wellhead Protection Activities, to be reported as part of Sanitary Survey

Name of System \_\_\_\_\_

Address of owner/operator \_\_\_\_\_

Location of well or wellfield \_\_\_\_\_ (latitude/longitude)

VDH permit # \_\_\_\_\_

Date of last survey or evaluation by VDH \_\_\_\_\_

Is the waterworks interested in wellhead protection? Yes No

Has the waterworks initiated a written wellhead protection plan? Yes No

Have you:

Established a protection committee or team?

Defined your protection area?

Identified or updated your potential sources of contamination?

Implemented protection or management options within the protection area?

Conducted public education and outreach?

Established a contingency plan in the event of contamination?

Has there been a contaminant event since the last evaluation?

Please provide any additional details on the questions above:



## APPENDIX D

§ 15.2-2223. Comprehensive plan to be prepared and adopted; scope and purpose.

The local planning commission shall prepare and recommend a comprehensive plan for the physical development of the territory within its jurisdiction and every governing body shall adopt a comprehensive plan for the territory under its jurisdiction.

In the preparation of a comprehensive plan the commission shall make careful and comprehensive surveys and studies of the existing conditions and trends of growth, and of the probable future requirements of its territory and inhabitants. The comprehensive plan shall be made with the purpose of guiding and accomplishing a coordinated, adjusted and harmonious development of the territory which will, in accordance with present and probable future needs and resources, best promote the health, safety, morals, order, convenience, prosperity and general welfare of the inhabitants.

The comprehensive plan shall be general in nature, in that it shall designate the general or approximate location, character, and extent of each feature shown on the plan and shall indicate where existing lands or facilities are proposed to be extended, widened, removed, relocated, vacated, narrowed, abandoned, or changed in use as the case may be.

The comprehensive plan shall include a transportation element that designates a system of transportation infrastructure needs and recommendations that shall include, as appropriate, but not be limited to, roadways, bicycle accommodations, pedestrian accommodations, railways, bridges, waterways, airports, ports, and public transportation facilities. The Virginia Department of Transportation shall, upon request, provide localities with technical assistance in preparing such transportation element.

The plan, with the accompanying maps, plats, charts, and descriptive matter, shall show the locality's long-range recommendations for the general development of the territory covered by the plan. It may include, but need not be limited to:

1. The designation of areas for various types of public and private development and use, such as different kinds of residential, business, industrial, agricultural, mineral resources, conservation, recreation, public service, flood plain and drainage, and other areas;
2. The designation of a system of community service facilities such as parks, forests, schools, playgrounds, public buildings and institutions, hospitals, community centers, waterworks, sewage disposal or waste disposal areas, and the like;
3. The designation of historical areas and areas for urban renewal or other treatment;
4. The designation of areas for the implementation of reasonable ground water protection measures;
5. An official map, a capital improvements program, a subdivision ordinance, a zoning ordinance and zoning district maps, mineral resource district maps and agricultural and forestal district maps, where applicable;
6. The location of existing or proposed recycling centers; and
7. The location of military bases, military installations, and military airports and their adjacent safety areas.

The plan shall include: the designation of areas and implementation of measures for the construction, rehabilitation and maintenance of affordable housing, which is sufficient to meet the current and future needs of residents of all levels of income in the locality while considering the current and future needs of the planning district within which the locality is situated.

(1975, c. 641, § 15.1-446.1; 1976, c. 650; 1977, c. 228; 1988, c. 268; 1989, c. 532; 1990, c. 19; 1993, cc. 116, 758; 1996, cc. 585, 600; 1997, c. 587; 2003, c. 811; 2004, cc. 691, 799.)

§ 15.2-2283. Purpose of zoning ordinances.

Zoning ordinances shall be for the general purpose of promoting the health, safety or general welfare of the public and of further accomplishing the objectives of § 15.2-2200. To these ends, such ordinances shall be designed to give reasonable consideration to each of the following purposes, where applicable: (i) to provide for adequate light, air, convenience of access, and safety from fire, flood, crime and other dangers; (ii) to reduce or prevent congestion in the public streets; (iii) to facilitate the creation of a convenient, attractive and harmonious community; (iv) to facilitate the provision of adequate police and fire protection, disaster evacuation, civil defense, transportation, water, sewerage, flood protection, schools, parks, forests, playgrounds, recreational facilities, airports and other public requirements; (v) to protect against destruction of or encroachment upon historic areas; (vi) to protect against one or more of the following: overcrowding of land, undue density of population in relation to the community facilities existing or available, obstruction of light and air, danger and congestion in travel and transportation, or loss of life, health, or property from fire, flood, panic or other dangers; (vii) to encourage economic development activities that provide desirable employment and enlarge the tax base; (viii) to provide for the preservation of agricultural and forestal lands and other lands of significance for the protection of the natural environment; (ix) to protect approach slopes and other safety areas of licensed airports, including United States government and military air facilities; (x) to promote the creation and preservation of affordable housing suitable for meeting the current and future needs of the locality as well as a reasonable proportion of the current and future needs of the planning district within which the locality is situated; and (xi) to provide reasonable protection against encroachment upon military bases, military installations, and military airports and their adjacent safety areas, excluding armories operated by the Virginia National Guard. Such ordinance may also include reasonable provisions, not inconsistent with applicable state water quality standards, to protect surface water and ground water as defined in § 62.1-255.

(Code 1950, §§ 15-821, 15-968.3; 1962, c. 407, § 15.1-489; 1966, c. 344; 1968, c. 407; 1975, c. 641; 1976, c. 642; 1980, c. 321; 1983, c. 439; 1988, c. 439; 1989, cc. 447, 449; 1990, cc. 19, 169, 384; 1992, c. 812; 1993, cc. 758, 884; 1997, c. 587; 2004, c. 799.)

#### **12VAC5-590-690. Capacity of waterworks.**

B. Minimum acceptable effective finished water storage for domestic purposes shall not be less than 200 gallons per equivalent residential connection at minimum pressure.

E. Waterworks serving 50 or more residential connections with wells as the source of supply shall provide at least two water sources which do not hydraulically interfere with another source of public water supply. Consideration shall be given to requiring each source to be of a minimum

yield so its reliability is realistic. The secondary well should be rated at 20% of the waterworks capacity as a minimum.

F. Waterworks serving less than 50 residential connections with wells as the source of supply shall provide or have access to an auxiliary pump stored or stocked locally or they shall provide 48 hours of total effective storage volume based on water usage.

### **Authority for Emergency Planning & Response in Virginia**

§ 44-146.19. Powers and duties of political subdivisions.

A. Each political subdivision within the Commonwealth shall be within the jurisdiction of and served by the Department of Emergency Management and be responsible for local disaster mitigation, preparedness, response and recovery. Each political subdivision may maintain in accordance with state disaster preparedness plans and programs an agency of emergency management which, except as otherwise provided under this chapter, has jurisdiction over and services the entire political subdivision.

B. Each political subdivision shall have a director of emergency management ...

E. Each local and interjurisdictional agency shall prepare and keep current a local or interjurisdictional emergency operations plan for its area. The plan shall include, but not be limited to, responsibilities of all local agencies and shall establish a chain of command.

(1973, c. 260; 1974, c. 4; 1975, c. 11; 1978, c. 495; 1982, c. 5; 1990, cc. 404, 945; 1993, cc. 621, 671, 781; 2000, c. 309; 2003, c. 622.)

§ 44-146.20. Joint action by political subdivisions.

If two or more political subdivisions find that disaster operation plans and programs would be better served by interjurisdictional arrangements in planning for, preventing, or responding to disaster in that area, then direct steps may be taken as necessary, including creation of an interjurisdictional relationship, a joint emergency operations plan, mutual aid, or such other activities as necessary for planning and services. Any political subdivision may provide or receive assistance in the event of a disaster or emergency, pursuant to this chapter, under the provisions of any local mutual aid agreement or by the Statewide Mutual Aid program if agreed to by resolution of the governing body. The action of the governing body may include terms and conditions deemed necessary by the governing body for participation in the program. The governing body may withdraw from participation in the Statewide Mutual Aid program by adoption of a resolution or ordinance upon a finding that participation is no longer in the public interest. The locality shall immediately notify the State Coordinator of Emergency Services of the adoption of a participation or withdrawal resolution.

(1973, c. 260; 2000, cc. 309, 437.)

§ 44-146.24. Cooperation of public agencies.

In carrying out the provisions of the chapter, the Governor, the heads of state agencies, the local directors and governing bodies of the political subdivisions of the Commonwealth are directed to utilize the services, equipment, supplies and facilities of existing departments, offices, and agencies of the Commonwealth and the political subdivisions thereof to the maximum extent practicable consistent with state and local emergency operation plans. The officers and personnel of all such departments, offices, and agencies are directed to cooperate with and extend such services and facilities to the Governor and to the State Department of Emergency Management upon request.

(1973, c. 260; 1974, c. 4; 1975, c. 11; 2000, c. 309.)

12VAC5-590-10. Part I General Framework for Waterworks Regulations, Article 1. Definitions :

"Community water system" means a waterworks which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

"Noncommunity water system" means a waterworks that is not a community waterworks, but operates at least 60 days out of the year.

"Nontransient noncommunity water system (NTNC)" means a waterworks that is not a community waterworks and that regularly serves at least 25 of the same persons over six months out of the year.

## APPENDIX E

### Resources

[www.deq.virginia.gov/gwpssc](http://www.deq.virginia.gov/gwpssc) Virginia Ground Water Protection Steering Committee

[www.vdh.virginia.gov/dw/swap.asp](http://www.vdh.virginia.gov/dw/swap.asp) Virginia Department of Health, Source Water Assessment

<http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+TOC> Code of Virginia Statutes by title

<http://leg1.state.va.us/000/reg/TOC.HTM> Code of Virginia Regulation by title

[www.townhall.virginia.gov](http://www.townhall.virginia.gov) Virginia Regulatory Townhall

<http://assembler.law.cornell.edu/uscode/42/300h-7.html> Legal Information Institute, US Code, State programs to establish wellhead protection areas

<http://www.epa.gov/safewater/index.html> US EPA Ground Water and Drinking Water

<http://www.vrwa.org/> Virginia Rural Water Association

## APPENDIX F

### (Appendix F in the Virginia Source Water Assessment Program document)

Table 1  
LAND USE ACTIVITY INVENTORY  
(Community and Nontransient Noncommunity Waterworks)

CLASSIFICATION	CONTAMINANT	SURFACE WATER RISK	GROUND WATER RISK	NAICS CODE
<b>Residential/Commercial</b>				
Fuel Storage Systems [ground water only]	V	X	medium	814110
On-site sewage system [ground water only]	M, N	X	medium	814110
<b>Agriculture</b>				
Chemical/fuel storage areas	V, S, N	low	medium	111, 112
Crop and fodder production	S, N	low	medium	111
Specialty crop production/nursery (e.g. horticulture, citrus, nuts, fruits)	S, N	low	medium	112
Livestock/poultry				112
Pasture (grazing)	M, N	medium	low	112
Intensive animal feeding operations				112
Confined animal feeding operations (permitted)	M, N	high	high	112
Confined animal feeding operations (non-permitted)	M, N	high	high	112
Aquaculture	M, N	low	medium	11251
Animal burial areas	M, N	low	medium	112
Manure holding or spreading	M, N	medium	medium	112
Other				
<b>Industrial/Commercial [Dry and Discharging]</b>				
Above ground storage tank (> 660 gallons) excluding potable water and petroleum	V, S, N	medium	medium	
Animal Slaughtering or Processing	M, N	low	medium	311
Asphalt Plants	V, S, N	low	medium	32412
Car Wash	V	low	low	811192
Cemetery [ground water only]	M, N, S	X	low	812220
Coal Gasification Facility	V	low	medium	324199
Dry Cleaning Establishment	V	low	medium	812320
Electrical and Electronic Product Manufacturing	I, V	low	medium	335310, 334410
Electroplating/Metal Finishing	I, V	low	medium	332813
Fertilizer/Manufacturer/Distributor/Storage	N, S	medium	medium	325, 422
Fire Training Facilities	V	low	medium	922160
Food Processing	M, N	low	low	311
Funeral Home/Mortuary	M, V	low	low	812210
Furniture/Boat Refinish (Boat Yards)	V, S, N	medium	medium	811420, 336612
Gasoline Station/Service Center	V, S, N	low	medium	447100
Golf Course	N, S	low	medium	713910
Hazardous Waste Recovery Facility	V, S, R, M	high	high	562211
Hazardous Waste Transfer, Storage or Disposal	V, S, R, M	high	high	562
Hospital	V, S, R, M	low	medium	622110
Laboratories	V, S, R, M	low	medium	541380, 621510
Machine Shops	V	low	medium	332710
Marina [Surface Only]	M, V, S	medium	X	713930
Military Base	V, S, R, M	high	high	928110
Oil & Gas Production (Refining)/Storage/Pipelines	V	medium	medium	324110, 422710, 486910
Paint Shop	V	low	medium	811121
Pesticide/Herbicide Manufacturer/Distributor/Storage	S	medium	medium	325320, 422690, 422910,
Photo Processor/Printer	I	low	medium	812290
Pipeline / Powerline Right of Way	S	low	low	486910, 221120
Plastic Manufacturer	V, S	low	medium	326100, 325211
Power Generation Station	S	medium	low	221110
Scrap and Junk Yards	V, I	low	medium	421930
Solid Waste Collection/Transfer Site	V, S, M, I	low	low	562111
Superfund Site	V, S, R, M, I	high	high	562211
Underground Injection Well [groundwater only]	V, S, R, M, I	X	high	562
Underground Storage Tanks [excluding potable water][groundwater only]	V	X	medium	
Underground Storage Tanks [leaking][regulated][groundwater]	V	X	high	
Wood Preservative Manufacturer/Wood Preserver	S	low	medium	321114
Other				
<b>Wastewater Facilities</b>				
Combined Sewer Overflow/Discharge	M, N, V, S	high	low	22132
Septage Lagoon	M, N	medium	medium	22132



Table 1  
**LAND USE ACTIVITY INVENTORY Continued**  
 (Community and Nontransient Noncommunity Waterworks)

CLASSIFICATION	CONTAMINANT	SURFACE WATER RISK	GROUND WATER RISK	NAICS CODE
Sewer Lines (Surface-crossing and adjacent lines only) [surface water only]	M, N	High	X	22132
Storm Sewer Discharges and Stormwater infiltration ponds	V, N, S	Medium	low	22132
Untreated Piped Discharge [straight pipe]	M, N	High	low	22132
Wastewater Pump Station	M, N, V	High	low	22132
Wastewater Treatment Facility [point source discharge]	M, N, V	Medium	low	22132
Wastewater Treatment Nondischarging lagoon/mass drainfield	M, N, V	Low	medium	22132
<b>Land Disposal</b>				
Biosolids	M, N, I	low	low	111, 112
Industrial Sludge	M, N, I, S, V	low	low	562
Landfill (Lined)	M, N, V, S	low	medium	562212
Landfill (Unlined)	M, N, V, S	low	high	562212
Open Dump	M, N, V, S	low	High	5622
Septage	M, N	medium	Medium	111, 112, 562
Tire Pile	V	high	High	5622
Wastewater	M, N	medium	Medium	22132
Other				
<b>Resource Extraction</b>				
Coal	V	low	Low	21211
Oil + Gas	V	medium	Medium	211
Sand, Gravel, Limestone	V	low	Low	2123
Other				
<b>Transportation</b>				
Airport	V	low	Medium	422720
Parking Lots	V	low	Low	814
Primary Roadways	V, S, N, M, R	medium	Low	48
Railroad Tracks and Yards	V, S, N, M, R	medium	Low	482110
Salt Storage Sites	I	low	Low	48
Truck Terminals	V, S, N, M, R	medium	Medium	484
<b>Special Cases (specifically identified as a significant source of contaminants)</b>				
Barge and Vessel Traffic for surface sources		high	X	483211
Caves/Sinkholes for surface sources			X	

"x" – does not mean no risk

M = microbiological  
 N = nitrate/nitrite  
 V = volatile organic chemicals  
 S = synthetic organic chemicals  
 I = inorganic chemicals  
 R = radiological contaminants

(NOT all inclusive)

Table 2  
 LAND USE ACTIVITY INVENTORY  
 (Transient Noncommunity Waterworks)

CLASSIFICATION	CONTAMINANT	SURFACE WATER RISK	GROUND WATER RISK	NAICS CODE
<b>Residential</b>				
On-site sewage system [ground water only]	M, N	X	medium	814110
<b>Agriculture</b>				
Chemical/fuel storage areas	V, S, N	low	medium	111, 112
Crop and fodder production	S, N	low	medium	111
Specialty crop production/nursery (e.g. horticulture, citrus, nuts, fruits)	S, N	low	medium	111
Livestock/poultry				112
Pasture (grazing)	M, N	medium	low	112
Intensive animal feeding operations				112
Confined animal feeding operations (permitted)	M, N	high	high	112
Confined animal feeding operations (unpermitted)	M, N	high	high	112
Aquaculture	M, N	low	medium	11251
Animal burial areas	M, N	low	medium	112
Manure holding or spreading	M, N	medium	medium	112
Other				
<b>Industrial/Commercial [Dry and Discharging]</b>				
Above ground storage tank (> 660 gallons) excluding potable water and petroleum	V, S, N	medium	medium	
Animal Slaughtering or Processing	M, N	low	medium	311
Fertilizer/Manufacturer/Distributor/Storage	N, S	medium	medium	325310
Hospital	V, S, R, M	low	medium	622110
Laboratories	V, S, R, M	low	medium	541380, 621510
Marina [Surface Only]	M, V, S	medium	X	713930
Solid Waste Collection/Transfer Site	V, S, M, I	low	low	562111
Underground Injection Well [groundwater only]	V, S, R, M, I	X	high	562
Other				
<b>Wastewater Facilities</b>				
Combined Sewer Overflow/Discharge	M, N, V, S	high	low	22132
Septage Lagoon	M, N	medium	medium	22132
Sewer Lines (Surface-crossing and adjacent lines only) [surface water only]	M, N	high	X	22132
Storm Sewer Discharges and Stormwater infiltration ponds	V, N, S	medium	low	22132
Untreated Piped Discharge [straight pipe]	M, N	High	low	22132
Wastewater Pump Station	M, N, V	High	low	22132
Wastewater Treatment Facility [point source discharge]	M, N, V	Medium	low	22132
Wastewater Treatment Nondischarging lagoon/mass drainfield	M, N, V	Low	medium	22132
<b>Land Disposal</b>				
Biosolids	M, N, I	Low	low	111, 112
Industrial Sludge	M, N, I, S, V	Low	low	562
Landfill (Lined)	M, N, V, S	Low	medium	562212
Landfill (Unlined)	M, N, V, S	Low	high	562212
Open Dump	M, N, V, S	Low	high	5622
Septage	M, N	Medium	medium	111, 112 562
Wastewater	M, N	Medium	medium	22132
Other				
<b>Special Cases (specifically identified as a significant source of contaminants)</b>				
Barge and Vessel Traffic for surface sources		High	X	483211
Caves/Sinkholes for surface sources			X	

"x" – does not mean no risk

M = microbiological  
 N = nitrate/nitrite  
 V = volatile organic chemicals  
 S = synthetic organic chemicals  
 I = inorganic chemicals  
 R = radiological contaminants

(NOT all inclusive)

Table 3  
POTENTIAL CONDUITS TO GROUNDWATER  
(All Waterworks Utilizing Groundwater)

Abandoned Wells (which have not been permanently abandoned according to the Virginia Department of Health Regulations)
Caves / Sinkholes
Elevator shafts
Other Wells in Use (other than wells constructed in accordance with the Virginia Department of Health Regulations)
Ponds, streams
Vertical Ground Source Heat Pump systems