

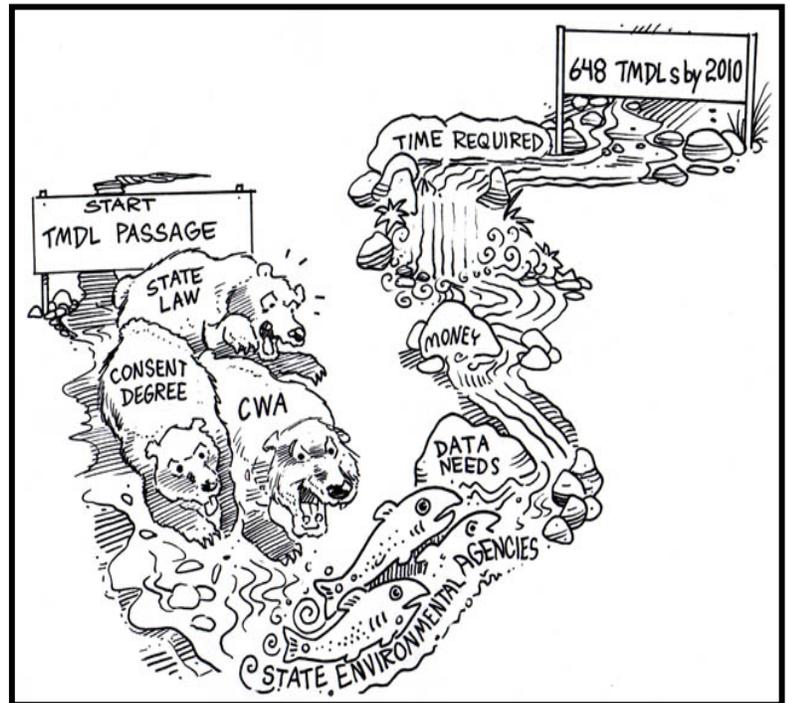
Virginia Water Central

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FEATURE ARTICLE

TMDLs Past, Present, and Future

In recent years the **Total Maximum Daily Load (TMDL) program** has become the center of attention for water-quality management. In Virginia, as in many other states, court orders have directed the U. S. Environmental Protection Agency (EPA), in partnership with the states, to implement more aggressively **Section 303(d)** of the 1977 Clean Water Act (CWA) amendments, which addresses TMDLs. Previous issues of *Water Central* (October 1998, October 1999, and December 1999) reported on the TMDL court case in Virginia and its impacts on water-quality management in the Commonwealth. This article provides an update on that activity, as well as an examination of activity on the federal level that may result in new TMDL considerations for all states, including Virginia.



INSIDE THIS ISSUE

Teaching Water _____	7
Sept. 11 Water-related Responses _____	8
EPA Statement on Water-supply Security _____	9
In and Out of the News _____	11
Notices _____	16
The Virginia STEP Program in 2001 _____	17
For the Record _____	18
You Get the Last Word _____	20

Review of TMDLs and the TMDL Story in Virginia

Let's first review the origin and use of this rather cumbersome term, "TMDL." The CWA requires states to establish by law **designated uses** for each of their regulated water bodies; in Virginia, the designated uses for state waters as a whole (not necessarily for a given water body) are support of aquatic life, drinking-water supply, fishing, shellfishing, and swimming. The combination of these designated uses, with

criteria for measuring whether the uses are being attained, makes up a water-quality **standard**. If monitoring of a particular water body finds that the one or more criteria are being violated, and consequently that the designated use(s) are not being supported, then the state is to identify the water body as **impaired**.

When a body of water is listed as impaired, a TMDL for that water body must be developed. What does it mean, under current federal and state law, to develop a TMDL?

According to the CWA's Section 303¹ and implementing regulations issued in 1992 by the EPA,² developing a TMDL requires two main things: first, a *calculation of the daily amount* of a given pollutant a body of water can receive and still meet the water body's designated use(s); second, *allocation of allowable pollutant loads*—such that the water body can meet the water-quality standard—among the various pollutant sources affecting the water body. For EPA to approve a TMDL, development of the TMDL must also meet five other criteria:

- consider the impacts of background pollutants;
- account for critical stream conditions (conditions when water quality is most likely to be violated);
- consider seasonal variation;
- include a margin of safety; and
- include public participation during the development process. (Please see page 3 for an outline of a Virginia TMDL that has been approved by EPA.)

In Virginia, however, a 1997 law adds an additional requirement.³ Not only are the

TMDL calculation and allocation steps necessary, but the State Water Control Board must also have a plan to *implement* TMDLs; that is, a plan of actions to reduce pollutant loads to the point that impaired water bodies once again meet standards.

In 1991 the Virginia Department of Environmental Quality (DEQ) began submitting lists of impaired water bodies—known as 303(d) lists—to EPA, and the state has subsequently submitted these lists every other year as required. But in 1998 EPA was sued in Virginia by the American Littoral Society and the American Canoe Association, who claimed that the state was not satisfactorily addressing its impaired waters and that EPA was obligated by provisions in CWA to move along the process. The court ruled for the plaintiffs, and a consent decree in 1999 settled the case (a consent decree is a court order to which all parties in a suit agree). The groups suing EPA agreed to rest their claim; in return, EPA and Virginia agreed to adhere to a schedule for establishing and implementing TMDLs for impaired waters identified by the state and EPA as of 1998. The time period allowed was 12 years.

Virginia, as of the 1998 303(d) reporting date, had listed 600 impaired waters. That meant, according to the consent decree, that Virginia and its environmental agencies⁴, along with EPA, had twelve years to develop TMDLs for every contaminant causing these waters to be impaired. Because a body of water can be impaired by more than one contaminant, and a given TMDL only addresses one particular contaminant, *the number of TMDLs to be developed in Virginia by 2010 is actually 648*.

Continued after box on next page

¹ This act of Congress has been incorporated into the *U. S. Code* under Title 33, Chapter 26, Subchapter III, Section 1313. You can locate this and other TMDL-related documents at the EPA's TMDL Program Web-site, www.epa.gov/owow/tmdl (click on "Policy/Program Documents").

² The 1992 regulations are in the *Code of Federal Regulations* at Title 40, Part 130, Section 130.7.

³ The law is the "Virginia Water Quality Monitoring, Information and Restoration Act of 1997" (S1122) (amended in 2000), now Sections

62.1-4.19:4 through 62.1-44.19:10 of the *Virginia Code*.

⁴ The 1997 law mentioned previously designated the DEQ as Virginia's lead TMDL agency. The departments of Conservation and Recreation; Health; and Mines, Minerals, and Energy also have TMDL responsibilities.

An Outline of an Approved Virginia TMDL*

Pleasant Run TMDL

This TMDL study was prepared by the Virginia Tech departments of Biological Systems Engineering and Biology; submitted to EPA for review on February 8, 2001; and approved in March 2001.

•**What and when was the impairment?**

In Pleasant Run, a 6.3-mile tributary to the North River (Shenandoah-Potomac Basin) in Rockingham County (about two miles SSE of Harrisonburg), 84 percent of samples from September 1993—December 1998 violated the criterion for Virginia's fecal coliform bacterial standard, preventing the stream from supporting the designated use of swimming. According to the criterion, the stream is to have a 30-day average fecal coliform concentration no greater than 200 colony-forming units per 100 milliliters of water (200 cfu/100 ml).

•**What is the TMDL calculation?**

Based on records of flow in the stream, and using a computer to model stream conditions, the calculation step of the TMDL indicates that the stream can receive no more than 2.4 trillion cfu daily in order to meet the fecal coliform criterion. Under existing conditions, the stream receives an estimated 3.2 trillion cfu daily. Therefore, a reduction of about 25 percent in the daily fecal coliform load is needed.

•**What is the allocation of acceptable pollutant loads to sources?**

According to available data, the current sources of fecal coliform bacteria in the stream are as follows:
 Cattle in streams = about 93 percent of the total;
 Runoff from upland activities = about 5 percent of the total;
 Milking-parlor washing activities and wildlife in streams = about 2 percent of the total.

A computer model generated various scenarios of reductions in the sources to achieve the calculated daily maximum load. Based on the judgment of the researchers plus public input through various meetings, the recommended scenario of reductions is as follows:

reduction from cattle in streams: 100 percent (completely exclude cattle from streams);
 reduction from milking-parlor washing activity: 100 percent (completely eliminate as a source);
 reduction from upland sources: 25 percent;
 reduction from wildlife: 15 percent.

*Internet users can find this and other TMDL reports at www.deq.state.va.us/tmdl/tmdlreports.html. Those without Internet access should contact Charles Martin through the toll-free phone number of the DEQ's Central Office in Richmond, (800) 592-5482.

Continued from page 2

Considering that mandate, the single Virginia TMDL that had been approved by the EPA and was being implemented at the time we last reported seemed like the smallest of steps at the start of a very long journey. Moreover, that TMDL—designed to reduce fecal coliform bacteria levels in a 10.4 mile section of Rockingham County's Muddy Creek—took nearly a year of study. But as the following section relates, Virginia is now a few significant steps farther along the TMDL course.

Update of TMDL Activity in Virginia

Meeting the TMDL Schedule

The most comprehensive guide (75 pages of narrative, tables, and graphs) to Virginia's efforts to meet its TMDL schedule is a November 2000 report from the DEQ to Governor James Gilmore and the General Assembly.⁵ Entitled "Total Maximum Daily

⁵ The report is available on-line at www.deq.state.va.us/tmdl/reports/hb30.pdf. The DEQ will send a printed copy to anyone who requests it; the toll-free phone number is (800) 592-5482.

Load Program: A Ten Year Implementation Plan,” the report explains how the DEQ intends to meet the TMDL timetable set by the 1999 consent decree. It provides cost projections and it acknowledges at least a few of the uncertainties that predictably accompany any effort of this size. As DEQ Director Dennis Treacy noted in the report’s executive summary, “The TMDL program represents a significant expansion in the way water quality is managed, with a change in the focus of pollution control from primarily point source controls to encompass non-point sources as well.” That expansion involves lots of questions that are still unanswered about the best methods for tracking non-point pollution sources, about the best methods for collecting and interpreting monitoring data, about how water-quality standards are set, and about how best to achieve the contaminant reductions necessary to bring impaired water bodies back into compliance with standards. The big problem, the report noted, is that there’s no time to wait for these questions to be answered, because the state and EPA are bound by the consent decree to take action.

And here’s a look at that action so far:

- EPA has approved 22 Virginia TMDLs;
- two more are awaiting approval from EPA;
- 30 more are underway and scheduled to be submitted to EPA by May 1, 2002;
- Virginia must submit another 74 for approval by May 2004, 84 more by 2006, 88 more by 2008, and 88 more by 2010.⁶

(By May 2002, DEQ hopes to submit 12 more TMDL studies than the number required at that time by the consent decree. This is because Virginia officials believe the only way they’ll make the 2010 quota is by exceeding the yearly schedules, especially in the early years.)

This list does not include 260 TMDLs for *shellfish waters*, also due by 2010. Acting on its own, without a directive from EPA or any court, Virginia placed these waters on its 303d list, because it reasoned that Virginia

Department of Health recommendations against eating shellfish from those waters indicated impairment. Now DEQ must develop TMDLs for them and is committed to doing 130 by 2006, 39 more in 2008, and 91 more by 2010.⁷

Paying for the Work

DEQ sets the cost for developing all these TMDLs, following current development and approval practices, at nearly \$60 million. Is the money available? Currently the agency has only a \$1.5 million commitment from the state, plus another \$16.7 million in grants from the EPA; that leaves a shortfall of about \$42 million. And this shortfall does not account for the biggest cost that will be associated with TMDLs—the costs of *implementing* the recommendations made for eliminating the impairments. Those costs, DEQ estimated in its November 2000 report to the legislature, will top \$500 million. There is no indication yet where that money will come from, although DEQ argues in the November 2000 report that the federal government should bear at least half the cost of developing and implementing TMDLs.

In a recent interview, David Lazarus, with the DEQ in Richmond, said that the costs are as high as they are—the current average cost of developing a TMDL in Virginia is about \$60,000—because TMDL development entails professional services and the compilation of lots of data. Of the TMDLs under development right now, about half are contracted out to private environmental engineering firms, and the other half to professors and other personnel at state universities. Mr. Lazarus said the state’s environmental agencies lack the staff to do the work “in house,” especially considering the strict timetable set by the consent decree. He concluded that it’s still unclear where Virginia will find the funding for the bulk of the TMDLs.

⁷ Note that Virginia is bound to do not only the 648 TMDLs cited above. In addition, beyond the scope of the 1999 consent decree, the state continues to monitor its waters and continues to report impaired ones to EPA. These, too, may eventually require TMDL development and implementation.

⁶ The figures cited here are from the November 2000 report, with additional information provided in November 2001 by David Lazarus at DEQ.

One time- and money-saving effort by DEQ and the Department of Conservation and Recreation is an attempt to develop TMDLs in *batches*. In appropriate situations, the agencies assign individual contractors to develop TMDLs *simultaneously* for impaired streams within the same watershed.

Typically the contractors are able to use the same watershed characteristics in their computer model, as well as much of the same data for each impaired water, lowering the total study costs.

Virginia's agencies are using other approaches, as well, in managing their TMDL responsibilities. Charles Martin, at the DEQ in Richmond, provided DEQ's perspective on these efforts in the following comments (all quotes in the following four "bulleted" sections are from Mr. Martin):

- The consent decree requires EPA Region III to provide Virginia by June 2002 with a method for developing shellfish TMDLs. In February 2001, DEQ formed a work group—with representatives from Virginia, Maryland, the EPA, and the U. S. Geological Survey—to develop a method. In September, the group endorsed a simple spreadsheet approach proposed by DEQ for shellfish waters with bacterial impairment, and EPA Region III has approved the approach. The preliminary cost estimate using this method is \$8,000 per TMDL.

- DEQ is now working with EPA Region III to expand statewide the spreadsheet method developed for shellfish waters. "We anticipate the development costs will be similar to the shellfish TMDLs. Although this [approach] will not eliminate the need for complex modeling for some TMDLs, we anticipate that the availability and subsequent use of the [approach] will [significantly reduce the cost of] TMDL development over the next nine years."

- DEQ is beginning an approach of "targeting some marginally impaired waters and making them a high priority for implementing pollutant-reduction strategies. If federal or state funding is available, strategies could be implemented to achieve pollution reductions in [these waters]." If

subsequent monitoring data showed that water quality standards are achieved, DEQ would submit a request to EPA to "de-list" the stream from the impaired waters list. If the waters were in fact de-listed, then the state would not have to pay to develop TMDLs for the waters.

- Finally, a current focus at DEQ is "to ensure that the water quality goals we are trying to achieve are appropriate and worth the resources that will need to be spent to achieve them." Violation of the bacteria criteria in waters designated for *primary* contact, i.e., swimming, is the most common cause of impairment in Virginia's impaired waters list. At its December 2002 meeting, the State Water Control Board was expected to consider whether the State Water Quality Standards should designate some waters as suitable only for *secondary* contact recreation, i.e., wading or fishing, but not swimming. "The bacteria levels needed to protect public health for wading or fishing uses is not as stringent as for swimming. Thus, the cost of TMDL implementation would not be as great in those instances."

Monitoring Developments

Besides requiring a TMDL implementation plan, the 1997 General Assembly act mentioned above also directed the DEQ to increase its monitoring of state waters. The expectation was that all stream miles would be monitored more frequently.

As reported in our October 1999 TMDL update, the state at the time was monitoring 17,000 miles of Virginia's nearly 50,000 total stream miles. Ideally, the goal is for every water body to be monitored, but as Roger Stewart and others in DEQ's water-quality monitoring division note, the state does not have the funds or the personnel to do this. Instead, said Mr. Stewart, Virginia has developed and refined a plan by which it says it can assure regular monitoring in 493 defined watersheds. The plan calls for *rotating* the monitoring effort among these watersheds, so that over the course of six years every water body will have been monitored for at least two years. Larger water bodies—such as rivers—will be

subdivided into 10-mile segments, with each segment monitored under the same approach. The DEQ believes that this approach will provide more comprehensive information for assessing water quality than has been available in the past.⁸

Update on the National Scene

As an indication of how central the TMDL program has become in the past few years in the national effort to reduce impairment of the nation's waters, let's examine the fate of EPA's "July 2000 Rule." This was a regulation issued by EPA to revise the requirements (set previously by regulation in 1992, as noted above) for establishing TMDLs.⁹

A number of provisions generated controversy. Some people argued that the rule required data and modeling capabilities that were not available. Other critics questioned the EPA requirement that TMDLs include an implementation strategy for all pollutant sources, with "reasonable assurances" that the strategy would become a reality. The implementation strategies would have to be submitted along with the currently required parts of a TMDL (described above), which is standard practice in Virginia but not in many other states.

Almost immediately after EPA issued the final rule, the agency was sued in federal court. The lawsuit claimed that, under the CWA, EPA could only require state TMDL plans to include estimates of the maximum loads that would be consistent with achieving water-quality standards, and estimates of the reductions necessary from point and nonpoint sources to meet the standards. The lawsuit also claimed that EPA's enforcement authority under CWA applied only to point sources.

Complaints about the July 2000 rule did not stop at the courthouse. In October 2000,

⁸ For a more detailed look at the DEQ's water-monitoring activities, please see the agency's Web-site at www.deq.state.va.us/tmdl/.

⁹ The rule was first proposed in the *Federal Register* on August 23, 1999. The final rule was published in the *Register* on July 13, 2000.

Congress passed a one-year moratorium on the rule and commissioned a National Academies of Science (NAS) panel to study the adequacy of available data and models to support the TMDL program.

Virginia Water Center Director Leonard Shabman helped coordinate the efforts of the NAS panel. In an interview for this article, he reported that the panel endorsed the TMDL program's *watershed approach* to water-quality management (called for by the CWA's Section 303d) and felt that available data and models are adequate to move forward with that approach. He noted, however, that the panel did have many concerns.

One key concern was that the program should focus on reducing *all* the stresses that affect the water body, not just pollutants (that is, account also for physical impacts on water bodies, such as alteration of stream channels). A second major concern was that decision makers were not taking into account *uncertainties* about TMDL data and computer-model predictions of the causes of impairments and the appropriate solutions. The panel recommended that TMDL implementation move forward by focusing on actions most likely to have results, but that implementation be accompanied by monitoring to identify any new or modified actions needed to reduce impairments. The panel also called for clarification of water-quality standards, enhanced monitoring, and use of valid statistical procedures for any listing that leads to a TMDL. In all, the panel made over 20 findings and recommendations for improving the TMDL program's scientific foundation.¹⁰

Following the release of the NAS study in June 2001, EPA administrator Christine Todd Whitman announced that the TMDL rules governing data collection, data interpretation and analysis, modeling for setting TMDLs, and implementation

¹⁰ The NAS report, *Assessing the TMDL Approach to Water Quality Management*, is available for free on-line at books.nap.edu/books/0309075793/html/index.html. Printed copies are available for a charge from the National Academy Press by calling (800) 624-6242 (toll-free) or (202) 334-3313.

requirements would be subject to further public meetings and review. A final release for the new rule is scheduled for March 2003. In addition, EPA's request for a suspension of the lawsuit over the July 2000 Rule was granted by the U. S. Court of Appeals for the District of Columbia. The court agreed to an 18-month suspension of the suit in conjunction with the agency's decision to suspend implementation of the rule while it considers revisions.

No Conclusion Yet

This article recaps the TMDL story to date—but the situation is definitely *fluid*.

Virginia is proceeding under current federal regulations, state law, and the consent decree to develop TMDLs and to

enhance its water-quality monitoring activities. We won't know, however, until late March 2003 how federal actions may change the way these activities will be conducted in the future. Congress and federal regulators may be influenced by the many questions that arose in the NAS study:

- What data, and how much data, will be used in assessing waters?
- What statistical procedures will be used to interpret the data?
- What opportunities will arise to set water-quality standards as part of the TMDL effort?
- What models will be used for TMDLs and will models be needed in all waters?
- What constitutes "reasonable assurances" that impairments will be addressed?

Of course, additional court action may follow any new regulation.

Stay tuned.

—David Mudd and Alan Rafto

TEACHING WATER Especially for Virginia's K-12 teachers

This Issue and the Virginia Standards of Learning

Below are suggested Virginia Standards of Learning (SOLs) supported by this issue's Feature (pp. 1—7) and "For the Record" section (pp. 18—19). Abbreviations: BIO=biology; C/T=computer technology; ES=earth science; LS=life science.

Feature Article—TMDLs

Science SOLs: LS.12, BIO.9.

Social Studies SOLs: 7.4, 12.6, 12.7, 12.8, 12.13, 12.16.

For the Record—Virginia General Assembly

Social Studies SOLs: 7.2, 7.3, 7.4, 7.9, 12.7, 12.8, 12.13.

Computer Technology SOLs: C/T5.3, C/T8.4.

For the Record—Water Quality

Science SOLs: 3.9, 3.10, 4.5, 4.8, 5.6, 6.11, LS.12, ES.7, ES.9, BIO.9.

Social Studies SOLs: 7.4, 10.2, 10.7.

Computer Technology SOLs: C/T5.3, C/T8.4.

SCIENCE BEHIND THE NEWS...



...will return next issue with a look at the "safe yield" concept of water-supply management, by William Cox of Virginia Tech's Civil Engineering Department.

A REVIEW OF WATER-RELATED RESPONSES TO SEPTEMBER 11, 2001

The attacks on September 11, 2001, are affecting water-resources policies and management in various ways. The immediate response involved identifying and protecting against potential contaminants in air, soil, or drinking water at or near the sites. Increased waterways security on the Potomac River near Washington was another immediate response. In three water-related areas—safety of water supplies and facilities; money; and issues regarding access to information—the country's responses have been evolving since the attacks and will continue to do so for some time. The following summaries highlight some of the responses in those three areas.

Safety of Water Supplies

- The EPA has responsibility for protection of water supplies and facilities from terrorist attack. On Oct. 5, Director Christine Whitman announced the formation of a Water Protection Task Force, charged with “helping federal, state, and local partners expand their tools to safeguard the nation’s drinking water supply from terrorist attack.” Also on Oct. 5, EPA issued guidance to water systems on improving security. (EPA Press Release, Oct. 5)

- Tighter security measures were reported at water-supply facilities in several localities in Virginia and neighboring areas. A newspaper reporter’s unhindered access to a Richmond water facility in led to a warning from the EPA for the city to increase security at the plant (which the city did do). (*Washington Post*, Oct. 4; *Roanoke Times*, Oct. 11; *Winston-Salem Journal*, Oct. 17; *Harrisonburg Daily News-Record*, Oct. 25; *Richmond Times Dispatch*, Nov. 16)

- The EPA is collaborating with the American Water Works Association (AWWA) and the AWWA Research Foundation to train water-facility personnel in advanced ways to protect their systems. (EPA Office of Water Web-site: www.epa.gov/safewater/security/secfs.html, Dec. 5)

Money

- On Oct. 10, Assistant Army Secretary for Civil Works Michael Parker told the House Water Resources and Environment Subcommittee that the Corps would need hundreds of millions of dollars to implement increased security at the dams, locks, and hydropower facilities that the Corps oversees. The cost estimated by Mr. Parker was \$267.3 million in the first year and \$65 million annually afterwards. (EPA Press Release Oct. 5; and *Water Policy Report*, Oct. 22)

- Several members of Congress wrote to President Bush on Oct. 11 asking him to support more money for drinking-water suppliers to “conduct

vulnerability assessments and begin revising and updating emergency response plans to address intentional acts of terrorism.” The letter cited Association of Metropolitan Water Agency estimates of \$81 million for these tasks at large water systems (serving over 100,000 people) and \$68 million for medium-sized systems (serving 50,000—100,000 people). (*Inside EPA’s Water Policy Report*, Oct. 22)

- On Oct. 30, Sen. James Jeffords (I-Vt.) and Rep. Sherwood Boehlert (R-N.Y.) introduced the Water Infrastructure Security and Research Development Act (S.1593 in the Senate, H.R.3178 in the House). It would provide \$12 million per year in FY’s 2002 through 2007 to support research and development of security measures for water facilities. (Thomas Legislative Information Web-site: thomas.loc.gov/home/thomas.html, Dec. 5)

Information Access

- A \$560,000 EPA grant will fund an Association of Metropolitan Water Agencies’ project to develop an Internet-based system for water suppliers, law enforcement officials, and emergency responders to share security and emergency information. A key part of the project will be how to prevent unauthorized people from getting access to the information. (*Water Policy Report*, Oct. 8)

- A new EPA work group on information security is to review the agency’s Web postings and documents available in libraries to identify information on water facilities that could help a potential saboteur. (*Water Policy Report*, Nov. 5)

- Various federal and state agencies have made efforts to restrict public access to certain information—on water supplies and facilities, chemical location and storage, transportation of materials and other subjects—that, prior to Sept. 11, was available on Web-sites, in libraries, or by request through the Freedom of Information Act. (*Washington Post*, Oct. 4; *Water Policy Report*, Oct. 8 and Nov. 5; OMB Watch Web-site: www.ombwatch.org, Dec. 5.)

A STATEMENT FROM THE U. S. EPA ON WATER-SUPPLY SECURITY

The following information (pages 9 and 10) is from the U. S. EPA's Office of Water Web-site at www.epa.gov/safewater/security/secqanda.html, as of December 5, 2001. It is reprinted here with no changes to content.

PROTECTING THE NATION'S WATER SUPPLIES FROM TERRORIST ATTACK

People have grown understandably concerned about the safety of America's drinking water supply. It is a concern we all share and that is why EPA has been working hard with our partners in the drinking water industry to disseminate to America's water utilities useful information about steps they can take to protect the Nation's drinking water. Below are the frequently asked questions we [EPA's Office of Water] have been receiving concerning drinking water safety.

Q: Is the Nation's drinking water supply safe from terrorist attack?

In general, the threat of contamination of drinking water through terrorist activities is small. Most contaminants would need to be used in very large quantities, thereby minimizing an actual threat. Treatment processes already in place will deactivate many contaminants. Also, following the tragic events of September 11, 2001, drinking water utilities across the nation were alerted about the need to increase security and have augmented surveillance and protection measures.

Q: What kinds of threats or terrorism are there to drinking water?

The primary threats to the Nation's drinking water supplies are contamination by chemical, biological or radiological agents; damage, destruction, or sabotage of physical infrastructure; and disruption to computer systems. Generally, biological agents considered to be weapons of mass destruction pose the most danger in aerosol form (i.e., direct exposure to pathogens transported in the air).

Q: What is EPA doing to protect the drinking water supply?

EPA is working in partnership with state and local governments to protect the Nation's drinking water supply from terrorist attack. Under Presidential Decision Directive (PDD) 63, issued in May 1998, EPA was designated as the lead agency for the water supply sector. The following is a brief description of the activities that have taken place since that directive.

- In September 1998, the Agency established a public/private partnership with water-related organizations and subsequently appointed Diane Van de Hei, executive director of Association of Metropolitan Water Agencies (AMWA), as the water sector liaison to the federal government on critical infrastructure.
- Over the past several years, EPA and its partners have developed training for utilities on how to assess vulnerabilities, determine what actions need to be taken to guard against attack, and develop emergency response plans.
- In October 2001, [the] Water Protection Task Force was established to ensure that activities to protect and secure water supply infrastructure are comprehensive and are carried out expeditiously.
- In October 2001, EPA disseminated to America's water utilities useful information about steps they can take to protect their sources of supply and their infrastructure. Working with the FBI, EPA also sent notice to local law enforcement agencies asking them to work closely with their local water utilities to provide extra security.
- EPA is working with Sandia National Labs and AWWA to develop training materials for water companies to help them conduct thorough assessments of their vulnerabilities.

Q: Is bottled water safer than water from my tap?

Bottled water is not necessarily safer from terrorist attack than your tap water. Bottled water is valuable in emergency situations (such as floods and earthquakes), and high quality bottled water may be a desirable option for people with weakened immune systems. In most cases, bottled water comes from a water source just like water from your tap. The safety of bottled water depends on the safety and emergency response plans in place at the bottling plant. Tap water is protected at the drinking water facility through local security measures advocated and supported by EPA, state and local governments, as well as state and local-based water organizations.

Q: Will boiling water help?

Boiling water is effective in removing certain contaminants. When microorganisms, like those that indicate fecal contamination, are found in drinking water, water suppliers may be required to issue boil water notices. Boiling water kills these organisms that can cause disease. However, boiling water containing certain contaminants, such as lead and nitrate, will increase the concentration and the potential risk. It is best to check with your local water utility or health department to determine if boiling water is necessary.

Q: Could a small amount of biological or chemical agent introduced into a source of drinking water contaminate a whole city's drinking water supply?

Not likely. Over the years, EPA, with other federal experts at the Centers for Disease Control and the Department of the Army, have studied chemical and biological threats to water. We have consistently found that it would take very large amounts of a contaminant to threaten the safety of a water system. Because of increased security at water reservoirs and utilities around the country—and because people are being extra vigilant as well—it would be difficult for someone to introduce the quantities needed to contaminate a system without being detected. In addition, should a contaminant be introduced, the treatment system already in place for treating drinking water before it comes out of the tap will, in many cases, remove the immediate threat to public health.

Q: If a terrorist attack on my water supply is carried out, how will I know? Will I be able to tell if my water is contaminated?

In the unlikely event of an attack on your local water system, the drinking water utility would activate its existing emergency response plan with local law enforcement and state emergency officials. These plans provide for shutting down the system, notifying the public of any emergency steps that need to be taken, like boiling water, and providing an alternative source of water, if needed. Follow the advice of your water supplier if you receive notice of a threat.

Q: What should I do if I see someone or something around my drinking water supply that looks suspicious?

As soon as possible, contact your local law enforcement authorities, or 9-1-1, to report a suspicious event, or if you witness a perceived terrorist activity. Remember, the more facts that you can provide, the quicker the response time. Please, be prepared to provide detailed information to help the authorities as much as possible.

Q: Where can I get more information?

Safe Drinking Water Web Site (www.epa.gov/safewater/)

Safe Drinking Water Hotline (800) 426-4791

Drinking Water Basics (www.epa.gov/safewater/dwhealth.html)

More Frequently Asked Questions (www.epa.gov/safewater/faq/faq.html)

Local Drinking Water Information (www.epa.gov/safewater/dwinfo.htm)

Centers for Disease Control and Prevention (www.cdc.gov/)

IN AND OUT OF THE NEWS

Newsworthy Items You May Have Missed

The following summaries are based on information in the source(s) indicated at the end of each item. Selection of this issue's items ended December 10, 2001. Unless otherwise noted, all localities mentioned are in Virginia and all dates are in the year 2001.

Drought-related News

- One indication of this fall's drought is the U. S. Geological Survey's (USGS) "**average streamflow index.**" For each of 62 stream-gaging sites with at least 30 years of records, the USGS compares the daily flow to the historical average for that day. Combining the daily readings for all 62 sites gives the statewide average. Through all of October and November, the statewide average for Virginia indicated below-normal streamflow. (USGS Web-site, water.usgs.gov/, Nov. 27)
- Below-normal rainfall over the past two years is affecting **groundwater levels**, as well. In late November, David Nelms, a groundwater specialist with the USGS in Virginia, stated, "The groundwater levels in some places [in Virginia] are [at] all-time lows. The rest are at normal or below normal." (*Danville Register & Bee*, Nov. 27)
- Low groundwater levels can cause a problem in **applications for federal drought relief funds**, because such funds are pegged to rainfall levels, rather than water table readings. For example, in Bedford County, Farm Service Agency Director Wayne Ampler's first request this year for emergency funds was denied in July because rainfall levels were not off significantly at the time, though the water table was low and dropping. He subsequently reapplied, using USGS data to document the groundwater conditions. (*Lynchburg News & Advance*, Oct. 22)
- Warm temperatures and low humidity increased the **vulnerability of Virginia's forests to wildfires**, leading to a statewide ban on outdoor burning from October 27—December 11. Statewide between January 1 and December 7, 2,481 fires were reported, affecting 21,352 acres. (Va. Dept. of Forestry Web-site, www.dof.state.va.us/, Dec. 11)
- As of November 21, **Maryland was having its driest autumn on record.** Rainfall at Baltimore-Washington International Airport was 2.2 inches between September 1 and November 21, seven inches below normal for that period.

Streamflow in 26 of 44 streams monitored by the USGS in Maryland and Delaware were less than 10 percent of the average flow for this time or year. (*Baltimore Sun*, Nov. 21)

- Researchers at the **University of North Carolina** at Chapel Hill will soon **start tracking drought status** and the potential for drought recovery across the state **via remote image sensing** and high-resolution satellite imaging. Standard measures of stream flow and reservoir levels are of limited use when drought conditions require water-supply managers to decide on a daily and sometime even hourly basis whether to limit water use. Geographers at the school believe the new satellite-driven information will make the job easier. (North Carolina Water Resources Research Institute's annual guide to current research, July 1, 2001 to June 30, 2002)

Other News in Virginia...

- More than **1,400 acres along the Potomac River in King George County have been preserved** through an agreement between several government agencies and the landowner. The U. S. Fish and Wildlife Service, the Va. Department of Conservation and Recreation, and the U. S. Army Corps of Engineers paid \$1.5 million to owner James Nash, who agreed to make the land a natural preserve barred from development. The agreement also involves restoration of some adjacent wetlands. The property borders another preserve, the Caledon Natural Area. The purchase was arranged by the Trust for Public Land. (*Bay Journal*, September 2001)
- The **southwestern Virginia town of Tazewell's** council voted in September to pursue eligibility for **a federal program to purchase homes that have been flooded** more than once. The Federal Emergency Management Agency's (FEMA's) hazard-mitigation fund has \$1.5 million available for this purpose in the area. Homeowners would apply to have their properties purchased with mitigation funds; if approved, the purchased property would be turned over to the

town. The town was to learn by November 15 if it was eligible; actual applications would be due by January 31, with FEMA decisions by July 31, 2002. (*Richlands News-Press* and *Clinch Valley News*, Sept. 12)

- The **U. S. Army Corps of Engineers** is considering a number of changes to the way it disposes of **sediments from the Dalecarlia Water Treatment Plant** in the Washington, D.C. area. The Dalecarlia plant is part of the Corps' Washington Aqueduct project, which supplies drinking water for about a million consumers in Falls Church, Arlington, and the District of Columbia. The Corps is hoping to lessen the alleged environmental impact of disposing of the sediments—which contain significant amounts of aluminum sulfate, a coagulant used in the treatment process—in the Potomac River. Under consideration are measures such as further diluting the sediments before discharge and changing the discharge schedule to avoid fish-spawning times (the latter was recommended in a recent U. S. EPA study). The Corps operates two drinking-water treatment plants in the D.C. area, which together result in discharge of over 200,000 tons of sediments (with about 10,000 tons of aluminum sulfate) into the Potomac each year. (*Washington Post*, Oct. 18)

Meanwhile, the Maryland Department of the Environment (MDE) and the National Wilderness Institute have claimed that the Corps is violating Maryland law and D.C. water-quality standards when it rinses its sedimentation basins with tap water that contains chlorine. Chlorine is considered a contaminant in waterways, and the Corps has no state permits to discharge any amount of chlorine into the Potomac. The Corps has admitted using treated water to rinse the sedimentation basins but reportedly is developing a plan to correct the problem. MDE alleges, however, that the Corps has failed to report some additional chlorine discharges, as required. MDE has also noted some inadequate monitoring records and sampling frequency by the Corps. (*Washington Times*, Nov. 26)

- Paolo Scardina, a Virginia Tech civil engineering graduate student, has been making some interesting discoveries about the **problems of air bubbles in water treatment**. Scardina has documented several problems caused by air bubbles: they can punch tiny holes in delicate filters (allowing particles and pathogens to pass through the filters); they can actually transport contaminants; and their presence can skew water-quality testing results, because the bubbles can

register as particles or pathogens instead of as simple pockets of air. Scardina's work has caught the interest of the water treatment industry, and earned him a \$150,000 grant recently from the American Water Works Association Research Fund. (*Virginia Tech Spectrum*, Oct. 19)

- In October the Chesapeake Bay Foundation (CBF) announced the results of its **annual study of environmental conditions in the Bay**. Out of a possible 100, based on 13 key indicators, the foundation says the Chesapeake this year merited a 27, down a point from 2000. The lowest score CBF has found was a 23 in the early 1980s. Among the factors that kept the score low this year were continued development in the Bay watershed and a decline in Blue Crab populations. Factors helping to raise this year's score included increasing populations of Striped Bass (Rockfish) and American Shad, and progress in establishing forest buffers along waterways. (*Washington Post*, Oct. 24)

- Virginia Tech dedicated its new **Horseshoe Crab Research Center** in October. The center hosts more than 200 adult animals, the largest captive collection in the country. Horseshoe Crabs have ecological, economic, and medical importance. The center was established to assist faculty and students at several colleges within the Tech system with research on managing the country's horseshoe crab population. Funds for the research come from BioWhittaker, Inc., Virginia Sea Grant, the National Fish and Wildlife Foundation, the Atlantic States Marine Fisheries Commission, and the states of New Jersey, Maryland, and Delaware. (*Virginia Tech Spectrum*, Oct. 26)

- A debate is underway about **whether or not to introduce a nonnative oyster species into the Chesapeake Bay**. With populations of the native oyster, *Crassostrea virginica* significantly reduced by disease, there is great interest in a species from Southeast Asia, *C. ariakensis*, which has done well in controlled research projects. Introduction of reproducing populations into the Bay would represent a major step beyond this research. Some in the oyster industry are advocating such an introduction, while some scientists and natural resource agency officials are wary of unforeseen, potentially negative consequences if the alien oyster were to establish a reproducing population. Past introductions—both intentionally and unintentionally—of various non-native aquatic species into U. S. water have often had disastrous economic and ecological

consequences. (For background on non-native aquatic species introductions, please see the Aug-Sept. 2001 *Water Central*, p. 7.) The Chesapeake Bay Program plans to form a task force to study the issue and make recommendations to Bay jurisdictions. (*Bay Journal*, November 2001)

- A special strategy group assembled by the Chesapeake Bay Program announced in October a voluntary program it hopes will lead industries to phase out **“mixing zones” in the Bay and its tributaries** by 2010. Allowed under the federal Clean Water Act, mixing zones are areas beyond the ends of discharge pipes where the levels of certain chemicals are allowed to exceed water quality standards while they are being diluted (mixed). The mixing zones are supposed to be designed in ways that minimize impacts on aquatic life. But there are concerns that even small amounts of some chemicals (such as mercury, lead, and dioxins) pose long-term hazards as they accumulate in sediment and become concentrated in the food chain.

The Bay Program group’s strategy is to use a phased-in approach and to start with areas in the watershed known to have contamination problems (Baltimore Harbor, the Anacostia River, and the Elizabeth River) or suspected of having problems (10 tidal river areas). The strategy group has noted many challenges to convincing dischargers to phase out mixing zones voluntarily. But that same voluntary aspect, plus the long lead time and the possibility of additional legal restrictions on mixing zones are considered incentives for participation. In the Great Lakes, for example, U. S. EPA regulations require the eventual elimination of mixing zones for chemicals that accumulate. (*Bay Journal*, November 2001)

- The Alliance for the Chesapeake Bay is planning to convert an old sand and gravel mine on the James River into a **“donor bed” for submerged aquatic plants** (SAVs, or “underwater grasses”) that can be transplanted to the Bay. The abandoned mine created a protected cove in the James that should be conducive to growing the plants, and in Spring 2002 the Alliance will set out 3000 plants purchased mostly from laboratories. Groups seeking to transplant such plants to help restore SAV areas in the Bay face increasingly tighter restrictions as state governments seek to protect their *existing* SAV areas. The donor bed will help ease that problem, although groups must still get permits to reintroduce the plants to the Bay. The Alliance hopes that donations from the site can begin in 2003. (*Bay Journal*, November 2001)

- The southwestern Virginia town of Galax.** The town is facing as much as \$52,500 per day in penalties for unauthorized discharges of polyaluminum chloride—a water-treatment coagulant—and for failure to keep accurate discharge records. The violations are alleged in a lawsuit filed by the U. S. Department of Justice at the request of the EPA. (*Roanoke Times*, Nov. 27.)

...and Outside of Virginia

- In response to reports that some people crossing illegally into southwestern U. S. deserts from Mexico were dying from dehydration, a group called Humane Borders placed **two 60-gallon water tanks in Arizona’s Organ Pipe Cactus National Park** in March. Unfortunately, that didn’t keep Jorge Alonso Mireles, one of group of eight Mexicans who crossed into the park illegally this summer, from succumbing to the desert heat and dying. Mireles’ brother, also part of the group, said they reached the tanks but his brother was so dehydrated by then he could not keep the water down. U. S. Border Patrol officers feared that other people would be emboldened by the presence of water to make similarly risky treks across the desert that they might not otherwise attempt. Humane Borders, however, contended that many other people had reached and used the tanks and then continued on their way. The Border Patrol agreed to allow the tanks to remain and said it would not use them as a place to lie in wait for illegal border crossers. (*Arizona Water Resource*, July-August, 2001)

- In 2001, **American Shad migrated up the Susquehanna River in record numbers** for the second year in a row. At the Conowingo Dam, 193,574 of the fish passed during the spring spawning run, compared to 153,546 in 2000. The Susquehanna has historically been the species’ largest East Coast spawning area. Strong runs were also reported Maryland and Virginia. U. S. Fish and Wildlife Service officials cited ideal spring weather and continued stocking as important factors in the increased numbers. (*Bay Journal*, September 2001)

- As of July 2001, **new regulations in Maryland** stipulated that **poultry-processing companies** Perdue Farms, Inc., Tyson Foods, Inc., and Allen Family Foods, Inc. must ensure that their contract farmers have workable poultry-waste-management plans. Previously, the responsibility for problems associated with manure from chickens grown for processing rested only with farmers who raise the birds, not with the

processing companies. Companies that violate the new rules could be fined as much as \$27,500 per day for each violation. State officials expected legal challenges from the companies. (*Bay Journal*, September 2001)

•**Zebra Mussels have been detected in a New York reservoir** at the northern end of the Susquehanna River basin (part of the Chesapeake Bay drainage area) and are thought to be moving downstream. Accidentally introduced to the United States from the Caspian Sea, Zebra Mussels are voracious eaters that can quickly overwhelm native mussel species, cause problems for boaters, and clog water-supply intake pipes. Scientists and state officials don't worry too much about the Bay itself, because Zebra Mussels don't thrive in salty waters; rather, the concern is for potential impacts on rivers and lakes throughout the region. (*Bay Journal*, September 2001)

•In response to concerns that not enough of the nation's waters are being monitored for quality, the **EPA, state water officials, and other federal agencies will conduct a review of state water quality programs**. States are reporting to EPA that budget and staff constraints are making it difficult to stretch their monitoring capacity to all their state waters. Some states have said they are only able to monitor the waters that have been declared "impaired," in order to determine whether the plans they've devised for easing those impairments are working. The Association of State and Interstate Water Pollution Control Administrators was to establish a task force by late September, manage the review, and report its conclusions in 2002. (*Water Policy Report*, Sept. 10)

•The EPA announced on October 31 that it would adopt a **new standard for the amount of naturally occurring arsenic in drinking water**. At 10 parts per billion (10 ppb), the proposed standard would be that same as the one proposed in the waning days of the Clinton Administration. That earlier standard was placed on hold earlier this year by the incoming Bush Administration. Now, after reviewing a report released in September by the National Academy of Sciences (NAS), which said the health risks posed by arsenic are much greater than previously assumed, EPA will proceed to reduce the allowable arsenic limit down from 50 ppb to 10 ppb by 2006. Several observers have claimed, however, that the NAS report supported an even lower standard, at 3 ppb.

EPA was also guided by a study released in August by a task force of the National Drinking Water Advisory Council (NDWAC). That group examined the likely national costs of imposing stricter arsenic standards. The task force concluded that the costs projected by the Clinton Administration were fairly accurate. The task force recommended in its report that Congress establish a fund to help small water systems deal with the increased costs of removing more arsenic during the treatment process.

Some environmental advocacy organizations are in a quandary as to whether to support the EPA's move on the arsenic standard. While the new standard would dramatically reduce the allowable amount of arsenic in drinking water, it would allow water-treatment plants to continue the practice of disposing of arsenic residue on water filters at municipal landfills. Some worry that arsenic disposed of in this manner will leach back into groundwater surrounding the landfills, then reach drinking water sources. EPA argues that testing does not indicate such leaching occurs, but some environmental organizations and researchers argue that the tests EPA points to are flawed, and that its methods of testing should be updated. The NDWAC cost report, meanwhile, suggested that the national costs associated with arsenic removal would soar much higher if EPA ruled that local water systems could no longer dispose of arsenic-containing filters in landfills.

EPA plans to provide \$20 million in research and development of cost-effective arsenic removal techniques to help small water systems, but the agency has said nothing so far about disposal. (NDWAC Arsenic Cost Working Group Report, Aug. 14; *Washington Post*, Sept. 10 and Nov. 1; and *Water Policy Report*, Sept. 10 and Oct. 8)

•**Lake Hamoun, Iran's largest body of fresh water** and one of the largest lakes in the world, is **almost gone**. Iran is suffering a third straight year of drastically reduced rainfall, off as much as 78 percent in some regions. The drought covers most of southern and central Asia. Complicating Lake Hamoun's situation is a dam regulating flow to the lake; until recently, the dam was under the control of the Taliban government in Afghanistan, and that regime had cut off the flow to the lake. All of Iran's major cities have imposed significant water-use restrictions, and the country has become the world's largest importer of wheat, taking in seven million tons last year, with even bleaker prospects for this year. (*New York Times News Service*, Sept. 20)

•**A dubious distinction for the “dead zone” in the Gulf of Mexico:** This summer it was larger than the state of New Jersey. The area of over 8,000 square miles topped 1999’s record 7,728 square miles. The dead zone is an area of the Gulf where the amount of oxygen dissolved in the water is too low to support life. The phenomenon is associated with the input of Mississippi River water laden with nutrients from agriculture and other land uses in the river’s huge watershed. When the nutrients reach the warm Gulf waters in spring and early summer, they stimulate the growth of algae, which eventually die and sink to the bottom. Decay of the algae consumes most of the available oxygen, significantly reducing the amount of the vital gas available to other marine life. Coastal currents tend to concentrate the incoming river water near the coast. (*Bay Journal*, October 2001)

•The University of North Carolina and the North Carolina Urban Water Consortium will seek to determine **whether antibiotics can be detected in North Carolina’s drinking water, and the possible effects of such contamination.** It’s known that both humans and animals metabolize only small amounts of the antibiotics they take, and that antibiotics thus reach sewage systems and streams that collect agricultural runoff. It’s also known that most conventional water treatment does not remove antibiotics. Thus, trace amounts of antibiotics are assumed to be in drinking water. It is feared that this presence can speed the emergence of bacteria *resistant* to these antibiotics, rendering them useless for fighting off infections in humans and livestock. European studies have confirmed the potential for antibiotic contamination of natural waters, but few studies have been conducted in the United States. The UNC study is to be completed by November 2002. (UNC Water Resources Research Institute’s Annual Program, 2001–2002)

•In October, a **North Carolina** state court ruled that the state was **within its rights to impose strict wetlands rules** and to require payment of fines and restitution from those who break the rules. The state’s Environmental Management Commission was sued by a coalition of construction, industrial, and agricultural interests, who claimed that the state was illegally getting into land-use policies by banning activities that alter the amount of water or types of vegetation on state wetlands. The court disagreed. (*Charlotte Observer*, Oct. 19)

•This fall EPA audited Wyoming’s **pollution-discharge permitting program**, part of a process of determining whether the state will retain the permitting authority granted by EPA under the Clean Water Act’s National Pollution Discharge Elimination System (NPDES). The audit was in response to allegations from the Wyoming Outdoor Council—a coalition of environmental and property rights organizations—that the state has failed to monitor properly and control water discharges from methane mining operations in the Powder River Basin. If EPA were to revoke Wyoming’s NPDES authority, it would be the first instance of such action in response to a citizens’ petition. (*Water Policy Report*, Oct. 22)

•In 2001, **Maryland’s Striped Bass (or Rockfish) index reached its second highest mark in nearly a half-century.** The index—based on samples of juvenile (“young-of-the-year”) Striped Bass from July through September—is considered the best predictor of future populations. This year’s index was 50.8, while the highest (in 1996) was 59.3. (*Bay Journal*, November 2001)

•The **largest single conservation easement in Maryland’s history** was assured when state and federal agencies put forward over \$8 million to purchase development rights for 5000 acres along more than two miles of the Chester River in Queen Anne’s County. The purchase was brokered by the nonprofit Conservation Fund in order to provide wildlife habitat, protect wetlands, and enhance water quality within the Chesapeake Bay Watershed, according to the group. Included on the property are a 90-acre lake and 600 acres of forested wetlands, known as “Delmarva bays,” which are dry in winter but covered with water in spring and summer. (*Baltimore Sun*, Nov. 15)

•Finally, in the **“just when you thought you knew what TMDLs meant”** department: The U. S. Court of Appeals for the Second Circuit, ruling in a case brought against EPA by the National Resources Defense Council, recently held that “...the [Clean Water Act] does not require TMDLs to be expressed in terms of daily loads.” Spell out the acronym, and the statement becomes “Total Maximum Daily Loads don’t have to be expressed as daily loads.”

—By David Mudd and Alan Raflo

N O T I C E S

On the Public Calendar

The Public Calendar is located at www.deq.state.va.us/info/.

•**Jan. 8, 2002**—Ground Water Protection Steering Committee. DEQ Central Office, Richmond, 9:00 a.m. For more information contact Mary Ann Massie, e-mail: mamassie@deq.state.va.us, or by phone at the DEQ Central Office in Richmond, toll-free in Virginia, (800) 592-5482.

•**Jan. 23, 2002**—Advisory committee on proposed reissuance of general VPDES permit for discharges from petroleum-contaminated sites. DEQ Fredericksburg Satellite Office, 9:30 a.m. For more information, contact Richard Ayers, e-mail: rwayers@deq.state.va.us, or by phone at the DEQ Central Office in Richmond (see number above).

Handbook of Water Use and Conservation

This 464-page, hardcover book describes water use characteristics, water audit steps, and efficiency measures for homes, landscapes, industries, businesses, and farms. To order, phone (toll-free) (866) 367-3300, or visit www.waterplowpress.com.

What Floyd Wrought

A new 312-page book, *Facing Our Future: Hurricane Floyd and Recovery in the Coastal Plain*, is available for \$24.95 from Coastal Carolina Press, phone (910) 362-9298, Web-site: www.coastalcarolinapress.org.

Clean Boating Grants

Local and non-profit organizations may apply for grants of up to \$2,000 from the BoatU.S. Foundation for Boating Safety and Clean Water. The grants are to support boater education and to promote waterway clean-up efforts. For the application or more information, go on-line to www.BoatUS.com/cleanwater/grants, or contact Vanessa Pert at (410) 897-0949, e-mail: vpert@boat.us. Deadline: Feb. 1, 2001.

Bay LOGIN

Bay Login stands for "Bay Local Government Information Network," a free Internet service provided by the Chesapeake Bay Program. Local officials may sign up at baylogin.org to receive electronically news about Bay-related issues of particular interest to local governments.

At the Water Center

For more information about any item below, call the Water Center at (540) 231-5624; e-mail: water@vt.edu; or visit www.vwrrc.vt.edu.

Requests for Proposals

•**Water Center Grant Programs.** The Water Center is accepting requests for proposals and fellowships for the fiscal year 2002 in the following programs:

- 1) Undergraduate Research Summer Fellowship Awards—deadline March 8, 2002;
- 2) Seed Grants—deadline March 29, 2002;
- 3) Competitive Grants—deadline March 29, 2002;
- 4) William R. Walker Graduate Research Fellowship Award—deadline March 29, 2002.

Guidelines for proposal preparation and fellowship application forms are posted on the Center Web-site at www.vwrrc.vt.edu. For more information, please contact Tamim Younos.

•**FY 2002 National Competitive Grant Program**, conducted by the U. S. Geological Survey. Proposals accepted starting December 17, 2001. Virginia applications must be filed by 5:00 p.m., EST, March 15, 2002, with Virginia Water Center. For more information, visit the National Institutes for Water Resources Web-site at <https://engineering.purdue.edu/WRRRC/NIWR/> (click on "National Competitive Grants Program"); or contact Tamim Younos at the Water Center.

STEP Internships for 2002

Virginia Service Training for Environmental Progress (STEP) encourages applications for its Summer 2002 internships. Current college juniors and above are eligible. Students in any state may apply, but Virginia students have first priority. Student applications are due Feb. 28, 2002. STEP also welcomes applications from Virginia communities that would like assistance with a local water-related issue. Community applications are due March 25, 2002. For more information, contact Alan Raflo at (540) 231-5463; e-mail: araflo@vt.edu; or visit the Water Center Web-site (click on "Education").

Please see page 17 for a report on STEP project in 2001.

New Publication

Advances in Water Monitoring Research, T. Younos, ed. 231 pages; \$52.00. Available from Water Resources Publications, (800) 736-2405; Web-site: www.wrpllc.com.

THE VIRGINIA STEP PROGRAM in SUMMER 2001

Service Training for Environmental Progress (STEP) is a service-learning program administered by the Virginia Water Resources Research Center in partnership with the Virginia Tech Service-Learning Center. Through STEP, students live in Virginia communities for eight weeks while working on a water-related project identified by the community. Following are summaries of the three STEP projects in Summer 2001. **If you are a student interested in a STEP internship, or a community group interested in STEP assistance**, you can get more information about STEP at the Water Center's Web-site, www.vwrrc.vt.edu (click on "Education"); by calling (540) 231-5463; by e-mail to araflo@vt.edu; or by writing to STEP, 10 Sandy Hall (0444), Blacksburg, VA 24061.



Sudipto Sengupta (l.) and Kelley Raftery

Groundwater Quantity Baseline Data Collection for Clarke County, Virginia

Clarke County faces pressures on its karst groundwater resources, which are especially vulnerable to impacts from land uses. County planners have been interested in a groundwater carrying-capacity study. During the summer of 2001, STEP interns Kelley Raftery and Sudipto Sengupta initiated a baseline data collection for such a study; integrated the data collected into the County geographic information system (GIS); and researched methods that may assist Clarke County in conducting a carrying-capacity study. The interns also designed a database for entering data from well-drillers' logs.

The Establishment of a Volunteer Biological Monitoring Network in the Upper Rappahannock Watershed

The Culpeper Soil and Water Conservation District, covering a five-county region, provides education and technical assistance to promote stewardship of the area's natural resources. The District sought help in setting up a volunteer network to conduct biological stream monitoring. STEP interns Mary Crawford and Tracy Hudak trained volunteer monitors; monitored stations that lacked baseline data; and compiled information for a Web-site to integrate chemical and biological data for the general public.



Mary Crawford (l.) and Tracy Hudak



Asmita Bhardwaj (l.) and Erica Clark

Watershed Improvement and Community Outreach Programs in Wise County, Virginia

In the Guest River Watershed, STEP interns Asmita Bhardwaj and Erica Clark worked with the Lonesome Pine Soil and Water Conservation District on a homeowner survey of sewage disposal systems in the watershed. They also helped prioritize acid mine drainage sites located in the watershed and conducted environmental education at a summer camp for teenagers. In the Upper Powell Watershed, they worked with Hands Across the Mountain, Inc. to map watershed-improvement sites; create a water-quality database; create a TMDL fact sheet for public education; and adapt stream-assessment methods for schoolchildren and volunteers.

FOR THE RECORD

Sources for Selected Water Resources Topics

This issue includes sources for two topics: Following the Virginia General Assembly (this page) and Finding Water-quality Information (page 19).

Following the Virginia General Assembly

(This topic was covered in the February 2000 *Water Central*, p. 15. We have added new information and rechecked the previous information to ensure it is still accurate.)

This page describes how to follow General Assembly legislation and the state budget process. The 2002 session (a 60-day session) convenes January 9 and is scheduled to conclude on March 9. The Assembly is to reconvene on April 17 to reconsider any bills vetoed by the governor.

Finding Your Legislator

The General Assembly's Web-site, legis.stat.va.us/, includes the "Online Legislature" with several useful features, such as legislator contact information (searchable by locality), law-making fundamentals, the Virginia Constitution, and a legislative glossary.

To find out the winners of the November 2001 House of Delegates election, contact the State Board of Elections on-line at www.sbe.state.va.us/, or by phone at (800) 552-9745 (8:15 a.m.—5 p.m., M—F).

To get the phone number for the Richmond office of any delegate or senator (during sessions), use the following formula:

Delegates' Numbers = (804) 698-10 plus the House district number. For example, delegate of the 1st House District: (804) 698-1001.

Senators' Numbers = (804) 698-75 plus the Senate district number. For example, senator of the 39th Senate District: (804) 698-7539.

(Be sure to use the new *post-reapportionment* district numbers.)

Tracking Legislation in General

Citizens can get a copy of any bill or resolution from the Legislative Bill Room, (804) 786-6984 (you will need to know the bill or resolution *number*). Internet users can find legislation easily: The on-line Legislative Information System (Web-site is leg1.state.va.us) provides the full text, a summary, and a record of action on every bill; bills are indexed by subject,

number, and committee. People without Internet access can learn about current legislation from the Legislative Information *Offices*: House, (804) 698-1500, or toll-free (877) 391-FACT; Senate, (804) 698-7410.

Tracking the Budget Process

The 2002 session will be the first session of a two-year cycle, so the General Assembly will be considering the state's **biennial budget**. The process begins in the December prior to the session, when the governor submits a proposed budget. During the Assembly session, the House and Senate each consider a **budget bill** which sets appropriations for the upcoming two-year period (subject to amendment the following year). Budget bill work occurs in the House Appropriations Committee and the Senate Finance Committee. Eventually each house passes a version of the budget bill. The two versions must be reconciled in conference committee and each house must then pass the final version.

Internet users can read the current budget at the Legislative Information System Web-site noted above. People without Internet access can get a copy of the budget from the Bill Room (see phone number above), or at one of the 13 state-depository libraries (call the Library of Virginia in Richmond at 804-692-3562 to learn the location of your nearest state-depository library).

To identify budget items related to a particular topic (such as "water"), Internet users can go to the Legislative Information System Web-site, select "State Budget," and type in the specific search topic. People without Internet access can request such information by calling the Legislative Information Office for either house.

People who wish to **register their opinion** with a delegate or senator on the budget or other current legislation can do so by calling (800) 889-0229, toll-free, 7 a.m.—7 p.m., M—F during the General Assembly session.

Text Telephone (TTY/TDD) Services are available from 8 a.m.—5 p.m. in the Legislative Information offices for the Senate and House. The phone numbers are (804) 698-7419 for the Senate, (804) 786-2369 for the House.

Finding Water Quality Information

(Please see the October 1998 *Water Central*, p. 15, for a previous article on sources of water-quality information.)

Nationwide Information Sources

- Every two years the U. S. Environmental Protection Agency (EPA) publishes *The National Water Quality Inventory Report to Congress* (“305b Report,” after the pertinent section of the Clean Water Act). The 1998 report (EPA-841-R-00-001), a 20-page summary (EPA841-S-00-001), and previous years’ reports are all available on-line at www.epa.gov/305b/. To request a printed copy of these publications from the National Service Center for Environmental Publications in Cincinnati, phone (800) 490-9198.

- The Clean Water Act requires states to identify “impaired waters,” that is, those waters that do not meet water-quality standards. The *EPA’s Atlas of America’s Polluted Waters 2000* has maps of the currently listed impaired waters in each state. This document is available on-line at www.epa.gov/owow/tmdl/; for a printed copy, phone (800) 490-9198 (request EPA-840-B00-002).

- Internet users can get information about specific watersheds at the EPA’s “**Surf Your Watershed**” Web-site, www.epa.gov/surf/. The site has much other information, as well.

- The U. S. Geological Survey (USGS) has been conducting the **National Water Quality Assessment (NAWQA) Program** since 1991. The program has collected surface and groundwater quality data from thousands of stream sites and wells in over 50 study areas (four areas covered parts of Virginia) and published hundreds of reports on current conditions. From 2001 to 2012, USGS intends to reassess 42 study areas (three covering parts of Virginia). For copies of the reports or other information, see the program’s Web-site at water.usgs.gov/nawqa/; or contact the program chief in Reston at (703) 648-5716; e-mail: nawqa_info@usgs.gov.

- Water Quality Information Center at the National Agricultural Library**, in Beltsville, Md., is a primarily on-line source for scientific findings, educational methods, and public policy information on water quality and agriculture. The center’s Web-site is www.nal.usda.gov/wquic. For more information, contact Dr. Joseph Makuch, phone (301) 504-6077; e-mail: jmakuch@nal.usda.gov.

Virginia Information Sources

- Long-term Water Quality Trends in Virginia’s Waterways*, a 1998 Water Center Special Report (SR11-1998), is a good starting point for learning about water quality monitoring in Virginia and how conditions have changed over the past 20—30 years. The report is available at the Water Center’s Web-site, www.vwrrc.vt.edu (click on “Publications/Videos,” then “Special Reports”). A few printed copies are available; phone the Water Center at (540) 231-5624.

- Virginia’s **Department of Environmental Quality (DEQ)** monitors water quality in surface water and groundwater. The DEQ’s central office number in Richmond is (800) 592-5482; the Public Affairs Office’s number is at (804) 698-4447.

Key DEQ water-quality documents include the following:

- 1) *Water Quality Assessment 305(b) Report* (biennial; summarizes water quality in the state).
- 2) *Ambient Water Quality Monitoring Report* (annual; presents monitoring data from the DEQ’s chemical, biological, and Chesapeake Bay monitoring programs).

These and other reports are available on-line at www.deq.state.va.us/water/reports.html. Alternatively, contact Alan Pollock, (804) 698-4002; e-mail: aepollock@deq.state.va.us.

The DEQ also has various water-quality technical studies and databases (such as “Smith River dissolved oxygen study”) that are less readily available. A fee may be charged in some cases for these sources. A list is available on-line at www.deq.state.va.us/info/other.html (click on “Reports, Studies and Databases”), with the appropriate DEQ contact person listed. Alternatively, contact Bill Hayden, (804) 698-4447; e-mail: wphayden@deq.state.va.us, to enquire about the available information.

- The Friends of the Rivers of Virginia published in January 2001 the *State of Our Rivers Report*. Using data from DEQ and other agencies, the report maps impaired segments, monitoring stations, and other features in Virginia’s major river basins. To request a copy, phone (540) 343-3693.

- Several **volunteer citizens’ groups** in Virginia monitor water quality. To learn about these groups and available data, contact Joyce Brooks, Virginia DEQ Citizen Monitoring Coordinator, at (804) 698-4000; e-mail: citizen@deq.state.va.us.

Next “For the Record” topic: Water Quantity and Hydrologic Information Sources.

Virginia Water Central

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