DRINKING WATER

2015 SUMMARY

National Grade

In its *2013 Report Card for America's Infrastructure* the American Society of Civil Engineers graded drinking water systems nationwide a **"D"**. This is a slight improvement over the 2009 grade of "D-".

Although the quality of drinking water in the United States remains universally high, America's drinking water systems are aging and must be upgraded or expanded to meet increasing demands and requirements. Deferral of the necessary improvements can result in degrading water service and higher costs in the future.

The 2013 national report anticipates urgent investment needs of as much as $40 billion per year over the next 25 years. In 2007 EPA's conservative estimate was an average of $16.7 billion per year over a 20-year term. "Congressional appropriations have declined over the five-year period 2008 to 2012, totaling only $6.9 billion—an average of $1.38 billion annually or $27.6 billion over 20 years, 8% of EPA's identified needs over 20 years."

Virginia Grade

Assignment of an overall grade of **"C"** to Virginia's drinking water infrastructure was based on the proven ability to meet four specific criteria:

- Compliance with Safe Drinking Water Act (SDWA) standards
- Routine identification and report of existing and future funding needs
- Acquisition of adequate existing and future funding to capitalize needs
- Capacity Development Strategy

Virginia's latest Annual Public Water Systems Compliance Report for calendar year 2011 indicates that there were 2,830 authorized public water systems providing drinking water to more than seven million Virginians. Of this number, 91.8 percent are served by waterworks that reported no SDWA violations.

EPA's 2007 assessment of Virginia's waterworks needs is nearly $6.1 billion to maintain these systems over the next 20 years. However, at only 72 percent of the national average, we must be more diligent in identifying, defining and quantifying our needs to appropriately justify increased federal funding awards.

For fiscal years 2000 through 2012 Virginia was awarded $200.9M in Drinking Water State Revolving Funds. Divided by the projected need of $2,187.8M for the same period, this investment is only 9.2 percent of the total need. In spite of increased needs, our award for FY 2012 was even less at 5 percent.

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INTRODUCTION AND BACKGROUND

The U.S. Congress adopted the Safe Drinking Water Act (SDWA) in 1974 and amendments in 1986 and 1996. The SDWA is the main Federal law that protects the quality of actual and potential drinking water from above ground and underground sources. The program emphasizes providing funds to small and disadvantaged communities, initially focused primarily on the source of supply and treatment and encourages pollution prevention as a tool for ensuring safe drinking water.

The Act authorizes the U.S. Environmental Protection Agency (EPA) to establish minimum standards and oversee compliance to protect drinking water and requires all states, localities, water suppliers, owners and operators of public water systems to comply with these primary, health-related standards. Under the authority of SDWA the EPA established the Public Water System Supervision (PWSS) Program which allows states and territories to seek EPA approval to administer their own PWSS Programs. The authority to run a PWSS Program is called "primacy". For a state to receive primacy, EPA must determine that the state meets certain requirements laid out in the SDWA and its regulations, including the adoption of drinking water regulations that are at least as stringent as the Federal regulations and a demonstration that they can enforce the program requirements.

The 1996 amendments recognize source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. These amendments also require that the EPA conduct an assessment of the nation's public water systems' infrastructure needs every four years and use the findings to allocate Drinking Water State Revolving Fund (DWSRF) capitalization grants to states. The DWSRF was established to help public water systems obtain funding for infrastructure improvements necessary to protect public health and comply with drinking water regulations. A public water system (PWS) is defined as a system for the provision to the public of water for drinking or domestic use through pipes or other constructed conveyances, if such system has at least 15 service connections or regularly serves at least 25 individuals.

EPA's Drinking Water Infrastructure Needs Survey and Assessment			Basis of DWSRF Funds Allocation
Assessment	Survey Data	Released	FY
1	1995	February 1997	1998-2001
2	1999	February 2001	2002-2005
3	2003	June, 2005	2006-2009
4	2007	March 26, 2009	2010-2013

The Commonwealth of Virginia created the Virginia Department of Health (VDH) in 1908, which has maintained primacy since 1977 and has received DWSRF funds since 1997. In 2003 the VDH established the Office of Drinking Water (ODW) which is responsible for regulatory oversight of public water supplies in accordance with Federal and State statutes. The ODW accomplishes its mission by: monitoring drinking water quality, applying engineering judgment, providing technical assistance and training, managing the Virginia DWSRF which provides funding for capital improvements, seeking other funding sources and enforcing drinking water regulations and standards of the Virginia *Waterworks Regulations*, the Virginia Public Water Supply Law and the federal SDWA.

CONDITION AND ADEQUACY

Drinking Water Consumption

From the raw water source to the consumer's consumption the amount of water available decreases with each step in the provision process including:

- Raw water withdrawn
- Drinking water produced by treatment
- Drinking water conveyed
- Drinking water metered or delivered
- Drinking water actually used for drinking and domestic purposes

One of the fundamental challenges confronting PWSs is the effort required to keep these reductions as low as is economically and physically possible.

In order to ensure that population projections are based upon uniform, broadly accepted, and sound principles the Code of Virginia requires the Virginia Employment Commission to prepare official population projections for the Commonwealth. The following population estimates and projections were prepared by the Weldon Cooper Center for Public Service of the University of Virginia under contract to the Virginia Employment Commission. Based on this data Virginia's population is projected to grow by 20.6 percent between 2010 and 2030 and another 9.2 percent between 2030 and 2040. The calculations tabulated below anticipate that Virginia PWSs will continue to serve 88.7 percent of the total population and that a consumption rate of 102 gallons per day per person will remain constant. This analysis indicates the need for an additional capacity of between 75 and 80 mgd every ten years for the next three decades.

Estimated Drinking Water Consumption				
Year	Number of people	People served by waterworks	Water consumed (gals per day)	Increase (by decade)
2010	8,001,024	7,093,464	723,533,346	
2011 (Estimate)	8,104,384	7,185,100	732,880,200	
2012 (Estimate)	8,185,867	7,257,340	740,248,715	
2020 (Projection)	8,811,512	7,812,018	796,825,851	73,292,505
2030 (Projection)	9,645,281	8,551,212	872,223,659	75,397,808
2040 (Projection)	10,530,228	9,335,779	952,249,499	80,025,840

At this time even improved conservation efforts can not offset the increasing demand for drinking water necessary to sustain Virginia's population growth and public health. These demands are in competition with drought availability and others for the use of our finite water resources.

Capacity Development Strategy

The SDWA requires a strategy to address the capacity of all existing waterworks. The ODW has developed a comprehensive Capacity Development Strategy, dated May 1, 2000, that includes all of the SDWA required elements, has been approved by the EPA and is currently under review for revisions. The ODW personnel performed a technical, managerial and financial capacity assessment of existing waterworks and use the assessment to assist waterworks in complying. Reports on the status and effectiveness of the Capacity Development Program are reported to the EPA annually. Reports on the efficacy of the strategy are prepared and submitted to the Governor of Virginia every three years.

Elements of the Capacity Development Strategy include the Source Water Assessment and Protection Programs. The Source Water Assessment Program (SWAP) began in April 2003 when the ODW conducted initial assessments on all active public water supplies and assigned susceptibility rankings to each source. Subsequent assessments are made on new supplies and to update historical records of existing supplies. Waterworks owners of many sources that were designated as "highly susceptible" have developed Source Water Protection Plans (SWPPs) to address the conditions that caused the susceptibility.

The voluntary Source Water Protection Program assists small water systems serving less than 10,000 people with the development of SWPPs including plans for groundwater source protection that are also called Wellhead Protection Plans. On May 26, 2005 EPA approved Virginia's Wellhead Protection Program which involves participation by local governments in land use management and development of local planning and zoning ordinances.

The most recent efficacy report for October 1, 2008 to September 30, 2011 concluded that: "The Capacity Development Strategy proves to be an effective tool to improve the technical, managerial, and financial components of Virginia's public waterworks ability to reliably produce and deliver safe drinking water to consumers."

Facilities Infrastructure of Waterworks

For planning purposes the *Waterworks Regulations* require that waterworks be designed to provide for the estimated population 10 to 30 years into the future under predicted growth conditions. The American Water Works Association and the American Society of Civil Engineers' third edition of the book entitled *Water Treatment Plant Design*, the standard treatise on this topic, states that master planning studies often develop the water supply and treatment needs for 30 to 50 years into the future. The Virginia Department of Environmental Quality (DEQ) utilizes a 50 year water supply planning horizon policy. During the preparation of construction contract documents the useful economic or design life of the proposed facilities is considered. In contrast to the theoretical planning and design phases, the expectations of the facilities' actual duration during the operations phase can be unreasonable, in spite of deferred maintenance driven by financial considerations.

Virginia saw large growth in all aspects of its public water systems after 1940. As a large number of these systems have pasted 70 years of age, many require significant asset renewal in the immediate future.

Water systems in Virginia routinely rely on treatment and pumping facilities that have exceeded a typical 20 year life and on pipes and storage tanks that have been in service over 100 years. In many cases these facilities have exceeded their design lives and there may be no current plans for replacement. The Capacity Development Program currently promotes and works with waterworks on Asset Management Plans. If replacement plans exist, implementation is contingent on the availability of funds.

The EPA 2002 Clean Water and Drinking Water Infrastructure Gap Analysis Report, projects that by 2020, 45 percent of water and sewer pipes in the U.S. will require replacement.

EPA's Drinking Water Infrastructure Needs Survey and Assessment has been conducted for the four data years noted below and the findings are reported as 20-year needs in millions of dollars. The following chart shows the assessed needs by project type and the percentage each type is of the total. Between 1995 and 2007 transmission/distribution and treatment needs have increased by 14 to 15 percent each while source needs have decreased by 30 percent.

20-Year Needs by Project Type

in millions of data year dollars

Data Year	Transmission /Distribution		Source		Treatment		Storage		Other		Total
2007	3,806	63%	196	3%	1,293	21%	723	12%	44	1%	6,062
2003	1,987	69%	403	14%	324	11%	134	5%	18	1%	2,865
1999	1,024	50%	519	25%	282	14%	190	9%	41	2%	2,055
1995	1,417	48%	966	33%	219	7%	276	9%	67	2%	2,944

Virginia Waterworks Statistics and Compliance Summary

Virginia's latest Annual Public Water Systems Compliance Report for calendar year 2011 was submitted to the EPA on June 2012. The report indicates that there were 2,830 authorized public water systems providing drinking water to nearly 7.2 million people or 89 percent of Virginia's population. Of these public water systems 1,643 or 58% are non-community waterworks that serve widely distributed areas throughout the State and are limited by size, technological capabilities and age of facilities.

Virginia Waterworks Statistics			
From Annual Public Water Systems Compliance Report for CY 2011			
Type of Waterworks	Examples	Number	% of Total
Community	Cities, Counties & Towns	1,187	42.0%
Transient Non-community	Rest stops & Restaurants	1,096	38.7%
Non-transient Non-community	Schools & Factories	547	19.3%
Total		2,830	100.0%
Waterworks reporting no violations		2,115	74.7%
Waterworks reporting violations		715	25.3%
Total waterworks		2,830	100.0%
Population served by waterworks reporting no violations		6,592,800	**91.8%**
Population served by waterworks reporting violations		592,300	8.2%
Population served by all waterworks		7,185,100	100.0%
Virginia Population Served			
Population served by all waterworks		7,185,100	88.7%
Population not served by waterworks		919,284	11.3%
Population statewide (2011 estimate)		8,104,384	100.0%

The Safe Drinking Water Act requires compliance in the categories of: maximum contaminant levels (MCLs), monitoring, treatment technique (TT) and consumer notification (CN). Between calendar years 2007 and 2011 the number of waterworks in noncompliance and the total number of violations were both reduced by nearly 20 percent. However, the remaining 80 percent in violation continue to affect an estimated 592,300 people.

Virginia ACR Summary						
	# of PWS	Number of Violations				
CY	in Viols	MCLs	Monitor	TT	CN	Total
2011	715	304	1,406	37	318	2,065
2007	890	430	1,765	96	284	2,575
Reduction	19.7%	29.3%	20.3%	61.5%	-12.0%	19.8%

ODW Input

An informal poll of the ODW Field Offices in February and March 2013 asked what the greatest challenges to providing safe drinking water are. The feedback fell into four general categories:

- Need for mentoring programs and internships for operators,
- Waterworks compliance with increased regulatory requirements,
- Aging infrastructure, and
- Lack of experienced waterworks operators.

Water Rates

The average monthly water rates shown in this chart are from Draper Aden Associates' *The 24th Annual Water and Wastewater Rate Report*. The report utilizes a control group of 20 water and wastewater providers who represent a cross section of utilities across the Commonwealth and who have consistently participated in annual surveys throughout the time period indicated. The rates reflect residential charges based on consumption of 5,000 gallons per month.

These rates indicate an increase of 46.8 percent over the past ten years. If continuation of this trend over the next 20 years is necessary to maintain current levels of service, then water rates will need to increase by 93.6 percent.

Virginia Waterworks Rates		
Year	Avg. Water Rate	Annual Increase
2012	$27.25	6.0%
2011	$25.70	2.8%
2010	$25.00	6.0%
2009	$23.58	4.8%
2008	$22.50	4.2%
2007	$21.59	8.3%
2006	$19.94	2.2%
2005	$19.52	7.0%
2004	$18.25	1.6%
2003	$17.97	4.0%
2002	$17.28	

INVESTMENT NEEDS AND FUNDING DEDICATED

EPA's Drinking Water Infrastructure Needs Survey and Assessment has been conducted for the four data years noted below. The findings are reported as 20-year needs and are used to allocate Drinking Water State Revolving Fund (DWSRF) capitalization grants for subsequent fiscal years. The following chart shows the assessed needs on an annualized basis and compares them to the actual funding awarded by fiscal year.

EPA Needs Assessment & DWSRF Awards (for Virginia in millions of dollars)					
Data Year	FY	20 yr Need	Need / Yr	Award	% of Need
	2012		$303.1	$15.2	5.0%
	2011		$303.1	$16.0	5.3%
	2010		$303.1	$23.0	7.6%
2007		$6,061.9			
	ARRA			$20.8	14.5%
	2009		$143.3	$17.4	12.1%
	2008		$143.3	$9.8	6.9%
	2007		$143.3	$8.8	6.1%
	2006		$143.3	$11.4	8.0%
2003		$2,865.0			
	2005		$102.8	$11.5	11.2%
	2004		$102.8	$11.1	10.8%
	2003		$102.8	$11.1	10.8%
	2002		$102.8	$15.2	14.8%
1999		$2,055.4			
	2001		$147.2	$15.1	10.3%
	2000		$147.2	$14.6	9.9%
1995		$2,943.9			
Totals			$2,187.8	$200.9	**9.2%**

For fiscal years 2000 through 2012 Virginia was awarded $200.9M in DWSRF funds. This program requires a 20 percent state match, so Virginia contributed an additional $40.2M for a total investment of $241.1M over the 13 year period. Divided by the projected need of $2,187.8M for the same period, this investment is about 11 percent of the total need.

Using the 20-year need from EPA's 2007 assessment of $323,991.4M for the nation and $6,061.9M for Virginia and the 2010 population of 308,745,538 for the nation and 8,001,024 for Virginia equates to a 20-year need of $1,049 per person for the nation and $758 per person for Virginia. The ratio of $758 per person for Virginia divided by $1,049 per person for the nation equals 72 percent. This fact may mean that Virginia's waterworks needs are not as severe as the national average based on EPA's criteria. Another interpretation is that Virginia's waterworks may have unidentified needs.

Actions to appropriately justify an increased share of the available federal funding awards may be warranted.

BASIS OF GRADE AND RESULTS

Basis of Grade

Assigning an overall grade to Virginia's drinking water infrastructure is based on the proven ability to meet four specific criteria:

Compliance with Safe Drinking Water Act (SDWA) standards

The score on this criterion is the percent of consumers served by waterworks reporting no violations versus all consumers, and is based on Virginia's latest Annual Public Water Systems Compliance Report for calendar year 2011. This is a change from the *2009 Virginia Infrastructure Report Card* which used the percentage of public water systems in compliance versus all public water systems.

Routine identification and report of existing and future funding needs

There is a continual need to inventory, assess and manage waterworks assets. The assessment includes identification of existing and future needs. Because the identification and reporting of needs are required on a routine basis, this criterion has been assigned a score of 84, Above Average, "B".

Waterworks' acquisition of adequate existing and future funding to capitalize needs

This score is the percentage of the needs that are funded by the DWSRF only. For this reporting period it is based exclusively on the average of EPA Needs Assessment and DWSRF awards for the period between FY 2000 and FY 2012. Nothing is meant to imply that Federal funding is the only source of revenue available.

Capacity Development Strategy

Because the Strategy has proven to be effective in improving Virginia waterworks' ability to provide safe drinking water, this criterion has been assigned a score of 84, Above Average, "B".

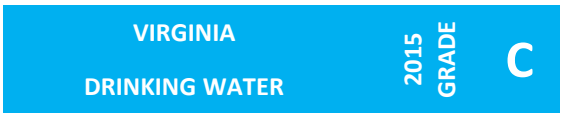
Weighting

The intention and goal is to continually make the grading criteria easily measurable and quantifiable. Similarly each criterion has been assigned a weighted value in recognition of their relative importance. This will allow for a uniform determination and comparison of results with future report cards.

Results

The results of the 2013 Virginia Infrastructure Report Card for Drinking Water are:

Rating of Virginia's Drinking Water Infrastructure			
Criteria	Score	Grade	Weight
Compliance with SDWA Standards	92	Excellent (A-)	40%
Identification/Report of Needs	84	Above Average (B)	30%
Acquisition of Funding	9	Poor (F-)	20%
Capacity Development Strategy	84	Above Average (B)	10%
RESULT	72	Average (C)	100%



OBSERVATIONS

Alternative Public Agencies

"Community" type waterworks are typically local municipal government owned utilities. Local municipal governments in Virginia have several choices of alternative agencies for provision of drinking water. Examples include utility departments, public service authorities and sanitary districts. The fundamental distinction is who is responsible for paying the costs.

Cost Recovery

There appears to be a basic misunderstanding of the operation of water systems concerning cost recovery by some waterworks. Activities that are necessary to provide water services include operations, maintenance, financing, debt service, billing and collection and have associated costs. Other expenses include depreciation and replacement costs. Complete cost recovery addresses all expenses and is usually designed to meet the requirements of an enterprise fund.

Enterprise Funds

Many waterworks are intended to be operated as "enterprise funds". In the generally accepted accounting principles (GAAP) of government, an enterprise fund is an account that is financed and operated in a manner similar to private, commercial business. The intent is that the cost of providing public drinking water services will be recovered through charges to the consumers that are sufficient to make the providing agency self-supporting.

Traditions

Many consumers have grown accustomed to:

- Safe drinking water with rare limits on the volume and quality available and without considering its necessity for their health,
- Rates and charges that have been less than full cost recovery and insufficient for infrastructure rehabilitation, and
- Reliance on government solutions and subsidies.

Virginia Waterworks Historical Timeline	
Year	Event
1610	Proclamation for clean water supply at Jamestown
1825	Lynchburg constructs & operates a water supply system 2nd oldest system in the U.S.
1910	90 waterworks in Virginia
1912	Report by Commissioner of Health on water supply purity
1912-1974	Continual maintenance of State drinking water program
1916	1st waterworks permit issued to Martinsville
1934	1st Short School offered
1974	*Waterworks Regulations* adopted

CONCLUSIONS, RECOMMENDATIONS AND POLICY OPTIONS

Conclusions

- The safety and quality of drinking water provided by public water systems in Virginia have improved significantly since their commencement in 1825.
- Continued improvement of our public water systems to maintain our drinking water quality is now negatively impacted by deferred remediation of the infrastructure and insufficient funding and investment.
- As a result consumers currently rely on aging waterworks systems and must acquire the monies needed to make the necessary improvements.
- Waterworks have an immediate responsibility to remedy the condition of the public water system infrastructure to ensure continued availability of safe drinking water.

Recommendations

The shared objective is to ensure that Virginia citizens have access to an adequate supply of affordable and safe drinking water. To accomplish this objective, it is recommended that Virginia waterworks engage in the following activities:

1. Protect existing raw water sources used for drinking water and develop additional new ones.
2. Monitor and minimize differences between withdrawal, treatment and metered water volumes.
3. Implement and maintain proactive leak detection and reduction, conservation measures and reuse strategies.
4. Continually communicate and educate consumers on the value of drinking water to their health, the actual cost to provide drinking water and its low cost relative to higher cost, lower priority commodities.

5. Conduct comprehensive and diligent assessments that identify, define and document our infrastructure needs to better inform the consumers, to maintain our eligibility for funding and appropriately justify increased funding awards.

6. Actively pursue grant and loan funding from all possible resources. Establish collaborative funding partnerships for assembly of the largest and most complete financial packages possible.

7. Utilize Governmental Accounting Standards Board (GASB) accounting principles for asset depreciation, replacement costs and full cost recovery and rate structures that can fund needed capital improvements, promote self-supporting operations and minimize financial dependency on others.

8. Examine low interest rate refinance options for existing debts and utilize savings for necessary capital improvements

9. Establish and maintain business practices that attract and retain a qualified administrative and technical workforce for waterworks operations. Utilize mentorship programs to promote continuing education, advancement and preservation of institutional knowledge.

Policy Options

1. Engage DEQ in conducting routine statewide water resource planning and defining strategic water supply alternatives.

2. Determine a means to reward waterworks who implement and maintain proactive leak reduction, conservation measures and re-use strategies.

3. Reward long term compliant waterworks with less frequent reporting requirements.