



# COMMONWEALTH of VIRGINIA

## DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219

Mailing address: P.O. Box 10009, Richmond, Virginia 23240

Fax (804) 698-4500 TDD (804) 698-4021

[www.deq.virginia.gov](http://www.deq.virginia.gov)

W. Tayloe Murphy, Jr.  
Secretary of Natural Resources

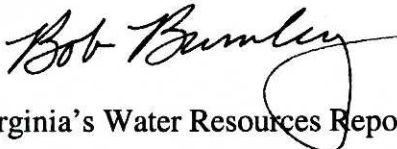
Robert G. Burnley  
Director

(804) 698-4000  
1-800-592-5482

November 18, 2005

### MEMORANDUM:

TO: The Honorable Mark R. Warner  
  
The Honorable Charles R. Hawkins, Chair  
Senate Agriculture, Conservation and Natural Resources Committee  
  
The Honorable M. Kirkland Cox, Chair  
House Agriculture, Chesapeake and Natural Resources Committee

FROM: Robert G. Burnley 

SUBJECT: Annual Status of Virginia's Water Resources Report

In accordance with Chapter 3.2 of Title 62.1 of the *Code of Virginia*, the Department of Environmental Quality has completed its annual report on the status of the State's water resources, including ground water.

The Department of Environmental Quality is committed to ensuring that adequate and safe drinking water is available to all citizens of the Commonwealth and protecting the beneficial uses of our state waters. The primary objective of this report is to document the status of Commonwealth's waters and to document the Department's water supply and resource planning accomplishments.

This report is being made available at [www.deq.virginia.gov/regulations/reports.html](http://www.deq.virginia.gov/regulations/reports.html). If you need further information or would like a hard copy of this report, please contact Rick Linker at 804-698-4195.

**A REPORT TO  
THE HONORABLE MARK R. WARNER, GOVERNOR,  
AND  
THE GENERAL ASSEMBLY OF VIRGINIA**



**STATUS OF VIRGINIA'S WATER RESOURCES  
A Report on Virginia's Water Supply Planning Activities**

**Department of Environmental Quality  
COMMONWEALTH OF VIRGINIA**

**2005**

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**STATUS OF VIRGINIA’S WATER RESOURCES  
A REPORT ON VIRGINIA’S WATER SUPPLY PLANNING ACTIVITIES – OCTOBER 2005**

**EXECUTIVE SUMMARY**

The ability to effectively manage Virginia's Water Resources requires an awareness of the current categories and volumes of water use as well as recognition of the historic trends in water use in the Commonwealth. This report describes the status of the Commonwealth's surface and ground water resources and provides an overview of the Commonwealth's Water Supply Program.

**I. Introduction**

Virginia’s current and future economic growth depends on the availability of quality water resources. We need to assure that water is available in the future for these purposes. We are fortunate that we have historically had abundant water resources in Virginia.

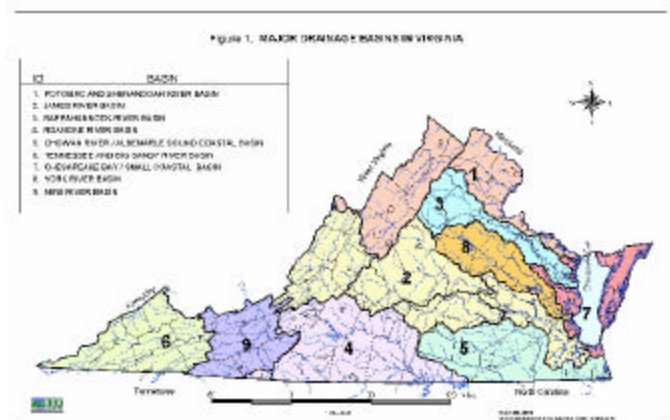
To assure that water resources are available for future generations, we must manage them wisely. With proper planning, our water resources are capable of serving multiple uses in a balanced manner. In the 21<sup>st</sup> century, sufficient water to meet our needs will not just happen, our resources must be continuously planned for so that they remain available to us and are protected from pollution and over use.

This report, submitted to the Governor and the Virginia General Assembly in accordance with Chapter 3.2 of Title 62.1 of the Code of Virginia, describes the status of the Commonwealth’s water sources, both surface and ground water. The report also provides an overview of climatological conditions and impacts on water supplies in the Commonwealth. Section VII entitled “Water Supply Planning Initiatives” summarizes Governor Warner’s comprehensive efforts to

improve the water supply planning and permitting process in Virginia.

**II. Water Resources Data**

Virginia has an estimated 50,537 miles of streams and rivers divided into nine major basins (**Figure 1**). Annual statewide rainfall averages almost 43 inches. The total combined flow of all freshwater streams in the state is estimated at about 25 billion gallons per day. The 248 publicly owned lakes in the Commonwealth have a combined area of 162,230 acres. Additionally, many thousands of other small privately owned lakes and ponds are distributed throughout the state. Other significant water features of Virginia include approximately 236,900 acres of tidal and coastal wetlands, 808,000 acres of freshwater wetlands, 120 miles of Atlantic Ocean coastline, and more than 2,500 square miles of estuaries. A summary of Virginia’s water resources is provided in **Appendix 1**.



### III. Status of Hydrologic Data Gathering in 2004

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#### A. Surface Water

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The Department of Environmental Quality (DEQ) and the U.S. Geological Survey (USGS) are the primary agencies responsible for collecting hydrologic data in Virginia. The two agencies have worked cooperatively since 1925, except for a period between 1957 and 1967 when they operated independently. Individually, the agencies carry out their own agendas in the collection of hydrologic data. Together, they provide a comprehensive picture of hydrologic affairs in the Commonwealth.

To collect systematic hydrologic data on surface water levels, flow volumes, and other streamflow data, the DEQ operates 72 continuous-record stream gaging stations all of which are real time recording of flows using satellite technology and more than 100 other measurement sites. The continuous-record gages are located primarily on larger, free-flowing streams whereas the DEQ miscellaneous measurement sites are in support of the TMDL program. The USGS operates 94 continuous-record gages and more than 100 miscellaneous measurement sites in Virginia. The USGS collects water quality data at 11 continuous-record gaging stations. The USGS also operates 13 gages that provide stage (surface level height) data for lakes and reservoirs. The flow, lake level, water quality, and miscellaneous measurement data are published in *Volume 1, Water Resources Data – Virginia*, an annual report cooperatively prepared by the DEQ and the USGS. The gages farthest downstream in each major river basin are used to summarize or index the hydrologic condition of the Commonwealth for any given water year. Water years run from October 1 through September 30.

#### B. Ground Water

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The DEQ collects data on ground water level at 185 wells. Ground water level in 25 of these

wells has been converted to 15 minute real time measurements using satellite technology. The USGS collects similar data at 161 wells, with water quality data being collected at 40 of those wells. These data are published in Volume 2 of the *Annual Water Resources Data Report*, which is cooperatively prepared by the DEQ and the USGS. The water level data collected by the DEQ contributes to a long-term ground water modeling project with the USGS. During 2004, DEQ continued working with the USGS on a multi-year effort to update and revise this ground water flow model (expected to be completed in late 2006) to better manage the ground water resources of the Virginia Coastal Plain.

### IV. Status of Resource Hydrology in 2004

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#### A. Surface Water

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Calendar year 2004 was one of the wettest on record with stream flow remaining above normal throughout the year. Water supply reservoirs were filled to capacity during the year. The remnants of four hurricanes brought varying amounts of significant precipitation to Virginia. Tropical storm Gaston struck parts of Virginia in August of 2004 dumping rain on to already saturated soils. Richmond and its surrounding counties received approximately 14 inches of rain in a six-hour period causing disastrous urban flooding and loss of life in the surrounding counties. Many of the roads and business damaged by the floods were closed for months while others are still closed one year later.

#### B. Ground water

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During 2004, the water levels in water table wells were generally above average for most of the water year (U.S. Geological Survey, *Water Resources Data-Virginia Water Year 2004*, Volume 2, Water-Data Report VA-01-2, page 2). Water levels in the confined Middle Potomac and Upper Potomac aquifers, however, continued their steady decline due to recent increases in withdrawals. Slight fluctuations to the contrary are due to

variations in pumping schedules (U.S. Geological Survey, *Water Resources Data-Virginia Water Year 2004*, Volume 2, Water-Data Report VA-01-2, page 2).

the top 50 water users including use by power generating facilities.

**Table 1  
Top 20 Water Users in 2004 (Non-Power)**

OWNER NAME	SYSTEM	TOTAL (MGD)	CATEGORY
HONEYWELL INTERNATIONAL INC	HOPEWELL PLANT	127.33	MAN
FAIRFAX COUNTY WATER	POTOMAC RIVER	84.49	PWS
RICHMOND, CITY OF	RICHMOND, CITY	74.30	PWS
CINERGY SOLUTIONS OF	CELCO PLANT	62.40	MAN
NORFOLK, CITY OF	NORFOLK	57.55	PWS
FAIRFAX COUNTY WATER	OCCOQUAN	55.14	PWS
GIANT YORKTOWN INC	YORKTOWN REFINERY	54.66	MAN
MEADWESTVACO CORPORATION	COVINGTON PLANT	39.60	MAN
INTERNATIONAL PAPER CORP	FRANKLIN PLANT	36.74	MAN
DUPONT E I DE NEMOURS & CO	SPRUANCE PLANT	29.34	MAN
APPOMATTOX R WATER	LAKE CHESDIN	26.99	PWS
NEWPORT NEWS, CITY OF	NEWPORT NEWS	26.31	PWS
NEWPORT NEWS, CITY OF	NEWPORT NEWS	25.21	PWS
HONEYWELL NYLON INC	CHESTERFIELD PLANT	23.03	MAN
VIRGINIA AMERICAN WATER	HOPEWELL DISTRICT	21.52	PWS
NEWPORT NEWS, CITY OF	NEWPORT NEWS	21.44	PWS
ST LAURENT PAPER PRODUCTS	WEST POINT PLANT	19.20	MAN
HENRICO COUNTY	HENRICO COUNTY WTP	16.89	PWS
PORTSMOUTH, CITY OF	PORTSMOUTH	16.80	PWS
VIRGINIA BEACH, CITY OF	VIRGINIA BEACH	15.46	PWS
<b>TOTAL</b>		<b>834.40</b>	

**Abbreviations Legend: MAN= MANUFACTURING, PWS= PUBLIC WATER SUPPLY**

## V. Status of Water Use

The most recent water use report by the USGS, titled *Estimated Use of Water in the United States in 2000* estimated that 75 percent of Virginia’s population is served by public water supply systems and 25 percent is supplied through private wells. Surface water sources supply 88 percent of the public water, and ground water sources supply the remaining 12 percent. The 2000 publication is the latest in print. The publication is updated and re-compiled every five years and new data will be published next year.

The Virginia Water Withdrawal Reporting Regulation (9 VAC 25-200-10 et seq.) requires that individuals or facilities that withdraw water at volumes greater than 10,000 gallons per day (one million gallons per month for crop irrigators) must measure and report annually to DEQ the monthly volume of water withdrawn. The Virginia Water Use Data System (VWUDS) database contains withdrawal data collected since 1982 under this regulation. The information presented below represents reported water withdrawals by category covered by the water withdrawal reporting regulation. Withdrawals of less than 10,000 gallons per day (gpd) are exempt from the reporting requirements and are not included in this report.

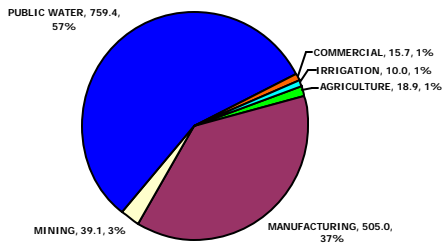
### A. 2004 Water Use

**Table 1** lists the top 20 individual non-power generating water users, ranked by the amount of their 2004 reported withdrawals. Excluding electric power facilities, public water supply systems were the largest consumers of water in the Commonwealth, accounting for 57 percent of the remaining withdrawals. The second largest consumer of water in Virginia is manufacturing, which accounted for 37 percent of withdrawals. **Appendix 2** includes a list of

Excluding power, reported 2004 water use increased by nearly 500 million gallons per day (mgd) over that reported in 2003. **Chart 1** on the following page shows the water usage in 2004 for categories excluding power generation. It shows that in 2004, public water supplies accounted for the greatest percentage (57%) of the total ground water and surface water use in Virginia. Manufacturing use in 2004 remained strong as well with 37% of the total ground water and surface water use.

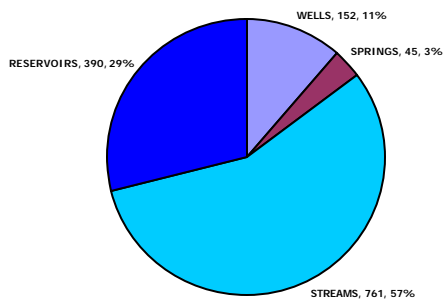


Chart 1  
WATER USE BY CATEGORY FOR 2004  
(EXCLUDING POWER)  
(1348 MGD)



The relative contribution of surface and ground water sources to 2004 non-power generation withdrawals is illustrated in **Chart 2**. The chart shows that large water demands are primarily met by surface water sources. Users of ground water sources outnumber surface water users; however, the amount of ground water withdrawn from aquifers is less than is withdrawn from streams and reservoirs.

Chart 2  
WATER USE BY SOURCE IN 2004  
(1348 MGD)



## B. Historic Trends in Virginia Water Use

A summary of the non-power generation water withdrawal data from VWUDS for the years 2000 through 2004 is presented in **Table 2**. The data are aggregated by category of use and by source water type. This time period is used to illustrate the changes in water use of both ground water and surface water resources during significant dry and wet rainfall years. Virginia experienced record drought in 2001-2002 and record rainfall in 2003-2004. The chart illustrates that ground water use by

commercial, public water supplies, and irrigation peaked during the 2002 drought. Ground water use by manufacturing reached its lowest point during the period during 2002. The use of surface water by public water supplies peaked in the drought year of 2002. Surface water withdrawals by power generating facilities are not included in this table as approximately 90-95% of their withdrawal is returned to the source. Newer power plants, however, usually use cooling towers that consume more water than the older plants. Ground water is not a significant source for power generation. DEQ is working on developing a better understanding of consumptive water use in Virginia and some of this information will be included in next year's report.

Table 2  
Virginia Water Use Summary (2000-2004)  
(in Million Gallons per Day – MGD)

	Category	2000	2001	2002	2003	2004
Ground Water	AGR	14.7	13.1	13.2	16.2	15.0
	COM	7.5	8.5	9.7	6.2	7.6
	MAN	100.8	95.2	93.1	99.9	97.4
	MIN	5.7	6.1	1.4	2.3	1.1
	PWS	64.3	68.4	76.1	68.4	72.2
	IRR	15.5	10.8	18.5	10.5	3.5
	TOTAL (GW)	208.5	202.0	211.9	203.5	196.9
Surface Water	AGR	4.6	4.5	4.6	5.2	3.9
	COM	7.8	10.8	10.4	5.1	8.1
	MAN	441.3	390.6	436.7	398.8	407.6
	MIN	38.4	32.2	31.2	29.0	38.0
	PWS	657.7	737.6	756.3	662.9	687.2
	IRR	7.8	10.5	9.6	5.4	6.5
	TOTAL (SW)	1157.5	1186.3	1248.8	1106.5	1151.2

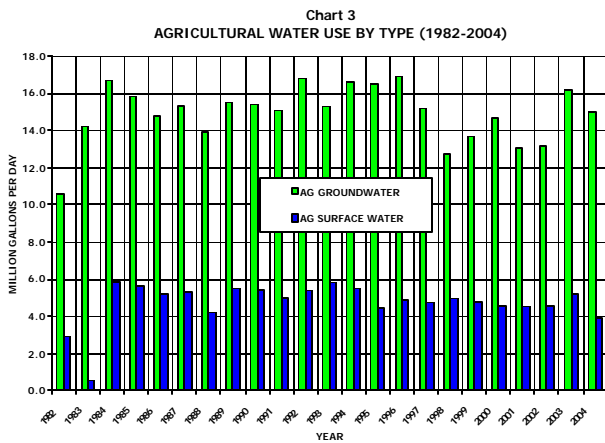
Abbreviations Legend: AGR= AGRICULTURE, COM= COMMERCIAL, MAN= MANUFACTURING, MIN= MINING, PWS= PUBLIC WATER SUPPLY, IRR= IRRIGATION

### B.1 Categories of Water Use

The next series of bar and pie charts have been included to illustrate the water use for individual categories from the time water withdrawal regulations came into effect in 1982 to the most recent year available (2004). Irrigation was added to the regulation in 1990.

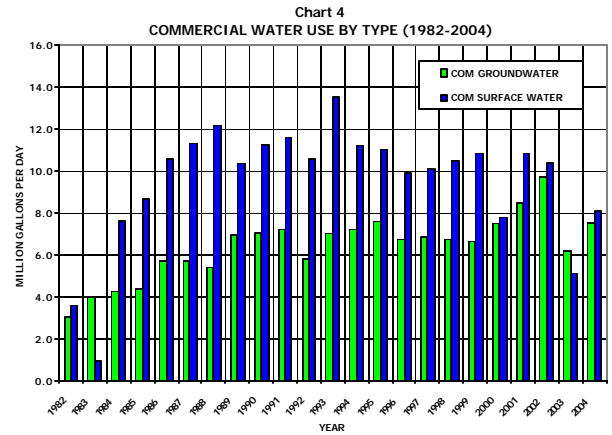
## B.1.a Agricultural Water Use

Agricultural (**Chart 3**) withdrawals include operations such as commodity farms, fish farms and hatcheries. Ground water withdrawals accounted for the majority of agricultural water use over the period of 1982 through 2004. Ground water use averaged approximately 15 mgd while surface water use for agriculture averaged approximately 5 mgd. For 2004 agricultural use of ground water averaged approximately 15 mgd, while use of surface water averaged approximately 4 mgd.



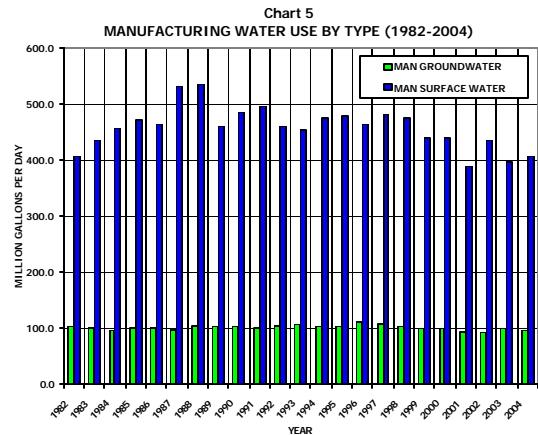
## B.1.b Commercial Water Use

Commercial (**Chart 4**) withdrawals include operations such as golf courses, local and federal installations, hotels and laundromats. Commercial use of surface water exceeded the commercial use of ground water for the majority of the period of record with the exception of 1983 when ground water accounted for a large majority of the use. In addition, since 2000 the commercial use of both sources has been relatively equal with surface water use only marginally greater for most of the period. Data for 2004 indicates a fairly equal use of both sources, with ground water approximately 7.5 mgd and surface water approximately 8.0 mgd.



## B.1.c Manufacturing Water Use

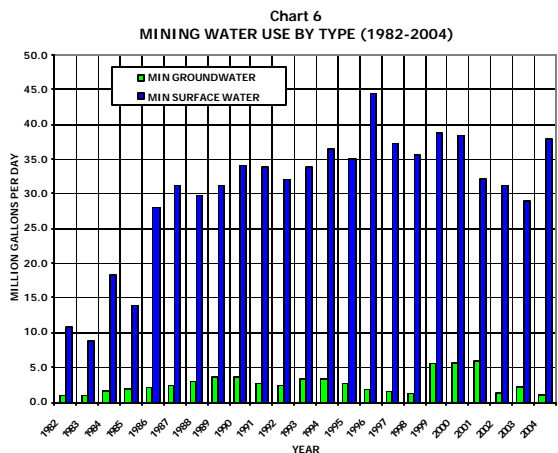
Manufacturing (**Chart 5**) withdrawals include operations such as paper mills, food processors, drug companies, furniture, and concrete companies. The major source of water for manufacturing has consistently been surface water. Ground water use for the period of record averaged approximately 100 mgd, while surface water use was 400 mgd or greater for each of the periods of record.



## B.1.d Mining Water Use

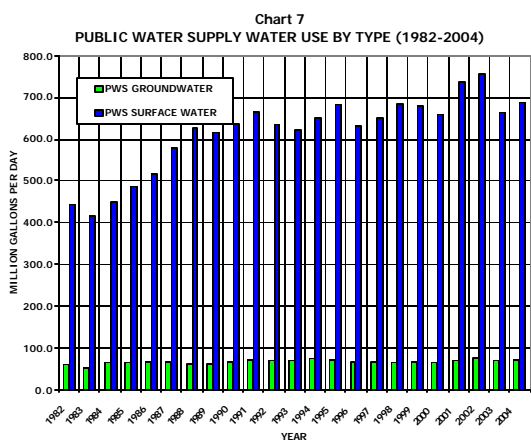
Mining (**Chart 6**) withdrawals include operations such as sand, rock and coal companies. Mining withdrawals of ground water normally fall below 5 mgd, while withdrawals of surface water have ranged well above 25 mgd since 1987. Data for 2004 indicates an average of approximately 1 mgd for mining use of ground water and in excess of 35 mgd for surface water use.

## B.2.a Fossil Power Generation



### B.1.e Public Water Supply Water Use

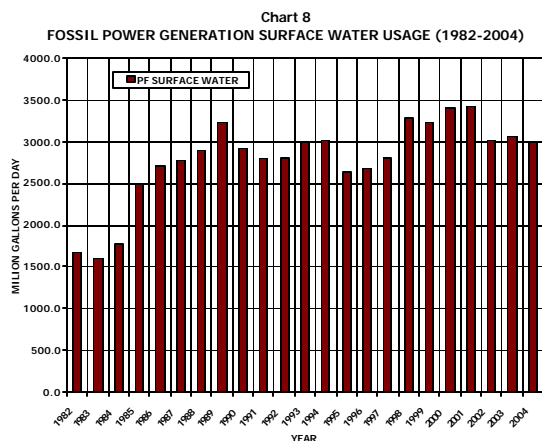
Public water supply (Chart 7) includes municipal and private water purveyors. Use of ground water sources for public water supply averaged less than 100 mgd for the period. Since 1986 use of surface water sources for public water supply has averaged over 500 mgd, with highs in excess of 700 mgd being reported for 2001 and 2002. Data for 2004 indicates that ground water use averaged less than 100 mgd, while surface water use approached 700 mgd.



## B.2 Power Generation Water Use

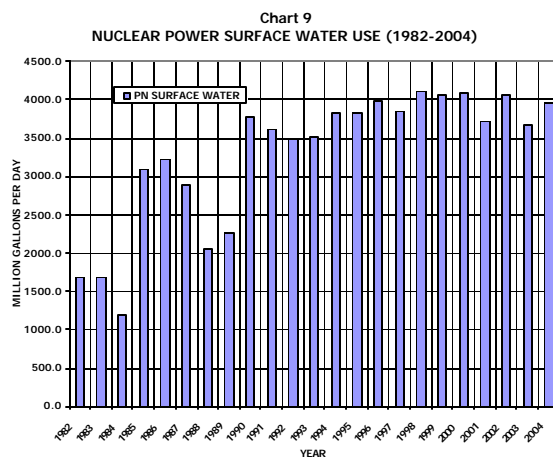
Power (Charts 8-10) generators use surface water sources to cool the generators or pass through the turbines to produce the electric power.

Chart 8 provides information on the use of surface water for Fossil Power generation. Since 1985 use of surface water for Fossil Power generation has averaged at or in excess of 2,500 mgd. For the past 3 years (2002 – 2004) surface water use in this category has averaged 3,000 mgd.



## B.2.b Nuclear Power Generation

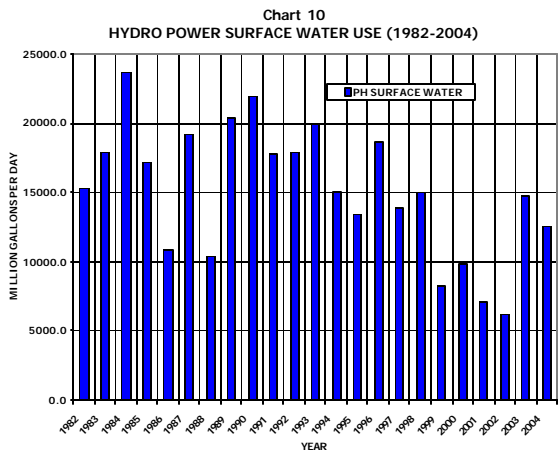
Chart 9 illustrates the extent of use of surface water for the generation of Nuclear Power. Use of surface water in this category has gone from a low of approximately 1,200 mgd in 1984 to highs in excess of 4,000 mgd in 1998, 1999, 2000 and 2002. Data for 2004 indicates a use of slightly less than 4,000 mgd of surface water for the generation of Nuclear Power.



## B.2.c Hydro Power Generation

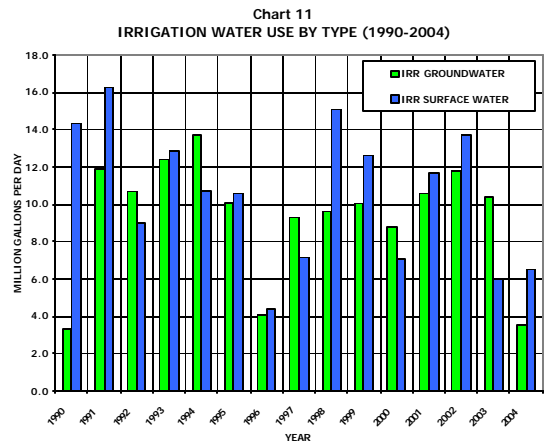
Chart 10 provides an illustration of the variations in use of surface water for the generation of Hydro Power over the period of

record. Use of surface water in this category has fluctuated greatly over the period with a high of approximately 24,000 mgd in 1984 to a low of approximately 6,000 mgd in 2002. Use in 2004 averaged approximately 12,000 mgd.



### B.3 Irrigation Water Use

Irrigation (**Chart 11**) withdrawals are used to promote growth in such crops as tobacco, corn and soybeans for example. As indicated previously, the reporting of irrigation withdrawals was added to the regulations in 1990. Over the period of record the use of surface water for irrigation normally exceeded the use of ground water in this category. However, the records show that in 1992, 1994, 1997, 2000, and 2003 that use of ground water exceeded that of surface water. Ground water use in this category has gone from a low of approximately 3 mgd in 1990 and 2004 to a high approaching 14 mgd in 1994. Surface water use in this category has gone from a high in excess of 16 mgd in 1991 to a low of approximately 4 mgd in 1996. Irrigation withdrawals for 2004 included approximately 3.5 mgd of ground water and approximately 6.5 mgd of surface water.

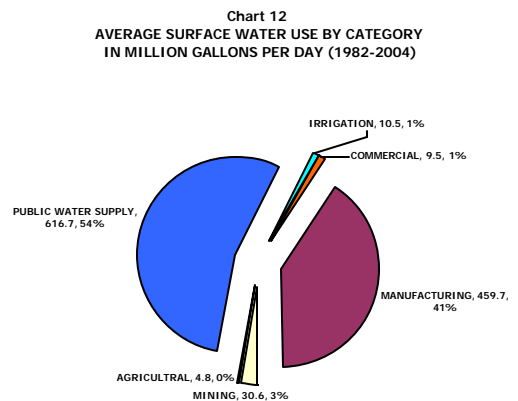


### B.4 Average Water Withdrawals

The following charts provide information on the average surface water withdrawals and ground water withdrawals by category in mgd for the period of record of 1982 through 2004.

#### B.4.a Average Surface Water Withdrawals

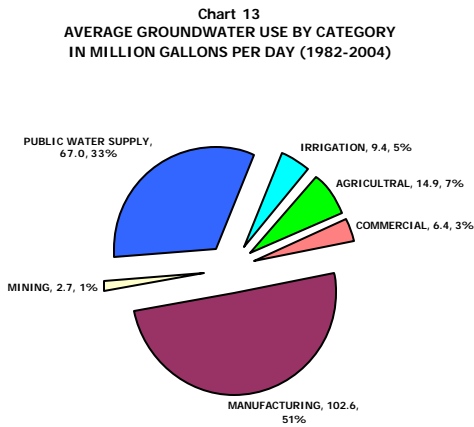
**Chart 12** shows the average surface water withdrawals by category in mgd for 1982-2004. Use categories included Public Water Supply (616.7 mgd); Manufacturing (459.7 mgd); Mining (30.6 mgd); Irrigation (10.5 mgd); Commercial (9.5 mgd); and Agriculture (4.8 mgd).



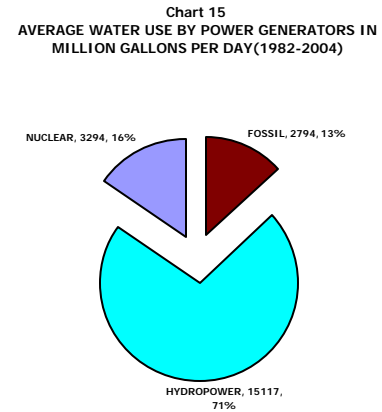
#### B.4.b Average Ground Water Withdrawals

**Chart 13** shows the average ground water withdrawals by category in mgd for the period of record. Use categories, ranked by use, included: Manufacturing (102.6 mgd); Public Water Supply (67.0 mgd); Agricultural (14.9

mgd); Irrigation (9.4 mgd); Commercial (6.4 mgd); and Mining (2.7 mgd).

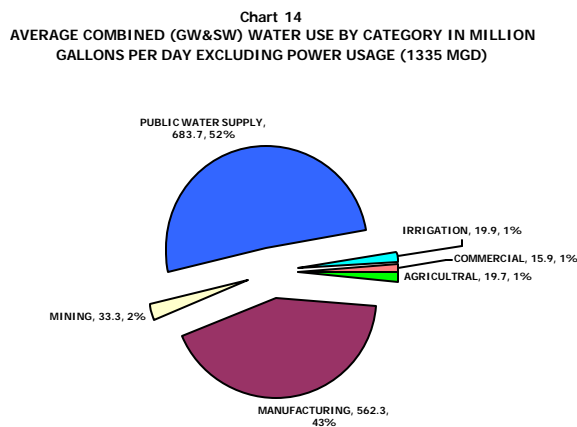


average nuclear and fossil power usage compared to hydroelectrical usage. For the period of record, Hydropower represented 71% of the average water use by Power Generators, with Nuclear Power Generation accounting for 16% and Fossil Power Generation 13%.



### B.4.c Average Surface & Ground Water Withdrawals – Excluding Power Generation

Chart 14 serves to illustrate the average water use by category to include both ground water and surface water withdrawals in mgd, excluding Power Generation. For the period of record of 1982 through 2004, the average combined ground water and surface water use included the following categories: Public Water Supply (683.7 mgd); Manufacturing (562.3 mgd); Mining (33.3 mgd); Irrigation (19.9 mgd); Agriculture (19.7 mgd); and Commercial (15.9 mgd).



## VI. Climatological Conditions

### VI.A 2004 Conditions

The US Drought Monitor indicated that Virginia experienced no areas of drought conditions in 2004.

### VI.B Statewide Drought Conditions - 2005

Significant precipitation deficits were experienced across the Commonwealth from mid-August through the first week of October 2005. This relatively short period of significant precipitation deficit resulted in noteworthy short-term drought impacts in many areas of the State.

As of November 7, 2005, forty Virginia localities had requested agricultural drought disaster designations due to losses in major commodities. One locality, Fauquier County has been designated a primary disaster area, twenty-one localities have been evaluated and forwarded to the U.S. Secretary of Agriculture for designation, seventeen localities are currently being evaluated, and one locality was found to have failed to meet the designation requirement of a minimum of 30% loss in a major commodity.

### B.4.d Power Generation Water Withdrawals

In addition to the use categories illustrated above, Power Generation accounted for an additional average use of 21,205 mgd from 1982 through 2004. Chart 15 shows the

Water supplies across the Commonwealth were relatively unaffected by the precipitation deficits with the notable exception of the Town of Big Stone Gap. As of November 10, 2005 Big Stone Gap continues to experience a water shortage emergency due to critically low reservoir levels. The low reservoir levels are due to a combination of events that include the reduction in reservoir levels to allow the construction of a new dam to increase reservoir storage. Unfortunately, the completion of the new dam coincided with the beginning of the period of precipitation deficit and the reservoir did not have the opportunity to refill. DEQ has issued an Emergency Virginia Water Protection Permit to the town that allows the withdrawal of one million gallons per day from the Powell River. This emergency permit along with interconnections from several local systems and significant logistical assistance from various state agencies and the Virginia National Guard has allowed the Big Stone Gap Water system to continue to provide minimal amounts of water to all of its customers.

The Drought Monitoring Task Force continues to monitor precipitation deficits, stream flow, ground water levels, and reservoir levels across the Commonwealth. While no significant hydrologic drought impacts currently exist, continued precipitation deficits through the winter season could result in early season drought impacts in many areas of the state in 2006.

## **VII. Water Supply Planning Initiatives**

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Informed management of Virginia's water resources is crucial to the health and welfare of Virginia's citizens and environment and continued economic prosperity. In recognition of the importance of water supply planning and water resources management, Governor Warner announced the water supply planning initiative during his first State of the Commonwealth address. This announcement mobilized an effort at DEQ to look at ways to improve the comprehensiveness of water supply planning and permitting to sustain the water resources of the Commonwealth for

future generations. The results of the initiative are a Local and Regional Water Supply Planning regulation (9 VAC 25-780), adopted by the Board June 28, 2005, proposed amendments to the Virginia Water Protection Program (9 VAC 25-210), and a proposed General Permit for Minor Water Withdrawals (9 VAC 25-800). The initiative was developed in partnership with the State Water Commission chaired by Senator Marty Williams, and represents the culmination of three years of concentrated work with localities, regional planning agencies, water providers, business and environmental interests, and the public. The core of this new policy focus is improved state support for and coordination of local and regional water supply planning and permitting.

This new regulation details information to be reported in a locality's water supply plan regarding existing water sources, existing water uses, and existing resource information. The regulation requires water supply plans to address conservation and drought response as part of the plan's water management actions. Contingency plans are required to be developed in accordance with the proposed regulation. Finally, all local and regional water supply plans are required to include a statement of need based on the adequacy of existing water sources to meet current and projected water demand over the planning horizon. In the event that existing sources are determined to be inadequate to meet demand over the planning period, water supply plans are required to include an analysis conducted in accordance with the requirements of this regulation that identifies alternative ways of meeting the shortfall in water supply. The Local and Regional Water Supply Planning regulation (9 VAC 25-780) is expected to be effective November 2, 2005.

The program is envisioned as a state and local partnership with the localities having the lead role in identifying their future demands and the state providing technical support and oversight.

Implementation of this program will result in a statewide understanding of local water needs and potential alternatives for at least 30 years



into the future. It will also allow for improved preparation for future drought, earlier identification of resource and inter-jurisdictional conflicts, increased opportunities for public input and the potential to reduce conflicts in future permit processes.

In addition to the new planning regulation, efforts are underway to develop a State Water Resources Plan. DEQ's concept for the State Plan is to put local and regional water supply plans together with relevant state water resource information in one place. This Plan should provide a qualitative and quantitative description of water resources in Virginia based upon readily accessible data and guidance on the use of that information in the decisions that face the Plan's users.

By doing this, at any point in the future someone can get a statewide snapshot of what the water supply needs are, where they are met, and our best estimate of the resource's ability to meet additional needs. The State Plan will be used as a tool to manage water resources to ensure their continued availability, while also maximizing environmental and economic benefits. An important result of this planning is that DEQ will be able to identify areas of the state where multiple users want the same source for their water needs. The Plan will also allow DEQ to identify existing areas of the state where water availability may be insufficient now or in the future based on these needs. By knowing these conflicts in advance, users and DEQ can have the opportunity to try and find resolutions to these conflicts through regional solutions, alternative sources, or some other option.

DEQ anticipates having available resource information and guidance about how to use this information by the end of 2006. DEQ expects to have the first complete State Plan in 2011. The Plan will be the embodiment of a continuous and repetitive planning process that evolves in response to changing conditions over time. Beginning next year, this report will predominately reflect progress on the State Water Resources Plan both in format and content.

Improvements have also been made in the area of water supply permitting. A 2005 technical advisory committee reached consensus on a series of amendments to the Virginia Water Protection Program (VWPP). Substantive changes to the VWPP regulation contained in these amendments include 1) clarification of which water withdrawals are excluded from the permit requirement and under what conditions; 2) the institution of a new pre-application panel and public information meeting process for surface water projects; 3) the creation of an Emergency Virginia Water Protection Permit for public water supplies during drought; 4) the inclusion of new language regarding permit conditions for withdrawals in the Potomac River consistent with the Potomac Low Flow Allocation Agreement; 5) new language defining what information will be considered in the evaluation of cumulative impacts to instream flow; 6) clarification of what information is submitted by the applicant to demonstrate that an alternatives analysis has been conducted; 7) the creation of a new variance provision to address permit conditions during drought; and 8) establishment of a new joint public notice process for surface water projects requiring both a VWPP permit and a Virginia Marine Resources permit. There are also a number of administrative amendments that will allow for a more efficient and understandable application, review and issuance process. These amendments have been approved by the State Water Control Board for public comment.

A general permit for minor surface water withdrawals was also developed which will significantly reduce the cost and administrative burden of obtaining permits for minor water users.

## **VIII. Conclusions and Recommendations**

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The Virginia Water Supply Program establishes new priorities for water supply managers. By encouraging regional water supply planning efforts and recognizing the role of local governments in meeting local water supply needs and the DEQ's responsibility to

protect and manage water supplies for human and environmental needs, the Program lays the groundwork for managing Virginia's Water Resources for decades to come.

The Virginia Water Protection Permit Work Group identified the following issues that they recommended needed to be addressed:

1. Timely receipt of comments on water supply permit submittals from other state agencies must be addressed, because while SB 1248, 2005 requires agencies to provide comments to DEQ within 45 days of project notification, the bill neither provides a penalty for failure to meet that deadline nor authorizes DEQ to require a response from other agencies.
2. DEQ should initiate cumulative impact modeling to better understand the affects of existing and proposed surface water withdrawals on beneficial uses in river systems.
3. DEQ should evaluate consumptive uses of water generally and whether flow augmentation for consumptive use is needed outside the Potomac basin to protect existing water supplies.
4. A revised and more accurate definition of "safe yield" should be developed to serve the needs of both the Department of Health and DEQ.
5. DEQ should establish a standing committee of individuals from the work group to address issues as they arise.
6. Sufficient staff and resources at resource agencies to review and process applications in a timely fashion should be funded.

DEQ has taken steps to begin addressing each of these recommendations. A work plan will be developed in early 2006 in coordination with the standing committee identified in recommendation #5.

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**Appendix 1:  
Virginia's Water Resources Data**

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**State Population (2004 Estimate)** - 7,459,827

**State Surface Area** - 40,741 square miles

**Major River Basins:**

Potomac/Shenandoah  
Rappahannock  
York  
James  
Chesapeake Bay/Small Coastal  
Chowan River/Albemarle Sound  
Roanoke  
New  
Tennessee/Big Sandy

**Perennial River Miles (freshwater)** - 50,537 miles

**Publicly Owned Lakes and Reservoirs**

Larger than 5,000 acres	5	109,838 acres
Smaller than 5,000 acres	243	52,392 acres
Total	248	162,230 acres

**Freshwater Wetlands** - 808,000 acres

**Tidal and Coastal Wetlands** - 236,900 acres

**Estuary** - 2,557 Square Miles

**Atlantic Ocean Coastline** - 120 Miles

**Statewide Average Annual Rainfall** - 42.8 inches

**Average Freshwater Discharge of All Rivers** - Approximately 25 billion gallons per day

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Appendix 2: Table 3

TOP 50 WATER WITHDRAWERS DURING 2004

OWNER NAME	SYSTEM	TOTAL (MGD)	CATEGORY*
DOMINION GENERATION	NORTH ANNA NUCLEAR POWER	2160.48	PN
DOMINION GENERATION	SURRY NUCLEAR POWER PLANT	1974.74	PN
DOMINION GENERATION	YORKTOWN FOSSIL POWER PLANT	918.10	PF
DOMINION GENERATION	CHESTERFIELD POWER STATION	818.45	PF
DOMINION GENERATION	CHESAPEAKE ENERGY CENTER	549.08	PF
MIRANT POTOMAC RIVER LLC	POTOMAC RIVER GENERATION	331.99	PF
AMERICAN ELECTRIC POWER CO	GLEN LYN POWER PLANT	235.68	PF
HONEYWELL INTERNATIONAL INC	HOPEWELL PLANT	127.33	MAN
DOMINION GENERATION	BREMO BLUFF POWER PLANT	123.23	PF
FAIRFAX COUNTY WATER	POTOMAC RIVER	84.49	PWS
RICHMOND, CITY OF	RICHMOND, CITY	74.30	PWS
CINERGY SOLUTIONS OF	CELCO PLANT	62.40	MAN
NORFOLK, CITY OF	NORFOLK	57.55	PWS
FAIRFAX COUNTY WATER	OCCOQUAN	55.14	PWS
GIANT YORKTOWN INC	YORKTOWN REFINERY	54.66	MAN
MEADWESTVACO CORPORATION	COVINGTON PLANT	39.60	MAN
INTERNATIONAL PAPER CORP	FRANKLIN PLANT	36.74	MAN
DUPONT E I DE NEMOURS & CO	SPRUANCE PLANT	29.34	MAN
APPOMATTOX R WATER	LAKE CHESDIN	26.99	PWS
NEWPORT NEWS, CITY OF	NEWPORT NEWS	26.31	PWS
NEWPORT NEWS, CITY OF	NEWPORT NEWS	25.21	PWS
HONEYWELL NYLON LLC	CHESTERFIELD PLANT	23.03	MAN
VIRGINIA AMERICAN WATER	HOPEWELL DISTRICT	21.52	PWS
NEWPORT NEWS, CITY OF	NEWPORT NEWS	21.44	PWS
ST LAURENT PAPER PRODUCTS	WEST POINT PLANT	19.20	MAN
HENRICO COUNTY	HENRICO COUNTY WTP	16.89	PWS
PORTSMOUTH, CITY OF	PORTSMOUTH	16.80	PWS
VIRGINIA BEACH, CITY OF	VIRGINIA BEACH	15.46	PWS
AMERICAN ELECTRIC POWER CO	CLINCH RIVER POWER PLANT	15.45	PF
U.S. SILICA	MONTPELIER PLANT	14.40	MIN
UNITED STATES GOVERNMENT	RADFORD AMMUNITIONS PLANT	14.06	MAN
WESTERN VA WATER AUTHORITY	ROANOKE, CITY OF	12.53	PWS
SMURFIT-STONE CONTAINER	HOPEWELL PLANT	12.43	MAN
CHESAPEAKE, CITY OF	CHESAPEAKE	12.39	PWS
NORFOLK, CITY OF	NORFOLK	11.68	PWS
FAIRFAX, CITY OF	FAIRFAX, CITY OF	11.60	PWS
WESTERN VA WATER AUTHORITY	SPRING HOLLOW RESERVOIR	11.43	PWS
MANASSAS, CITY OF	MANASSAS	10.97	PWS
DOMINION/OLD DOMINION ELECTRIC	CLOVER POWER STATION	10.74	PF
LYNCHBURG, CITY OF	LYNCHBURG	10.65	PWS
VIRGINIA, COMMONWEALTH OF	COURSEY SPRING FISH STATION	10.58	AGR
GEORGIA-PACIFIC	BIG ISLAND PLANT	10.03	MAN
MERCK & CO	ELKTON PLANT	8.58	MAN
CHESTERFIELD COUNTY	CHESTERFIELD COUNTY	8.21	PWS
DANVILLE, CITY OF	DANVILLE-MUNICIPAL	7.07	PWS
RIVANNA WATER & SEWER AUTH	ALCSA & CHARLOTTESVILLE	6.92	PWS
BLACKSBURG-C'BURG-VPI WTR	BLACKSBURG-CHRISTIANSBURG-VPI	6.83	PWS
HARRISONBURG, CITY OF	HARRISONBURG	6.56	PWS
WINCHESTER, CITY OF	WINCHESTER	6.48	PWS
VULCAN CONSTRUCTION	CURLES NECK PLANT	6.31	MIN
TOTAL		8,172.05	

\*PF = FOSSIL POWER, PN = NUCLEAR POWER, PWS = PUBLIC WATER SUPPLY, MAN = MANUFACTURING, MIN = MINING, AGR = AGRICULTURE