

Wise County Water & Sewer Study

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DISCLAIMER

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As required by our contract, this report is printed on recycled paper.

Wise County Water & Sewer Study

Executive Summary

The purpose of the Wise County Water & Sewer Study is to develop a comprehensive planning document to be used for the development of water and sewer systems in Wise County. This study was prepared by Dewberry & Davis with the help of the Water & Sewer Study Committee consisting of members from each of the service providers, LENOWISCO Planning District Commission, the Department of Environmental Quality, and the Department of Health. The study identifies the present conditions and future needs for the next 25 years.

This study was funded by a 604b grant from the Commonwealth of Virginia Department of Environmental Quality and Wise County Board of Supervisors.

The study addresses all providers of water and sewer services in Wise County. Those providers are the Wise County PSA, CNW Wastewater Authority, the City of Norton, the Towns of Pound, Appalachia, Big Stone Gap, Wise, Coeburn, St. Paul, and several smaller systems which serve isolated areas.

The 1990 Wise County population was 39,573. Based on the recent construction of the Red Onion and Wallens Ridge Prisons and expected additional employment, the estimated 2025 population is 42,200. Currently, 84% of the County population receive public water service and 45% receive public sewer service.

The current average day water use within the County is 5,800,000 gallons per day and the projected 2025 average day water use is 6,800,000 gallons per day. There is sufficient water supply/treatment plant capacity to meet the 2025 conditions provided that water is not wasted by leaks or inaccurate meters. Water accountability studies should be done for several systems to determine and repair/replace leaking pipes, inaccurate meters, and other causes of water loss. The safe yield of several reservoirs should be confirmed by further study.

The most significant impact on the 8 major water treatment plants in the County will be caused by the 1996 Safe Drinking Water Act Amendments. Treatment process upgrades will, in all likelihood, be required at all plants in the 2000 to 2005 period. Eight water supply alternatives were evaluated to determine if the combination of any or all of the existing water treatment plants would be more economical than individual upgrades. Because of the high cost of constructing and operating long transmission facilities was more expensive than individual plant upgrade, the lowest cost and recommended water service alternative is the continued use of existing plants.

The current average daily flow received at the four major wastewater treatment facilities in the County is 4,790,000 gallons per day. With the anticipated additional flow from the two prisons and additional service areas, the anticipated 2025 wastewater flow is 6,800,000 gallons per day. Plant expansion will be quite difficult at the two major plants, CNW and Big Stone Gap, because of physical space limitations and the needed for a higher degree of treatment because stream assimilation capacity. The recommended alternative is to begin a vigorous Infiltration/Inflow Abatement program in the service area of both plants in order to reduce the extraneous wastewater that is received. A successful program will delay or possibly eliminate future expansion, depending upon population growth.

Water and wastewater service is provided in the Towns and City by those municipalities. Water service is provided within the County by the PSA. Wastewater service has been provided by the Towns (City) for those areas which are adjacent and easily served. There are areas within the County such as the coal camp communities that need wastewater service. It does not appear that any entity has taken responsibility for provision of wastewater service within the County. The Board of Supervisors needs to assign this responsibility to a specific entity and follow through to assure that service is provided where feasible and/or required by public health.

The water and wastewater needs have been identified and prioritized on a County-wide basis and by each provider. Then prioritized needs were organized into an Implementation Schedule for the next 25 years which is shown on the following pages. This schedule is based on present day needs and conditions that are subject to changes. This schedule should be periodically reviewed and updated.

There are several funding options. A major funding source is Rural Development which offers grant/loan packages to keep water and sewer bills at about \$25/month. Rural Development is now requiring mandatory hookup ordinances for projects that they fund.

There are several management options that may be utilized to operate the water and wastewater facilities. These range from the current practice of municipal ownership and operation to a single County-wide agency that would operate all facilities by itself or a contract basis. Based on the available options, we believe that the Wise County communities should begin moving towards a regional operation of water facilities and explore additional regionalization of wastewater operations. The suggested steps to move toward regionalization are:

- Form a committee with representatives from each provider to explore ways to work together and share special services.
- Continue to work together and explore joint operations such as billing, meter reading, joint training, cross-training, bulk purchasing, and joint remote facility operation.
- Continue to explore working together as prudent. Explore joint contract operations if the committee believes appropriate.

It is recommended that the joint committee initially be chaired by the Executive Director of the

LENOWISCO Planning District Commission. There are many opportunities to improve operations by working together. The first step is getting together and beginning. Frequently, the first step is the hardest.

Water Project Implementation Schedule 1998-2025

Provider	Year	Project Description	Estimated Cost ¹ (Thousands \$ ²)	
Pound	1998	WTP Repair/Upgrade	250	
		Bold Camp Ph. I Ext. & Clintwood Interconn.	<u>2,595</u>	2,845
	2000	SDWA Plant Upgrade ³	750	
		Bold Camp Ph. II Extension	<u>720</u>	1,470
	2005	Accountability Study	<u>15</u>	<u>15</u>
				4,330
Appalachia	1998	Safe Yield Study	25	25
	2000	SDWA Plant Upgrade ³	<u>1,050</u>	1,050
	2005	Big Stone Gap Interconnection ⁴	<u>200</u>	200
	2010	Accountability Study	<u>15</u>	<u>15</u>
				1,290
Big Stone Gap	1998	Safe Yield Study	30	
		Accountability Study	50	
		Dam Spillway Repairs	<u>1,000</u>	1,080
	2000	SDWA Plant Upgrade ³	4,250	
		Norton Interconnection ⁴	<u>350</u>	4,600
	2005	Appalachia Interconnection ⁴	<u>200</u>	200
2010	Plant Filter Control, Etc., Upgrade	<u>1,000</u>	<u>1,000</u>	
				6,880
Norton	1998	Safe Yield Study	25	25
	2000	SDWA Plant Upgrade ³	2,000	
		Big Stone Gap Interconnection ⁴	<u>350</u>	2,350
	2005	Accountability Study	<u>30</u>	<u>30</u>
				2,405
Wise	1998	Safe Yield Study	15	15
	2000	SDWA Plant Upgrade ³	<u>1,875</u>	1,875
	2005	Accountability Study	<u>15</u>	<u>15</u>
				1,905
Coeburn	2000	SDWA Plant Upgrade ³	<u>1,200</u>	1,200
	2010	Supplemental Transmission Main	<u>1,120</u>	1,120
	2015	Accountability Study	<u>15</u>	<u>15</u>
				2,335
St. Paul	2000	SDWA Plant Upgrade ³	<u>750</u>	750
	2015	Carfax Interconnection ⁵	-	-
	2020	Accountability Study	<u>10</u>	<u>10</u>
				760

Water Project Implementation Schedule (Cont'd)
1998-2025

Provider	Year	Project Description	Estimated Cost ¹ (Thousands \$ ²)	
Wise Co. PSA	2000	SDWA Plant Upgrade ³	<u>1,625</u>	1,625
	2005	Upper Indian Creek	1,283	
		Lower Indian Creek	1,022	
		Birchfield/Dotson Creek	<u>800</u>	3,105
	2010	Jasper Line Extension	1,440	
		Seminary Line Extension	1,280	
		South Fork Line Extension	<u>3,000</u>	5,720
	2015	Virginia City Line Extension	<u>1,392</u>	1,392
2020	Hoot Owl Line Extension	<u>376</u>	<u>376</u>	
				12,218
County Water Committee	1998	Implement Committee	-	
		Jenny Springs Investigation	40	
		County Hydraulic Model	<u>50</u>	<u>90</u>
				90
Total Water Projects Through the Year 2025				32,213

- Notes:
1. Mandatory connection ordinance will likely be required on a project-by-project basis to obtain Rural Development funding.
 2. Costs are in 1997 dollars.
 3. SDWA (1996 Safe Drinking Water Act) plant upgrades when required by VDH.
 4. Each provider - 50% cost.
 5. With Virginia City Extension.

Wastewater Project Implementation Schedule 1998-2025

Provider	Year	Project Description	Estimated Cost ¹ (Thousands \$ ²)	
Pound	2000	I/I Abatement Study	<u>10</u>	10
	2015	Bold Camp - Ph. I & II Area	<u>2,744</u>	<u>2,744</u> 2,754
Appalachia	1998	I/I Abatement Study	20	20
Big Stone Gap	1998	I/I Abatement Study	50	50
	2025	Expand Plant If Required	-	<u>-</u> 50
Norton	2000	I/I Abatement Study	50	923
		Josephine Line Extension	<u>873</u>	
Wise	2000	I/I Abatement Study	50	50
Coeburn	2000	I/I Abatement Study	30	30
St. Paul	2015	I/I Abatement Study	10	10
CNW Authority	2005	Joint Sludge Land Application Permit	<u>15</u>	15
	2025	Expand Plant, If Required	-	<u>-</u> 15
Wise Co. ³	1998	Imboden/Exeter Line Extension	2,045	3,455
		Andover/Arno/Derby Line Extension	<u>1,410</u>	
	2000	Stonega Line Extension	3,037	6,534
		Osaka/Roda Line Extension	2,337	
		Banner Line Extension	<u>1,160</u>	
	2005	Coeburn Mountain Phase II Extension	2,201	5,477
		Coeburn Mountain Phase I Extension	1,866	
	2010	Glamorgan/Stephans/Rock Switch Line Ext.	<u>1,410</u>	12,722
		Cranes Nest Line Extension	1,061	
	-	Tacoma Line Extension	550	9,583
		Powell Valley Line Extension	5,061	
		Guest River Line Extension	3,912	
		Dorchester/Needmore Line Extension	1,434	
		Thacker Branch Line Extension	<u>704</u>	
		East Stone/Cracker Neck Line Extension	3,933	
	2015	Wildcat Line Extension	3,230	9,288
Indian Creek Line Extension		<u>2,420</u>		
2020	South Coeburn/Sheffield Line Extension	3,046	437	
	Timberville Acres Line Extension	947		
2025	Crab Orchard/Bull Run/Dry Fork Project	<u>5,295</u>	47,496	
	Blackwood Line Extension	<u>437</u>		
County Sewer Committee	1998	Implement Committee	-	-

Total Wastewater Projects Through the Year 2025**51,348**

Notes: 1. Mandatory connection ordinance will likely be required on a project-by-project basis to obtain Rural Development funding.

2. Costs are in 1997 dollars.

3. Could be Wise Co. PSA, CNW Authority, or similar agency.

SECTION 1 INTRODUCTION

0100 Purpose and Funding Source

The purpose of the Wise County Water & Sewer Study is to develop a comprehensive planning document for water and sewer systems development in Wise County, Virginia over the next 25 years (projected to the year 2025). Based on an overview of the County, study areas have been designated, their specific water and sewer needs identified, and alternatives for meeting these needs have been evaluated. The Water & Sewer Study provides a consolidated and direct plan of action for addressing needs in a logical, economical, and prioritized manner.

Funding for this project has been provided by a 604b Grant from the Commonwealth of Virginia Department of Environmental Quality and Wise County Board of Supervisors.

0102 Statement of Problem

A number of citizens in Wise County are provided water and sewer service through the Towns of Wise, Coeburn, Pound, Big Stone Gap, Appalachia, St. Paul, City of Norton, CNW Regional Wastewater Treatment Authority, and the Wise County Public Service Authority. The various systems are primarily separate with some interconnections. The demand/need for water and sewer service is increasing in certain areas. Wise County is becoming responsive to the need but must develop an overall plan for implementation.

Water and sewer related needs are becoming some of the most pressing problems faced by localities in Virginia and other states. Most often, the localities water and sewer needs far exceed their financial means to implement solutions. Economic development can be enhanced by the presence of public water and sewer facilities. The converse is that economic development can be stalled by the lack of public water and sewer facilities. Housing development is also directly affected by the presence or lack of sufficient water and sewer facilities.

Wise County must develop an effective water and sewer plan that can prioritize needs to maximize benefits to the public within an acceptable time frame.

0103 Objectives, Concerns and Issues

1. Objectives - The basic objectives of the Wise County Water & Sewer Study are:
 - Establish the current situation relative to water and sewer infrastructure in Wise County.
 - Develop future projections of water and sewer needs with an understanding of the current situation and applicable policies, goals, and issues
 - Identify and evaluate alternatives for meeting water and sewer needs.
 - Establish recommendations and priorities for proposed improvements.
 - Evaluate fundability for recommendations and proposed improvements.

2. Concerns - There are two basic concerns of the water and sewer providers in Wise County: (1) The existing systems must be maintained, and; (2) New users must be added to the systems.
 - Existing water systems need to have more detailed evaluations performed for water loss accountability.
 - Existing sewer systems need to have more detailed evaluations performed for infiltration and inflow problems.
 - Existing water and wastewater treatment facilities require repairs and upgrades to adequately serve Wise County.
 - Water and sewer systems must be extended to serve more citizens in Wise County.

3. Issues - Public water service is provided to 84% of Wise County Residents. However, only 45% of Wise County Residents are provided public sewer service. One key issue is to extend not only water service, but sewer service as well. In several cases, the sewer service may be the higher priority.
 - Evaluate alternatives based on environmental need and future development
 - Extend sewer service to Wise County residents.

- Consider consolidating some of the water and sewer providers for regions of Wise County.
- Evaluate economies of scale to reduce costs.
- Consider a Mandatory Hookup Ordinance.

0104 Study Area Identification

Seven specific study areas were selected based on physical/geographical boundaries and existing areas of concentrated population/development. The need and demand for water and sewer services in the more sparsely populated sections of Wise County may not be projected to be at significant levels over the next 25 years. However, the study must be re-evaluated periodically to make adjustments for developmental patterns. The study areas are discussed in further detail in Existing Conditions - Part C, Description of Individual Study Areas.

- 1) Town of Pound and surrounding communities
- 2) Town of Appalachia and surrounding communities
- 3) City of Norton and surrounding communities
- 4) Town of Big Stone Gap and surrounding communities
- 5) Town of Wise and surrounding communities
- 6) Town of Coeburn and surrounding communities
- 7) Town of St. Paul and surrounding communities

0105 Previous Reports and Studies Performed

Several documents from a variety of sources were reviewed to provide both background and current information for demographic, economic, water, and wastewater data. The documents used included comprehensive plans, preliminary engineering reports, operations and maintenance manuals, and previous water and/or sewer studies. The resources used in compiling this study are listed in the Appendix. The following studies were comprehensive in nature, and were instrumental in creating this report.

1. CNW Regional Wastewater Treatment Authority Preliminary Engineering Report, Dewberry & Davis, 1991. This report provided the basis of funding for the CNW Regional wastewater system. The Towns of Wise and Coeburn, the City of Norton, and the Wise County PSA all utilize the CNW system, in a regional approach to wastewater treatment.
2. Town of Big Stone Gap - Appalachia Sewer Project Preliminary Engineering Report, Thompson & Litton, 1990. This report provided the basis of funding and preliminary design for the regional wastewater system for the Towns of Big Stone Gap and Appalachia. A similar project to CNW, the completed facility utilizes the regional approach to treatment of wastewater.
3. Preliminary Engineering Report - Water Facilities Improvements, Mattern & Craig, 1991. This report provided a detailed study of the needs and alternatives for meeting the needs of the Pound Water System. The report addressed needs of the water treatment plant and the water distribution system. The report was written prior to the decision to locate the new Maximum Security State Prison on Red Onion Mountain near Pound.
4. Red Onion Prison Site Evaluation for Dickenson and Wise Counties, Thompson & Litton, 1991. This report provided the basis for locating a new Maximum Security State Prison on Red Onion Mountain near Pound, Virginia. The report addressed the need for water and sewer service to the proposed facility, including upgrades to the existing Pound Wastewater Treatment Facility.
5. Waterworks Improvements for City of Norton - Comprehensive Water Study, Dewberry & Davis, 1984. This study provided a complete evaluation of the existing waterworks system in the City of Norton. This study included an analysis of the capabilities of the system to meet the City's projected future water needs.
6. Preliminary Engineering Report - Bold Camp, Killen Hollow, and Indian Creek Water Project, Maxim Engineering, 1997. This report provided preliminary engineering information regarding water service to these areas.

0106 USGS Quadrangle Maps

As part of this study, 1"-2000' scale maps of the existing facilities and proposed improvements were prepared. The maps were prepared for all of Wise County. The base maps are USGS digital quadrangles produced by the Virginia Department of Mines, Minerals, & Energy. The existing facilities information was furnished by the service providers.

The 1"-2000' scale maps have been given to LENOWISCO in hard copy and CD. The maps were prepared in AUTOCAD R13. The base map, existing facilities, and proposed improvements are on a different layer.

SECTION 2

EXISTING CONDITIONS

0201 General Description

Wise County is located in southwestern Virginia. The County consists of six incorporated towns, one city, and several unincorporated communities. The towns include Wise (the County seat), Pound, Appalachia, Big Stone Gap, Coeburn, and St. Paul. The city is the City of Norton. The county is bounded by Dickenson County on the northeast, Lee County on the west, Scott County on the south, Russell County on the east, and by the State of Kentucky on the north.

Two main highways run through the county; U.S. Route 58 Alternate (from east to west) and U.S. Route 23 (from southwest to north). Both routes have bypasses around most of the towns in the county. There is a total of 507 miles of primary and secondary roads in Wise County.

Wise County is bounded on the north and south by large mountain ranges which are part of the Jefferson National Forest. The High Knob Recreation Area, and the North Fork of the Pound Lake Recreation Area are located in Wise County. The elevations in Wise County range from approximately 1,450 feet to 4,162 feet above sea level.

There is one major river located within Wise County, the Powell River. The Powell River and its tributaries provide water withdrawal for the Big Stone Gap/Appalachia Region. Toms Creek, a tributary of the Clinch River provides water withdrawal for Coeburn. The Clinch River is the eastern boundary between Wise County and Russell County. The St. Paul Water Treatment Plant and the Wise County PSA Water Treatment Plant at Carfax withdraw water from the Clinch River. The Guest River, another tributary of the Clinch River, runs through Coeburn, into which the CNW Wastewater Treatment Facility discharges.

Wise County has six major water impoundments; the Bear Creek Reservoir, the City of Norton Twin Reservoirs, the Big Cherry Reservoir in Big Stone Gap, the Ben's Branch Reservoir in Appalachia, the Toms Creek Reservoir in Coeburn, and North Fork Lake Reservoir on the Pound River.

Wise County also offers two major industrial parks. One is located in the Esserville section of the County near Norton and Wise, and the other is located in Blackwood, between Norton and Appalachia. Industries in Wise County include Buster Brown Shoes, Fournier, Mulligan Lumber, and several coal mining companies.

The 1996 average employment statistics indicate that Wise County has a labor force of 14,966, of

which 12,582 are employed. This indicates an average unemployment rate of 15.9% for 1996. The 1994 per capita income average was \$17,276 for Wise County and the City of Norton.

Two colleges are located in Wise County. Clinch Valley College of the University of Virginia is located in Wise and Mountain Empire Community College is located in Big Stone Gap. All of the Towns in Wise County and the City of Norton have both an elementary and high school. The Wise County School Board is the administrative body for the public schools in the County, and the City of Norton operates its own school board. The Wise County Christian School is located in Wise near Clinch Valley College.

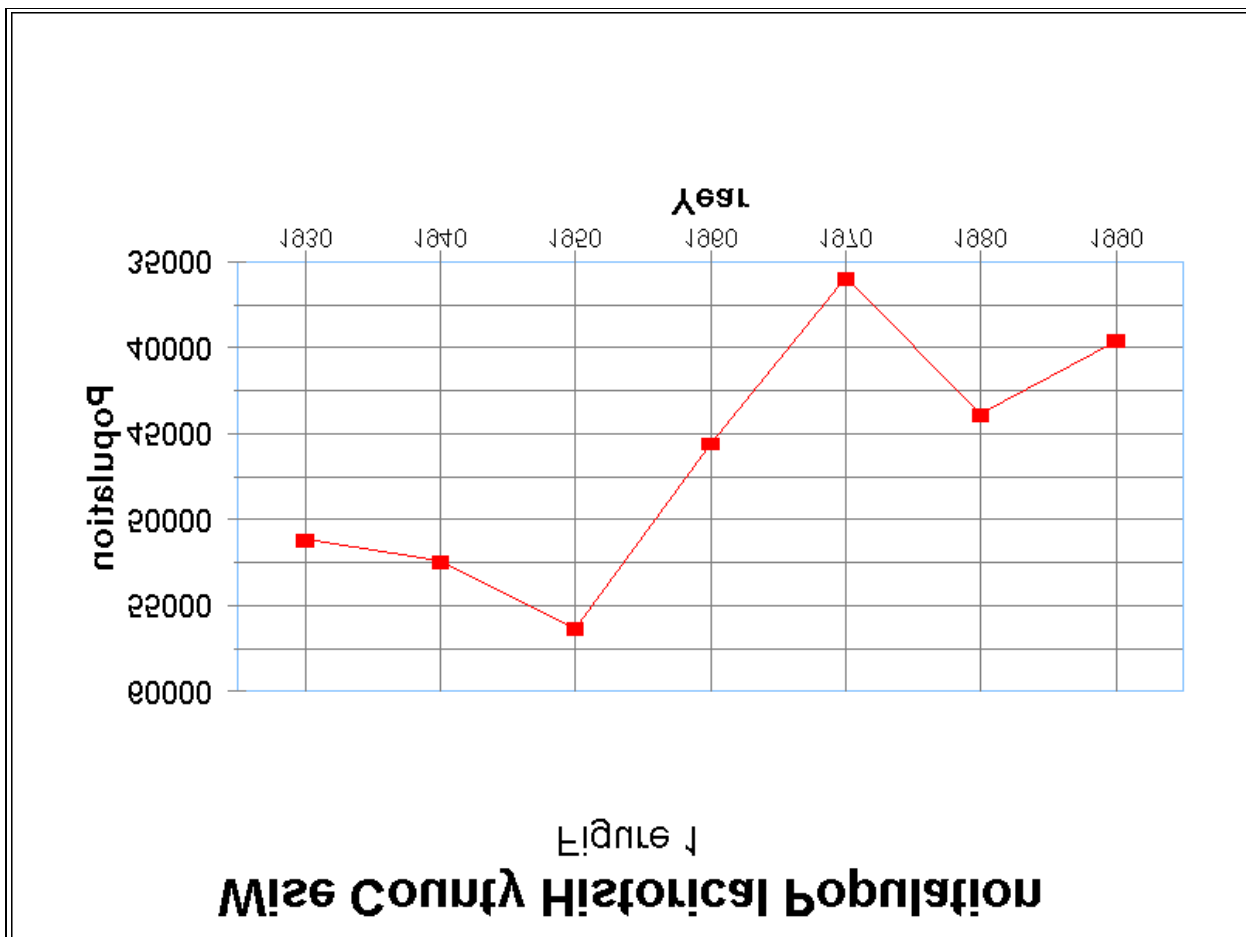
Two state prisons are currently being constructed in Wise County. Wallens Ridge Prison is being constructed in Big Stone Gap. Red Onion prison is being constructed on Red Onion Mountain between Pound and the Town of Clintwood in Dickenson County. Red Onion is requiring sewer service from the Town of Pound. Wallens Ridge is requiring both water and sewer service from the Town of Big Stone Gap.

There are four hospitals in Wise County. St. Mary's Hospital and Norton Community Hospital are located in the City of Norton. Wise Appalachia Regional Hospital is located in Wise, and Lonesome Pine Hospital is located in Big Stone Gap. Several health clinics and doctors' offices are located throughout Wise County.

EXISTING CONDITIONS

0202 Population

The 1990 census reported the population of Wise County to be 39,573. The County experienced high rates of growth between 1920 and 1950, to a high of 58,335. From 1950 to 1970 there was a substantial decline in population to a low of 35,947. An increase of 22% occurred between 1970 and 1980. The 1990 census revealed a decline of about 10% since 1980. Figure 1 graphically illustrates the population history in Wise County.



Section 0301 will include the population trend for Wise County for the purposes of this water and sewer study.

Source: U.S. Census Bureau

EXISTING CONDITIONS

0203 Description of Individual Study Areas

An overview of the communities included in each of the study areas follows. Refer to Figure 2 for more exact geographical information of the primary study areas.

1. Town of Pound

The Town of Pound is located along Route 23 north in northern Wise County. Route 83 runs through the town, and connects to Town of Clintwood in Dickenson County. Included in the study area are the communities of Bold Camp, Almira, Mill Creek, Indian Creek, South Fork, and the remaining northern section of the County, bounded by the State of Kentucky on the north, and the Wise study area in the south.

2. Town of Appalachia

The Town of Appalachia is located along Business Route 23 in western Wise County. Included in the study area are the communities of Andover, Imboden, Inman, Laurel, Stonega, Arno, Derby, Osaka, Exeter, Dunbar, Roda, and Pardee. State Route 78 runs north from Appalachia to these areas. This study area is also bounded on the north by the State of Kentucky, on the west by the Lee County, and on the south by the Big Stone Gap study Area.

3. Town of Big Stone Gap

The Town of Big Stone Gap is located in southwestern Wise County at the western intersection of Route 23 and Route 58A. Included in the study area are the communities of East Stone Gap, Powell Valley, Irondale, the new Wallens Ridge Prison, Mountain Empire Community College, and the Route 23 south corridor.

4. City of Norton

The City of Norton is located in central Wise County at the eastern intersection of U.S. Route 23 and U.S. Route 58. A new bypass has recently been constructed for Route 23 around the City of Norton. A large shopping center is located in the City of Norton. Included in the study area are the communities of Esserville and Blackwood, which include the Esserville Industrial Park and the Blackwood Industrial Park.

5. Town of Wise

The Town of Wise is located in central Wise County. US Route 23 bypasses the west side of Wise. There are two shopping centers located opposite the Route 23 bypass. Included in the study area are the communities of Stephens, Glamorgan, and Tacoma. The Wise County Public Service Authority purchases water from the Town of Wise and distributes throughout this planning area.

6. Town of Coeburn

The Town of Coeburn is located along Route 58A in eastern Wise County. A new bypass for Route 58A is currently being constructed around the town. The study area is bounded on the north by Dickenson County, on the west by the Wise planning area, and on the east by the St. Paul planning area. Included in the study area are the communities of Banner, Cranes Nest, Toms Creek, Dry Fork, Crab Orchard, and Herald.

Also included are the CNW Wastewater Treatment Facility along the Guest River in Coeburn and the Wise County PSA Water Plant at Carfax.

7. Town of St. Paul

The Town of St. Paul is located along Route 58A in eastern Wise County. The study area is bounded on the north and east by Russell County, on the west by the Coeburn planning area, and on the south by the Clinch River. Included in the study area is the Town of St. Paul, Virginia City, and the northern Route 63 corridor.

EXISTING CONDITIONS

0204 Existing Water Systems

There are presently eight publicly owned water treatment plants in Wise County. A water treatment plant is located in each of the seven study areas, and the Town in those study areas operates the water plants. In addition, the Wise County PSA operates a regional water treatment plant in Carfax in the Coeburn study area. The PSA also purchases water from the Coeburn WTP, Wise WTP, and the Norton WTP for distribution to citizens of Wise County. The water systems in the planning areas are described below.

Water Distribution Systems - Community

There are 22 permitted waterworks in Wise County. Of these, 8 are classified by the Virginia Department of Health as a community water system. The Waterworks Regulations define a community waterworks as "...a waterworks which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents". Generally, these are the larger water systems in the County. Shown below are their rated capacities, 1996 average water productions, and percent capacity.

Water Treatment Plant	Capacity (MGD)	Safe Yield (MGD)	1996 Average	Percent Capacity
Pound WTP	0.50	0.50	0.288	57.6
Appalachia WTP	0.70	0.70	0.397	56.7
Big Stone Gap WTP	4.00	3.20*	2.130	53.3
Norton WTP	1.44	1.50*	0.921	63.9
Wise WTP	1.50	1.00*	0.829	55.3
Coeburn Toms Creek WTP	1.15	0.75*	0.428	37.2
Wise Co. PSA Carfax WTP	2.00	30.7†	0.528	24.6
St. Paul WTP	0.50	28.3†	0.273	54.6
TOTAL Wise County	11.8	n/a	5.8	49.1

* Safe Yield Assumption

† 1Q30 Model - Actual Withdrawal by Permit for Plant Capacity

Town of Pound

The Town of Pound water distribution system consists of a 0.50 MGD water treatment plant and approximately 85,000 linear feet of 8" through $\frac{3}{4}$ " water line. There are two booster pump stations and two water storage tanks on the system.

Water Supply - Water is supplied by the Town of Pound Water Plant. Water is pumped from the treatment works to the distribution system. The water source is the North Fork Lake which is a reservoir operated by the U. S. Army Corps of Engineers.

Pump Stations - Two booster pump stations are included in the water system as follows:

The Mill Creek pump station pumps water to the Edwards Gap water tank via two centrifugal pumps rated at 100 gpm. The pump station is controlled by telemetry at the Edwards Gap Tank.

The J. W. Adams pump station pumps water to the J. W. Adams Elementary School along Route 23. The duplex pump station is rated at 40 gpm, and pumps water to a hydropneumatic tank at the school. The pump station is controlled by pressure switches. This station is owned and operated by the school.

Water Storage Tanks - There are two water storage tanks on the water system as follows:

Austin Hills	150,000 gal	Edwards Gap	150,000 gal
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The combined storage capacity of the tanks is 300,000 gallons.

Current Operation - The water plant currently produces an average of 0.288 MGD. Total billings are 187,000 gallons per day, which amounts to a water accountability of 65%.

The Virginia Department of Health inspection on 12/17/96 noted that the Austin Hills water tank should be painted in the near future.

Interconnections and Communities Supplied - The water distribution system serves the Town of Pound. The system is not interconnected with another water provider.

Pound Water Treatment Plant

The Town of Pound currently operates a 0.50 MGD water treatment plant. The plant is currently producing water for 2,000 persons through 800 connections. A brief description of the process follows.

Process Description - The plant receives raw water by gravity from the North Fork Lake of the North Fork Pound River. The Town of Pound is permitted to withdraw up to 50,000 gallons per day. In the winter, the reservoir pool is 9.4 feet lower than the summer elevation so that the reservoir can be utilized for flood control. Because the water plant receives flow by gravity, only about 46,300 gpd is available when the reservoir is at the lower elevation. This will increase to 50,000 gpd when the transmission main is cleaned. Three raw water intakes located at the impoundment supply water to the treatment plant.

The units in the treatment train include the raw water intakes with strainer, chemical feeders, solids contact upflow clarifier, two rapid rate sand filters, 50,000 gallon rectangular water clearwell, dual finished water pumps, and 180,000 gallon sludge basin. Chemicals added to the water include alum, lime, soda ash, and carbon (seasonally). Chlorine is added to the water for disinfection by gas injection.

Water flows by gravity from the raw water intake to the filter plant. Chemical addition of alum, lime, and soda ash occurs prior to the flow going to a solids contact upflow clarifier. Carbon is added seasonally for taste and odor control. The upflow clarifier has an upflow loading rate of 0.7 gpm/sf. The plant utilizes a rapid rate filter loading of 2 gpm/sf. The filters are comprised of a single layer sand media. Water flows from the filters to the 50,000 gallon clearwell, and is injected with chlorine before being distributed to the system. Two centrifugal finished water pumps rated at 350 gpm distribute water to the system.

Backwash of the filters is achieved using a centrifugal backwash pump, rated at 1300-1700 gpm. Sediment from the filters flows to the sludge holding basin, where it is allowed to settle before it is removed. Supernatant from the basin is drained into the North Fork Pound River. Sludge from the basins is removed to the Big Stone Gap Regional WWTF.

Current Operation - The plant produces an average daily flow of 0.288 MGD, or approximately 57 % of capacity.

An NOV was issued to the facility on 11/25/96 for failure to meet reliability and responsibility conditions in the waterworks. Specifically, the clarifier is in need of structural repair, the filter under drain and backwash manifolds need evaluation, the quantity and quality of the filter media need evaluation, the chemical solution tanks are leaking and need repair or replacement, and the raw water meter is not functioning properly.

The Virginia Department of Environmental Quality has issued three significant NOVs over the past three years. These were related to exceeding discharge limits from the sludge holding basin, and the sludge management plan. DEQ would prefer for the water plant to discharge supernatant and sludge from the sediment basin to the sewer collection system. See Section 0205 - Existing Sewer Systems.

The Pound Water Plant distributes water to the Town of Pound water distribution system. The plant is not interconnected with any other system.

Town of Appalachia

The Town of Appalachia water distribution system consists of a 0.70 MGD water treatment plant and approximately 230,000 linear feet of 8" through $3\frac{3}{4}$ " water line. There are 14 water tanks, two emergency wells, and four booster pump stations on the system. The water system operates as one low pressure service area and two high pressure service areas.

Water Supply - Water is supplied by the Town of Appalachia Water Treatment Plant. Water flows by gravity from the plant to the water distribution system. The water source is the Ben's Branch Reservoir.

Emergency Water Supply - The two wells are included in the system which are designed to pump 110 gpm and 140 gpm for emergency supply. These wells would supplement the Roda and Osaka tanks. Only emergency operation of the wells is permitted.

Pump Stations - Four booster pump stations supply water to different hydraulic elevations.

The Imboden Pump Station pumps water to the Exeter water tank via two 228 gpm, 338 ft TDH booster pumps. The pump station is controlled by telemetry at the Exeter Water Tank.

The Exeter Pump Station pumps water to the Keokee water tank, via two 208 gpm, 345 ft TDH booster pumps. The pump station is controlled by telemetry at the Keokee water tank.

The Boggs Avenue Pump Station serves eight homes on Boggs Avenue, and uses two $7\frac{1}{2}$ hp pumps rated at 25 gpm and 162 ft TDH to pump to the 1,500 gallon Boggs Avenue hydropneumatic pressure tank. The Boggs Avenue pump station is controlled by high and low pressure switches.

The Cold Spring Pump Station boosts the pressure to the Cold Spring hydropneumatic pressure tank via two 62 gpm, 110 ft TDH booster pumps, controlled by pressure switches. A 450 gpm, 92 ft TDH fire pump is also provided at the Cold Spring Pump Station for fire flows.

Water Storage Tanks - The 14 water storage tanks on the system are as follows:

Clearwell	1,000,000 gal	Cold Spring*	1,500 gal
Cold Spring	100,000 gal	Ridge Avenue	509,930 gal
Inman	105,660 gal	Imboden	99,097 gal
Exeter	135,046 gal	Keokee	410,000 gal
Andover	141,581 gal	Derby	118,147 gal
Stonega	120,133 gal	Osaka	43,000 gal
Roda	23,681 gal	Boggs Ave.*	1,500 gal

The combined storage capacity of the above water tanks is 2,809,275 gallons. The asterisk (*) indicates a hydropneumatic pressure tank.

Current Operation - The plant currently produces an average of 397,000 gallons of water per day. Total billings are 258,000 gallons per day, which amounts to a water accountability of 65%.

Interconnection and Communities Supplied - The water distribution system serves several communities located around the Town of Appalachia. The communities of Stonega, Roda, Derby, Andover, Inman, Imboden, Exeter, and Keokee (Lee County) are connected to the water system. The Appalachia Elementary School is currently being connected to the water system.

There is no emergency connection between the Appalachia water system and another water provider.

Appalachia Water Plant

The Town of Appalachia currently operates a 0.70 MGD water treatment plant. The facility is currently producing water for 3,625 persons through 1,478 connections. A brief description of the process follows.

Process Description - The plant receives raw water from a raw water intake on the North Fork of the Powell River. The water intake is located on the Ben's Branch Reservoir. The usable volume of the Reservoir is 356 acre feet, or 116 million gallons (total volume is 146 MG). The safe yield of the reservoir has been designated as 0.70 MGD. The capacity of the water plant is based upon the safe yield of the reservoir. The plant was designed to operate at a capacity of 1.0 MGD.

The units in the treatment train include the raw water intake, chemical feeders, flash mixer, flocculation basins, sedimentation basins, high rate filters, 50,000 gallon water clearwell, and two 100,000 gallon sludge basins. Chemicals added to the water include chlorine, alum, lime, polymer, fluoride, soda ash, calgon, and carbon (seasonally).

Water flows by gravity to the plant from the intake structure. Chemical addition of lime, soda ash, polymer, alum, and carbon (seasonally) occurs immediately before flash mixing. The water flows from the flash mixer to the flocculation basins, and then to the sedimentation basins. From the sedimentation basins water flows to the filters. The filters utilize a high rate loading of 4.0 gpm/sf to treat the water. The filters are comprised of a 3-layer media, consisting of anthracite, sand, and gravel. Water flows out of the filters and chemical feeders add chlorine, fluoride, and calgon before flowing to the 50,000 gallon clearwell. Water flows by gravity to a 1.0 MG above ground clearwell located adjacent to the plant and then to the distribution system.

Backwash of the filters is achieved using a 1085 gpm, 33 ft TDH backwash pump. Sediment from the filters flows to the two 100,000 gallon sludge holding basins, where it is allowed to settle before it is removed. Supernatant from the basin is drained back into the Powell River downstream of the raw water intake.

Current Operation - The plant produces an average daily flow of 0.397 MGD, or approximately 55.3 % of capacity. The plant does not currently experience any operational problems. No significant NOVs have been issued to the facility in the past two years. The 12/9/96 VDH Inspection report stated "Keep up the good work!"

The Town of Appalachia Water Plant distributes water to the Appalachia water distribution system, and several surrounding systems which are at varying hydraulic elevations.

Town of Big Stone Gap

The Town of Big Stone Gap water distribution system consists of a 4.0 MGD water treatment plant and approximately 200,000 linear feet of 12" through $\frac{3}{4}$ " water line. There are five booster pumping stations and twelve water storage tanks on the system.

Water Supply - Water is supplied by the Town of Big Stone Gap Water Plant. Water flows by gravity from the treatment works to the distribution system. The water source is the Big Cherry Reservoir.

Pump Stations - Five booster pump stations are included in the system.

The Clinch Haven Farm Pump Station pumps water to the Country Club Water Tank via two 50 hp vertical split case centrifugal pumps rated at 500 gpm and 255' TDH. The pumps are controlled by high and low pressure switches.

The Lower Hamner Hollow Pump Station pumps water to the Hamner Hollow Water Tank via two 75 hp 4-stage vertical turbine pumps rated at 420 gpm and 327' TDH. The pumps are controlled by telemetry at the Tank.

The Upper Hamner Hollow Pump Station pumps water to the Big Stone Heights Water Tank via two 50 hp vertical turbine pumps rated at 400 gpm and 465' TDH. The pumps are controlled by telemetry at the tank.

The Big Stone Heights hydropneumatic booster pump station pumps water to the Big Stone Heights area via two 9-stage, 15 hp vertical turbine pumps rated at 150 gpm and 300' TDH. The pumps are controlled by high and low pressure switches.

The Wallens Ridge Prison booster pump station pumps water to the Wallens Ridge Prison Tank through a duplex vertical turbine pump station. The pump station is controlled by telemetry at the Wallen Ridge Prison Water Tank.

Water Storage Tanks - There are eleven water storage tanks on the water system as follows:

Clearwell	1,000,000 gal	Wallens Ridge Prison	500,000 gal
Downtown No. 1	676,770 gal	Downtown No. 2	225,590 gal
Downtown No. 3	225,590 gal	Southern	508,330 gal
Country Club	508,330 gal	Irondale	974,550 gal
Hamner Hollow	50,360 gal	Big Stone Heights	308,590 gal
Hamner Hollow	180,000 gal	Cadet	497,240 gal

The combined storage capacity of the twelve tanks is 5.655 million gallons.

Current Operation - The Big Stone Gap Water Plant currently produces an average of 2.130 MGD. Total billings are 1.0 MGD, which amounts to a water accountability of 47%.

Interconnections and Communities Supplied - The water distribution system serves the Town of Big Stone Gap and the Communities of East Stone Gap, Powell Valley, Back Valley, Crackers Neck, Wildcat, Route 23 to the Lee County line, and towards Dryden on Route 58A to the Lee County line.

There is no emergency connection between the Big Stone Gap water system and another water provider.

Big Stone Gap Water Plant

The Town of Big Stone Gap currently operates a 4.0 MGD water treatment plant. The facility is currently producing water for 9,000 persons through 3,270 connections. A brief description of the process follows.

Process Description - The plant receives raw water from a raw water intake on the South Fork of the Powell River. The water intake is located downstream of the Big Cherry Reservoir. The usable volume of the Big Cherry Reservoir is 1,132 acre feet, or 368 million gallons (total capacity 410 MG). The safe yield of the reservoir is believed to be 3.2 MGD.

The units in the treatment train include raw water intake, chemical feeders, flash mixer, flocculation basins, sedimentation basins, high rate filters, 1,000,000 gallon water clearwell, two 20,000 gallon service water storage tanks, and 264,000 gallon sludge basin. Chemicals added to the water include chlorine, alum, lime, polymer, fluoride, soda ash, calgon, and carbon (seasonally).

Water flows by gravity to the plant from the intake structure. Chemical addition of lime, soda ash, polymer, alum, and carbon (seasonally) occurs immediately before flash mixing. The water flows from the flash mixer to the flocculation basins, and then to the sedimentation basins. The sedimentation basins utilize a reduced sedimentation detention time before flowing to the high rate filters. The filters utilize a high rate loading of 4.0 gpm/sf to treat the water. The filters are comprised of a 3-layer media, consisting of anthracite, sand, and gravel. Water flows out of the filters and chemical feeders add chlorine, fluoride, and calgon before flowing to the 1,000,000 gallon clearwell. Water flows by gravity to the distribution system.

Backwash of the filters is achieved using a 2,800 gpm/58' TDH, 50 hp backwash pump. Sediment from the filters flows to the sludge holding basin, where it is allowed to settle before it is removed. Supernatant from the basin is drained back into the Powell River downstream of the raw water intake.

Current Operation - The plant produces an average daily flow of 2.130 MGD, or approximately 53.2 % of capacity. The plant does not currently experience any operational problems. No significant NOV's have been issued to the facility in the past two years.

City of Norton

The City of Norton water distribution system consists of a 1.44 MGD water treatment plant and approximately 130,000 linear feet of 12" through $\frac{3}{4}$ " water line. There are four booster pump stations and four water storage tanks on the system.

Water Supply - Water is supplied by the City of Norton Water Plant. Water is pumped from the treatment works to the distribution system. The water source is the Benges Branch Reservoirs.

Pump Stations - Four booster pump stations are included in the system as follows:

The Laurel Avenue pump station pumps water to the Laurel Avenue Water Tank via two 5 hp pumps rated at 88 gpm and 75' TDH. The Laurel Avenue pump station is controlled by timer.

The Flag Rock pump station pumps water to the Flag Rock Water Tank via two 15 hp piston pumps. The Flag Rock pump station is controlled by timer

The 11th Street pump station pumps water to the 11th Street Water Tank via two 50hp centrifugal pumps rated at 320 gpm and 330' TDH. The 11th Street pump station is controlled by telemetry at the 11th Street Tank.

The Hawthorne pump station pumps water to the Hawthorn Water Tank via two 1750 rpm centrifugal pumps rated at 400 gpm and 90' TDH. The Hawthorne pump station is controlled by telemetry at the Hawthorne tank.

Water Storage Tanks - There are four water storage tanks on the water system as follows:

Laurel Avenue	5,000 gal	Flag Rock	5,000 gal
11th Street	288,650 gal	Hawthorne	500,000 gal

The combined storage capacity of the four tanks is 798,650 gallons.

Current Operation - The water plant currently produces an average of 0.921 MGD. Total billings average 0.543 MGD, which amounts to a water accountability of 59%.

The Virginia Department of Health inspection on 12/18/96 noted that the 11th Street Pump Station was leaking, and will require repairs. VDH recommended that an engineering firm be consulted for the repairs due to the nature of the problem, and that the City water crew not attempt to make the repairs.

Interconnections and Communities Supplied - The water distribution system serves the City of Norton and the small communities of Esserville, Ramsey, and Josephine. The system is interconnected with the Wise County PSA and the Town of Wise Water System.

Norton Water Plant

The City of Norton currently operates a 1.44 MGD water treatment plant. The plant is currently producing water for 6,053 persons through 2,423 connections. A brief description of the process follows.

Process Description - The plant receives raw water by gravity from two impoundments on Benges Branch. The volume of the reservoirs is 135 million gallons. The safe yield of the reservoirs is assumed to be 1.5 MG. The raw water intake is located approximately one mile downstream of the impoundments in a natural stream bed, which is the spillway for the impoundments. The water source is also supplemented by a 50 gpm centrifugal pump which pumps water from a small tributary of Benges Branch located adjacent to the water plant.

The units in the treatment train include raw water intake with strainer, chemical feeders, flash mixer, flocculation basins, spiral settling basin, dual media filters, 720,000 gallon rectangular water clearwell, dual finished water pumps, and three sludge basins, totaling 200,000 gallons. Chemicals added to the water include alum, lime, soda ash, and carbon (seasonally). Pre- and Post-Chlorine is added to the water for disinfection.

Water flows by gravity from the raw water intake to the filter plant. Chemical addition of alum, lime, and soda ash occurs prior to the flow going through a flash mixer. Carbon is added seasonally for taste and odor control. The water flows from the flash mixer to the flocculation basins, and then to the spiral settling basin. The plant utilizes a high rate filter loading of 4 gpm/sf at the filters. The filters are comprised of a three layer media, consisting of anthracite, sand, and gravel. Water flows from the filters to the 720,000 gallon clearwell, and is injected with chlorine before being distributed to the system. Two centrifugal finished water pumps rated at 320 gpm and 250' TDH distribute water to the system.

Backwash of the filters is achieved using a centrifugal backwash pump, rated at 100 gpm. Sediment from the filters flows to three sludge holding basins, total 200,000 gallon capacity, where it is allowed to settle before it is removed. Supernatant from the basin is drained into the City of Norton sewer collection system. Sludge is removed to the CNW Wastewater Treatment Facility.

Current Operation - The plant produces an average daily flow of 0.921 MGD, or approximately 63 % of capacity. The plant does not currently experience any operational problems. An Informational Notice of Federal Violation was issued on 1/3/97 for Phase II, IIB and V Rules of the National Primary Drinking Water Regulations, for failure to monitor nitrate concentrations.

An NOV was issued to the facility on 11/20/96 for implementation of a cross-connection & backflow program.

The Norton Water Plant distributes water to the City of Norton water distribution system. The plant also purchases water from the Wise County PSA, and is interconnected with the Town of Wise Water System.

Town of Wise

The Town of Wise water distribution system consists of a 1.5 MGD water treatment plant and approximately 80,000 linear feet of 8" through $\frac{3}{4}$ " water line. There are four booster pump stations and five water storage tanks on the system.

Water Supply - Water is supplied by the Town of Wise Water Plant. Water is pumped from the treatment works to the distribution system. The water source is the Wise Reservoir on Bear Creek. A supplemental water source of about 0.5 MGD is available at Bear Creek. This supplemental source can be pumped from Bear Creek into the reservoir.

Pump Stations - Four booster pump stations are included in the water system.

The Lee Norse pump station pumps water to the water system via dual 125 hp pumps rated at 300 gpm. The Lee Norse pump station is controlled manually at the Water Plant.

The Hospital pump station pumps water to the hospital water tanks via dual centrifugal pumps. The pumps are 40 hp and rated at 400 gpm and 300' TDH.

The Gibson Street pump station pumps water via dual $\frac{1}{2}$ hp pumps rated at 40 gpm. The pumps are controlled by pressure switch.

The Wampler Street pump station pumps water via dual $\frac{1}{2}$ hp pumps rated at 40 gpm. The pumps are controlled by pressure switch.

Water Storage Tanks - There are seven storage tanks on the water system as follows:

Modoc (steel)	1,000,000 gal.
Modoc (concrete)	300,000 gal.
Elevated Hospital	75,000 gal.
Health Dept.	250,000 gal.
Hospital	500,000 gal.
Airport 1	250,000 gal.
Airport 2	250,000 gal.

The combined storage capacity of the water tanks is 2.875 million gallons.

Current Operation - The water plant currently produces an average of 0.829 MGD. Total billings average 600,000 gallons per day, which amounts to a water accountability of 72.4 %.

Interconnections and Communities Supplied - The water distribution system serves the Town of Wise. The system is also connected to the Wise County PSA water system and the City of Norton.

Wise Water Plant

The Town of Wise currently operates a 1.5 MGD water treatment plant. The plant is currently producing water for about 5,800 persons through about 2,200 connections. A brief description of the process follows.

Process Description - The plant receives raw water from the Wise Reservoir, an impoundment of Bear Creek. The volume of the reservoir is 262 million gallons. The safe yield of the reservoir is assumed to be 1.0 MG. The raw water intake is an intake tower equipped with seven overflow weirs.

The units in the treatment train include the raw water intake tower, raw water pump station, chemical feeders, flash mixer, flocculation basins, sedimentation basin, four high rate dual media filters, 110,000 gallon water clearwell, two high service finished water pumps, and 200,000 gallon sludge tank. Chemicals added to the water include alum, lime, soda ash, carbon (seasonally), fluoride, and polymer. Chlorine is added to the water for disinfection.

Water is pumped from the raw water intake to the filter plant. Two 30 hp turbine pumps deliver water at a rate of 1050 gpm. At the plant, chemical addition of alum, fluoride, chlorine, lime, and soda ash occurs prior to the flow going through the flash mixer to the flocculation basins. Carbon is added seasonally for taste and odor control. Water flows from the flocculation basins to the sedimentation basin. Water flows from the sedimentation basins to the high rate filters, which are loaded at 3.0 gpm/sf. The filters are comprised of a dual layer media consisting of anthracite and sand. Water flows from the filters and is injected with chlorine prior to flowing to the 50,000 gallon clearwell, before being distributed to the system. Dual high service 125 hp finished water pumps rated at 1050 gpm and 468' TDH distribute water to the system.

Backwash of the filters is achieved using a centrifugal backwash pump, rated at 1,800 gpm and 40' TDH. Sediment from the filters flows to the 200,000 gallon sludge basin where it is allowed to settle. Supernatant from the basin flows into Bear Creek. Sludge disposal is land application at the old Wise Sewer Lagoon.

Current Operation - The plant produces an average daily flow of 0.829 MGD, or approximately 55 % of capacity. No significant NOV's have been issued to the facility in the past two years.

The Town of Wise Water Plant distributes water to the Town of Wise water distribution system. The plant also provides water for the Wise County PSA, and is also interconnected to the City of Norton.

Town of Coeburn

The Town of Coeburn water distribution system consists of a 1.15 MGD water treatment plant approximately 150,000 linear feet of 10" through ³/₄" water line. There is one booster pump station and four water storage tanks on the system.

Water Supply - Water is supplied by the Town of Coeburn Toms Creek Water Plant. Water flows by gravity from the treatment works to the distribution system via a 10" main line. The water source is the Toms Creek Reservoir, and the abandoned Jenny Spring supply.

Pump Stations - One booster pump station is included in the system. The Flatwoods pump station pumps water to the Flatwoods Water Tank via two 42 hp centrifugal pumps rated at 200 gpm and 575' TDH. The pump station is controlled by telemetry at the water tank.

Water Storage Tanks - There are four water storage tanks on the water system as follows:

Caudill Hill	300,000 gal	South Coeburn (old)	100,000 gal
Flatwoods	250,000 gal	South Coeburn (new)	1,000,000 gal

The combined storage capacity of the four tanks is 1.65 million gallons.

Current Operation - The water plant currently produces an average of 0.428 MGD. Total billings are 350,000 gallons per day, which amounts to a water accountability of 82%.

The Virginia Department of Health inspection on 12/17/96 recommended that a complete inspection and rehabilitation of the Flatwoods water tank be considered.

Interconnections and Communities Supplied - The water distribution system serves the Town of Coeburn. The system is interconnected with the Wise County PSA at two major locations. The Wise County PSA Water Plant at Carfax is connected to the Coeburn system, which supplies water to the south and east portions of the Town of Coeburn. The Coeburn Toms Creek Water Plant is connected to a Wise County PSA booster pump station which serves Sandy Ridge, and Dickenson County to Ervinton High School.

Coeburn Water Plant

The Town of Coeburn currently operates a 1.15 MGD water treatment plant. The plant is currently producing water for 3,202 persons through 1,392 connections. A brief description of the process follows.

Process Description - The plant receives raw water by gravity from a reservoir on Toms Creek. The volume of the reservoir is 32 million gallons. The safe yield of the reservoir is unknown, but historical data indicates a probable safe yield of 0.75 MGD. The reservoir is supplemented by a well located in an abandoned mine shaft, known as the Jenny Mine. A 720 gpm well pump is installed, and no safe yield of the well has been established, but is assumed to be 1.036 MGD. The combined safe yield of the reservoir and the well can be assumed to be 1.78 MGD.

The units in the treatment train include raw water intake with strainer, chemical feeders, static mixer, flocculation basins, sedimentation basins, high rate filters, 72,000 gallon water clearwell, and 100,000 gallon sludge basin. Chemicals added to the water include chlorine, alum, lime, polymer, potassium permanganate, fluoride, soda ash, calgon, and carbon (seasonally).

Water flows by gravity from the raw water intake at the dam to the filter plant. Chemical addition of alum, lime, polymer, soda ash, fluoride, and potassium permanganate occurs prior to the flow going through a static mixer. Carbon is added seasonally for taste and odor control. The water flows from the static mixer to the flocculation basins, and then to the sedimentation basins. The plant utilizes a high rate filter loading of 4 gpm/sf at the filters. The filters are comprised of a 3-layer media, consisting of anthracite, sand, and gravel. Water flows from the filters to the 72,000 gallon clearwell, and are fed with chlorine and calgon before being distributed to the system by gravity.

Backwash of the filters is achieved using a single 40 hp vertical turbine backwash pump, rated at 2,000 gpm at 56' TDH. A spare backwash pump is in storage at the facility. Sediment from the filters flows to the sludge holding basin, where it is allowed to settle before it is removed. Supernatant from the basin is drained back into Toms Creek downstream of the dam.

Current Operation - The plant produces an average daily flow of 0.428 MGD, or approximately 37% of capacity. The plant does not currently experience any operational problems. No significant NOV's have been issued to the facility in the past two years. An Informational Notice of Federal Violation was issued on 1/3/97 for Phase II, IIB and V Rules of the National Primary Drinking Water Regulations, for failure to monitor nitrate concentrations.

The Coeburn Water Plant distributes water to the Town of Coeburn water distribution system. The plant also produces water for the Wise County PSA, for distribution on Sandy Ridge, and into Dickenson County at Ervinton High School.

Wise County PSA at Carfax

The Wise County PSA operates a widespread water distribution system. This system consists of a 2.0 MGD water treatment plant and approximately 790,000 linear feet of 14" through $3\frac{3}{4}$ " water line. There are four booster pump stations and eight water storage tanks on the system. The system provides water to the Dry Fork and Crab Orchard areas and "swaps" water with Coeburn for the Sandy Ridge and Ervinton areas.

Several other smaller communities are supplied by the PSA. These are addressed at the end of this section.

Water Supply - Water for most of the PSA water system is supplied by the Wise County PSA Water Plant at Carfax, which is discussed in detail in this section. Water is pumped from the treatment works to the distribution system via dual high service pumps rated at 1390 gpm and 468' TDH through a 14" transmission main line. The pumps deliver water south along Rt. 657 and then northwest along Route 658 to the Dry Fork Pump Station.

Pump Stations - Four booster pump stations are included in the water system.

The Dry Fork pump station pumps water to the Bond Gap Water Tank via dual 200 hp centrifugal pumps rated at 1390 gpm and 406' TDH. The Dry Fork pump station is controlled manually at the Water Plant. The Dry Fork pump station also supplies the White Oak water tank and pump station.

The White Oak pump station pumps water to the Coeburn Mountain water tank via four centrifugal pumps; two in parallel and two in series. The pumps are 40 hp and were originally rated at 133 gpm and 394' TDH. The pumps have been retrofitted with larger impellers which provide 230 gpm against an unknown TDH (approximately 210' TDH). The pumps are controlled by the water level in the Coeburn Mountain water tank.

The Coeburn Mountain pump station pumps water to the Coeburn Mountain water tank from the Town of Wise in the event of an emergency. The six-stage 30-hp turbine pump is rated at 200 gpm and 355' TDH. The pump is operated by manual controls at the pump station. A master meter is located at the pump station.

The Tacoma pump station pumps water to the Hawthorne Tank in Norton. The duplex pumps are 125 hp rated at 500 gpm and designed for 422 ft of TDH. Due to a PRV in Ramsey, the actual operating TDH is unknown. The pumps are controlled by telemetry.

Water Storage Tanks - There are eight storage tanks operated by the Wise Co. PSA. Their water sources are indicated.

<u>TANK</u>	<u>SIZE</u>	<u>SOURCE</u>
Bond Gap	387,400 gal	Carfax WTP
White Oak	293,900 gal	Carfax WTP
Coeburn Mountain	257,900 gal	Carfax WTP
Toms Creek	50,000 gal	Coeburn WTP
Sandy Ridge Tank(2)	150,000 gal	Coeburn WTP
Huff Tank	50,000 gal	Norton WTP
Industrial Park	250,000 gal	Norton WTP
Dunbar Tank	178,000 gal	Well

The combined storage capacity of the above water tanks is 1.62 million gallons. The Bond Gap tank is the primary storage tank for the Carfax WTP.

Current Operation - The water plant currently produces an average of 0.528 MGD. Total billings are 400,000 gallons per day, which amounts to a water accountability of 75 %.

Interconnections and Communities Supplied - The water distribution system serves the southeastern end of Wise County. The system is also connected to the Town of Coeburn water system, which purchases water from the PSA, and also sells water to the PSA. A transmission main is connected to Norton along Route 58A.

Carfax Water Plant

The Wise County PSA currently operates a 2.0 MGD water treatment plant. The plant is currently producing water for 3,965 persons through 1,416 connections. A brief description of the process follows.

Process Description - The plant receives raw water from the Clinch River. The safe yield based on the 1Q30 model is 30.7 MGD. Withdrawal from the Clinch River is by VDH Permit, which is currently based on the operating capacity of the plant of 2.0 MGD.

The units in the treatment train include the raw water intake with strainer, raw water pump station, chemical feeders, flash mixer, flocculation basins, sedimentation basin, two high rate filters, 200,000 gallon water clearwell, two high service finished water pumps, and 1.12 MG sludge lagoon. Chemicals added to the water include alum, lime, soda ash, carbon (seasonally), fluoride, and polymer. Chlorine is added to the water for disinfection.

Water is pumped from the raw water intake a distance of 1 mile to the filter plant. The duplicate raw water pumps are submersible pumps rated at 1,400 gpm and 164' TDH through 5400 LF of 14" water line. At the plant, chemical addition of alum, fluoride, chlorine, lime, and soda ash occurs prior to the flow going through the flash mixer to the flocculation basins. Carbon is added seasonally for taste and odor control. Water flows from the flocculation basins to the sedimentation basin. Water flows from the sedimentation basins to the high rate filters, which are loaded at 4 gpm/sf. The filters are comprised of a three-layer media consisting of anthracite, silica sand, and support gravel. Water flows from the filters and is injected with chlorine prior to flowing to the 200,000 gallon clearwell, before being distributed to the system. Dual high service finished water pumps rated at 1390 gpm and 468' TDH distribute water to the system through the 14" high service line.

Backwash of the filters is achieved using a centrifugal backwash pump, rated at 3,511 gpm and 45' TDH. A spare backwash pump is in storage at the plant. Sediment from the filters flows to the sludge lagoon where it is allowed to settle. Supernatant from the basin flows into Bull Run Creek. Sludge has not been removed from the basins throughout the plant's operation.

Current Operation - The plant produces an average daily flow of 0.528 MGD, or approximately 26 % of capacity. No significant NOV's have been issued to the facility in the past two years.

The Wise County PSA Water Plant distributes water to the Wise County PSA water distribution system. The plant also provides water for the Town of Coeburn.

PSA Small Systems

The following small systems are supplied with water by the Wise County PSA.

Sandy Ridge - Water is supplied from the Coeburn Toms Creek water treatment plant and is pumped to the Sandy Ridge water tank. Average demand is 83,000 gallons per day for a total of about 332 customers.

Wise #2/Esserville - Water is supplied from the Wise water treatment plant to the Esserville Community. Average demand is 34,000 gallons per day for a total of about 136 customers.

Stephens - Water is supplied from the Wise water treatment plant to the Stephens Community. Average demand is 50,000 gallons per day for a total of about 200 customers.

Norton System - Water is supplied to Laurel Creek and Guest River from the Norton water treatment plant. Average demand is 50,000 gallons per day for a total of about 200 customers.

Dunbar - Water is supplied to Dunbar community from a 60 gpm well. Average production is about 25,000 gallons per day for a total of about 100 customers.

Town of St. Paul

The Town of St. Paul water distribution system consists of a 0.5 MGD water treatment plant and approximately 20,000 linear feet of 10" through ³/₄" water line. There is one booster pump station and four water storage tanks on the system.

Water Supply - Water is supplied by the Town of St. Paul Water Plant. Water is pumped from the treatment works via a 10" transmission main line to the distribution system. The water source is the Clinch River.

Pump Stations - Two booster pump stations are included in the water system. The Grey Hills pump station pumps water to the Upper Grey Hills water tank via vertical turbine pumps.

Water Storage Tanks - There are four water storage tanks on the water system as follows:

Lower Grey Hills	508,333	West Hills Estates	245,298
Upper Grey Hills	100,000	Onion Head Tank	59,707

The combined storage capacity of the tanks is 913,338 million gallons.

Current Operation - The water plant currently produces an average of 0.273 MGD. Total billings average 0.229 MGD, which amounts to a water accountability of 84%.

Interconnections and Communities Supplied - The water distribution system serves the Town of St. Paul. The system is connected to the Russell County Water & Sewer Authority along Route 63 towards Dante. The Town of St. Paul supplies water to Dante during the dry summer months. The Town is also connected to the Castlewood system in Russell County and supplies water to that area on a supplemental basis.

St. Paul Water Plant

The Town of St. Paul currently operates a 0.50 MGD water treatment plant. The plant is currently producing water for 1,010 persons through 455 connections. A brief description of the process follows.

Process Description - The plant receives raw water from the Clinch River. The safe yield based on the 1Q30 model is 28.3 MGD.

The units in the treatment train include the raw water intake with strainer, raw water pumps, chemical feeders, flocculation basins, sedimentation basin, two rapid rate sand filters, unbaffled 63,498 gallon water clearwell, a high service and a low service finished water

pump, and waste sludge basin. Chemicals added to the water include alum, lime, soda ash, and fluoride. Chlorine is added to the water for disinfection.

Water is pumped from the raw water intake to the filter plant. The duplicate raw water pumps are electrically driven centrifugals rated at 350 gpm. At the plant, chemical addition of alum, fluoride, chlorine, lime and/or soda ash occurs prior to the flow going to the flocculation basins. Water flows from the flocculation basins to the sedimentation basin. Water flows from the sedimentation basins to the rapid rate sand filters, which are loaded at 2 gpm/sf. The filters are comprised of a single layer sand media. Water flows from the filters and is injected with chlorine prior to flowing to the 63,498 gallon unbaffled clearwell, before being distributed to the system. Two centrifugal finished water pumps distribute water to the system. A 360 gpm pump and a 550 gpm pump are provided, so that the operator may vary the finished water production for high and low service, based upon the system demand.

Backwash of the filters is achieved using a centrifugal backwash pump. Sediment from the filters flows to the sludge holding basin, where it is allowed to settle before it is removed. Supernatant from the basin is drained into the Clinch River. Sludge from the basins is removed to the CNW Wastewater Treatment Facility in Coeburn.

Current Operation - The plant produces an average daily flow of 0.273 MGD, or approximately 54 % of capacity.

An Informational Notice of Federal Violation was issued on 1/3/97 for Phase II, IIB and V Rules of the National Primary Drinking Water Regulations, for failure to monitor nitrate concentrations.

Water Distribution Systems - non-community/transient or non-transient

The following water systems are smaller systems, when compared to the primary municipal water systems in Wise County. These systems are classified as non-community, transient, or non-transient.

The primary municipal systems are considered to be transient community systems. The minimum amount of treatment (chlorination) is provided at the source. A general list of the smaller systems is as follows:

Smaller Water Systems			
System	Type	Water Source	Capacity
Appalachia Elementary School	non-transient	on-site well	48,200 gpd
Bee Bottom Campground	non-transient	on-site well	60,800 gpd
Bullion Hollow Coal Co.	non-transient	on-site well	n/a
Cane Patch Rec. Area	non-community	on-site well	3,500 gpd
Holton Mine Complex	non-transient	on-site well	n/a
High Knob Campground	non-community	on-site well	8,640 gpd
Morgan's Trailer Park	non-transient	2 wells	5,500 gpd
Paramount Coal Co-Ramsey	non-transient	on-site well	5,500 gpd
Valley View Trailer Park	non-transient	on-site well	6,250 gpd

n/a - not available

EXISTING CONDITIONS

0205 Existing Sewer Systems

There are two types of sanitary sewer systems in Wise County, which are used to collect, treat, and return wastewater to the environment. The several systems include those which are permitted by the Commonwealth of Virginia Department of Environmental Quality (DEQ) under the Virginia Pollutant Discharge Elimination System (VPDES), and privately-owned septic tank systems, which are regulated by the Virginia Department of Health.

One of the primary problems experienced by all sanitary sewer collection systems, especially those in Wise County, is infiltration and inflow. Both are detrimental to the sanitary sewer system - particularly with respect to cost of treatment and excessive wear on equipment.

Infiltration is the unintentional flow of water into the sewer pipe through bad joints, failed seals, and cracked pipes. A certain degree of infiltration is expected in sewer lines. However, excessive infiltration creates unreasonably high costs of treatment, wears out equipment at an accelerated rate, and may lead to Notices of Violation for the treatment facility.

Inflow is directly related to stormwater. Inflow occurs when stormwater runoff enters the sanitary sewer system. The stormwater enters from a number of sources; roof drains attached to the system, storm sewer connections, open manhole covers, etc. Inflow is the primary cause of poor treatment and high costs at a modern wastewater treatment facility, due to the “shock” of the additional wastewater in the system.

More information regarding infiltration and inflow is covered in Section 0208 - Existing Sewer Needs. A discussion of the sanitary sewer collection systems and wastewater treatment facilities follows. The remaining small-system wastewater treatment facilities follows the larger systems.

Major Wastewater Treatment Providers

Town of Pound Wastewater System

The Town of Pound operates a sewer collection system. This system consists of approximately 55,000 linear feet of collection line. There are also two main sewer pumping stations located throughout the town.

Treatment - Sewage from the Town of Pound sewer collection system flows to the 0.50 MGD Pound Wastewater Treatment Facility.

Pump Stations - There are two main sewer pump stations on the system. The Pound Pump Station pumps the wastewater flow from central Pound to the wastewater facility. The Almira Pump Station pumps wastewater from the Almira section back to the wastewater facility.

Current Operation - The projected flow from the Town of Pound including the new Red Onion Prison is 0.39 MGD, based on number of users and industrial flow projections. The current average flow received at the Pound WWTF is 0.099 MGD. With an existing population of 995 persons the projected flow would be 0.069 MGD, which indicates a problem with infiltration.

Pound Wastewater Treatment Facility

The Town of Pound operates a 0.175 MGD wastewater treatment facility located in the Town of Pound. The facility is currently being upgraded and expanded to 0.50 MGD. The plant is currently discharging an average of 0.0997 MGD to the Pound River, in the Big Sandy River Sub-basin. The WWTF is considered a minor municipal plant. The current discharge reflects the old permit flow of 0.175 MGD. The new permit limits are as follows:

VPDES Permit Limits						
Flow MGD	BOD₅ mg/l	TSS mg/l S/W	TKN S/W	D.O. mg/l	pH	TRC mg/l
0.50	15/25	30/30	15/n/a	6.6	6.0-9.0	Non-Detect

The purpose of the expansion and upgrade to the Pound WWTF is to accommodate the new Red Onion Prison. Average daily flow from the prison is expected to be 260,000 gpd, with higher than average residential concentrations of BOD₅ and TSS. Combined with the current average daily flow, the total flow will be 0.390 MGD, or 78% of plant capacity.

The new Pound wastewater treatment facility provides secondary treatment of wastewater using the extended aeration modification of the activated sludge process. The process employed utilizes a 24-hour detention time. The units provided at the facility include a barminutor with bypass bar screen, aerated grit chamber, Parshall flume flow measurement, dual train aeration basins, secondary clarifiers, dual chlorinators with chlorine contact tanks, sulfur dioxide dechlorinators, post-aeration basins, aerated digesters, four sludge drying beds, new portable belt filter press, effluent structures including effluent flume measurement.

Raw sewage is pumped from the Pound pump station into a 10-inch force main and from the Almiré pump station into an 8-inch interceptor. Both lines discharge into the influent manhole at the WWTF. Wastewater flows from the influent manhole to the preliminary treatment building. Flow passes through a mechanical barminutor screen and is split into two grit chambers. The preliminary effluent flows into the main pump station and is pumped into the aeration basins where the biological treatment process occurs. The aeration basin effluent flows to the secondary clarifier. Sludge is drawn off in the secondary clarifier and recycled to the main pump station or wasted to the aerobic digester. Clarifier effluent flows to the chlorine contact tank for chlorine disinfection. The chlorinated water flow to the post-aeration basins and then to the effluent manhole, where sulfur dioxide dechlorinates the effluent. After dechlorination the effluent is measured by an effluent parshall flume before being discharged into the Pound River. Sludge from the aerobic digesters is dewatered by the belt press or by the sludge dewatering beds.

The Pound WWTF receives sludge from the Pound WTP for treatment and disposal. Sludge disposal is at the Wise County Landfill. The Sludge disposal plan is not currently complete, but anticipated values are 400 lb/day of 15% solids.

The facility is experiencing problems with Infiltration and Inflow. During a rainfall event, the flow at the facility increases to 0.169 MGD, or 170% over average. The Town is currently pursuing an on-going I/I abatement program. The program includes smoke testing, night flow testing, and manhole flow testing. No significant I/I reductions have been made to date. The WWTF cannot consistently meet the required limitations due to hydraulic overload resulting from the excessive I/I.

Six NOV's have been issued to the facility since 1993. The most recent NOV was issued on March 7, 1995 regarding a violation of TSS (32/30), and TRC indication. Most of the NOV's are related to the I/I problems experienced by the Town.

The Town of Pound is currently under a Department of Environmental Quality special consent order for the wastewater treatment facility. The consent order contains schedules for: WWTF upgrade due to overload at the WWTF, development of a wastewater pre-treatment program, development and implementation of an I/I abatement program, and elimination of the Pound Water Treatment Plant VPDES discharge and connection to the WWTF.

Town of Appalachia Wastewater System

The Town of Appalachia operates a sewer collection system. This system consists of approximately 55,000 linear feet of collection line, and 20,000 LF of 10" force main interceptor. There is one main sewer pumping station located in town, and a terminal pump station which pumps the Town's wastewater directly to the Big Stone Gap Regional Wastewater Treatment Facility.

Treatment - Sewage from the Town of Appalachia sewer collection system flows to the Big Stone Gap Regional Wastewater Treatment Facility. Flow from the Town of Appalachia is metered and recorded at the Appalachia Pump Station. Average flow is 0.315 MGD.

Pump Stations - There is one main sewer pump stations on the system and a terminal pump station. The terminal Appalachia Pump Station is rated at 0.30 MGD and pumps wastewater to the Big Stone Gap Regional Wastewater Treatment Facility through a 10" force main line.

Current Operation - The current average daily flow from Appalachia is 0.315 MGD. During normal rainfall events the flow increases 38% to 0.435 MGD. The pump station has recorded flows as high as 1.0 MGD from the pump station, which indicates a serious problem with infiltration and inflow.

Town of Big Stone Gap Wastewater System

The Town of Big Stone Gap operates a sewer collection system. This system consists of approximately 65,000 linear feet of collection line. There is one main sewer pumping station located in Artesian Well Hollow and a terminal pump station located in Cadet near the wastewater facility.

Treatment - Sewage from the Town of Big Stone Gap sewer collection system flows to the Big Stone Gap Regional Wastewater Treatment Facility. Flow from the Town of Big Stone Gap is metered and recorded at the Big Stone Gap Main Pump Station.

Pump Stations - There are two sewer pump stations on the system. One is located in the Artesian Well portion of the system. The station is a suction - lift station with a capacity of 250 gpm. The second station is located in Cadet near the plant and has a capacity of 2,100 gpm.

Current Operation - The current average daily flow from the Town of Big Stone Gap is 1.24 MGD. During normal rainfall events average flow increases 68% to 2.08 MGD. The main pump station has recorded flows as high as 4.0 MGD, which indicates a serious problem with infiltration and inflow.

Big Stone Gap Regional Wastewater Treatment Facility

The Town of Big Stone Gap operates a 2.0 MGD wastewater treatment facility located on the Powell River, on the west end of Big Stone Gap. An upgrade to the facility was

completed in 1994. The WWTF is currently averaging 1.56 MGD of discharge to the Powell River, in the Clinch River Sub-basin. The facility is classified a major municipal WWTF. Permit limits are as follows:

VPDES Permit Limits						
Flow MGD	CBOD ₅ mg/l	TSS mg/l S/W	NH ₃ -N S/W	D.O. mg/l S/W	pH	Fecal Coliform n/100 ml
2.0	15/30	30/30	4.5/11.3	6.9/6.0	6.0-9.0	200 n/100 ml

The Big Stone Gap wastewater treatment facility provides secondary treatment of wastewater using the extended aeration modification of the activated sludge process. The process employed is an oxidation ditch which utilizes a 24-hour detention time. The facility receives wastewater from Appalachia and Big Stone Gap, which will soon include Wallens Ridge Prison.

The treatment process is as follows: Effluent from the grit chambers flows to the flow equalization basin for aeration and mixing. The flow equalization basin effluent is pumped to the oxidation ditch for biological treatment. The oxidation ditch utilizes aerobic biological populations for reduction and removal of organic impurities in the wastewater. The effluent from the oxidation ditch flows by gravity to the secondary clarifiers where final settling occurs. Waste sludge from the secondary clarifiers is drawn off and pumped to the digester as it begins to accumulate beyond normal operating levels. The digested sludge will be pumped as required to the belt filter press; and after dewatering, the sludge will be trucked off-site for disposal according to the approved disposal plan. After final settling occurs in the secondary clarifier, the effluent flows by gravity to the ultraviolet disinfection system. The disinfected effluent flows over a cascade aerator before final discharge into the Powell River.

Sludge drying is accomplished on-site. Sludge disposal is at the Wise County Landfill in Blackwood. Sludge disposal of 20% solids is 2,363 lbs/day. Total yearly sludge production is 430.7 tons.

The facility is experiencing problems with Infiltration and Inflow. During a rainfall event, the flow at the facility increases an average of 200%. The flow equalization basin was constructed with the concept of controlling large inflows during rainfall events. The Towns of Big Stone Gap and Appalachia are currently conducting I/I abatement programs.

The Town of Big Stone Gap was issued a consent order in August 1992 to construct the upgraded WWTF, with an emphasis on controlling I/I. Since that time, seven NOV's have been issued to the facility.

The latest NOV was issued February 28, 1996 for a TSS violation 74/30. This occurred due to a washout at the facility, which was directly related to the I/I problem. Other NOV's have been issued regarding BOD₅ violations, which are also directly related to the I/I problem.

City of Norton Wastewater System

The City of Norton operates a sewer collection system. This system consists of approximately 80,000 linear feet of collection line. There is also one main sewer pumping station located in the City.

Treatment - Sewage from the City of Norton sewer collection system flows to the CNW Regional Wastewater Treatment Facility. Flow from the City of Norton is metered and recorded at the Norton metering station.

Pump Stations - There is one sewer pump station on the system. The Josephine Pump Station pumps wastewater from the west Norton area to the gravity collection system in central Norton.

Current Operation - The current average daily flow from the City of Norton is 1.1 MGD. During normal rainfall events average flow increases 150% to 2.75 MGD. Heavy rainfall causes the flow to peak at approximately 4.5 to 5.0 MGD. The Norton metering station has recorded flows as high as 5.0 MGD, which indicates a serious problem with infiltration and inflow.

Town of Wise Wastewater System

The Town of Wise operates a sewer collection system. This system consists of approximately 50,000 linear feet of collection line and one small pumping station.

Treatment - Sewage from the Town of Wise sewer collection system flows to the CNW Regional Wastewater Treatment Facility. Flow from the Town of Wise is metered and recorded at the Wise metering station.

Pump Stations - There is one small sewer pump station (Monkey Hill) which serves a few streets.

Current Operation - The current average daily flow from the Town of Wise is 0.75 MGD. During normal rainfall events average flow increases 113% to 1.6 MGD. The metering

station has recorded flows as high as 4.2 MGD, which indicates a serious problem with infiltration and inflow.

Town of Coeburn Wastewater System

The Town of Coeburn operates a sewer collection system. This system consists of approximately 60,000 linear feet of collection line. There is one small sewer pumping station located in Town.

Treatment - Sewage from the Town of Coeburn sewer collection system flows to the CNW Regional Wastewater Treatment Facility. Flow from the Town of Coeburn is metered and recorded at the Coeburn metering station.

Pump Stations - There is one sewer pump station on the system located at the Marty Shopping Center. This pump station pumps the flow from the shopping center into the gravity collection system.

Current Operation - The current average daily flow from the Town of Coeburn is 0.35 MGD. During normal rainfall events average flow increases 114% to 0.75 MGD. The main pump station has recorded flows as high as 1.1 MGD, which indicates a serious problem with infiltration and inflow.

Wise County PSA Wastewater System

The Wise County PSA operates a sewer collection system. The collection system consists of approximately 10,000 linear feet of collection line in the Riverview area near Coeburn. There are five metering station on the system.

Treatment - Sewage from the PSA's Riverview sewer collection system flows to the CNW Regional Wastewater Treatment Facility. Flow is metered and recorded at five metering stations.

Current Operation - The current average daily flow from the PSA's Riverview system is 0.10 MGD. During normal rainfall events average flow increases slightly. While a problem with infiltration and inflow exists, the problem is not creating a serious impact on the CNW Facility.

Coeburn-Norton-Wise Sewer Regional Wastewater Interceptor System

The CNW Authority operates a sewer interceptor system. The interceptor consists of approximately 58,000 LF of 24, 30, and 36 inch sewer lines and associated manholes. Sewage flows from the City of Norton, Town of Wise, Town of Coeburn, and Wise County (Riverview) through eight metering stations into the CNW interceptor..

Treatment - Sewage from the CNW interceptor flows to the CNW Wastewater Treatment Facility. This facility is a 4.0 MGD activated sludge treatment facility.

Pump Stations - There are three pump stations operated by the CNW Authority. The Blackwoods Pump Station delivers flow from the Blackwoods Industrial Park to the Josephine Pump Station. The Josephine Pump Station pumps wastewater from the west side of Norton to the gravity system at the natural divide in Norton. The Laurel Hills Pump Station in Wise serves a portion of the Laurel Hills Subdivision.

Metering Stations - There are eight metering stations which meter the flow from CNW's wastewater customers. The Norton, Wise, and Coeburn metering stations meter flow from these respective communities. There are also five metering stations located on the Riverview system operated by the Wise County PSA.

Current Operation - The current average daily flow is 2.78 MGD. During normal rainfall events average flow increases 102% to 5.61 MGD. Flow has been recorded as high as 13.0 MGD at the 4.0 MGD facility. A serious inflow problem experienced by CNW's four customers is adversely affecting the treatment facility's operation during normal rainfall events.

Coeburn-Norton-Wise Regional Wastewater Treatment Facility

The Coeburn Norton Wise (CNW) Authority operates a 4.0 MGD wastewater treatment facility located in Coeburn. The completely new facility was completed in 1992 and is expandable to 6.0 MGD. The WWTF discharges an average of 2.78 MGD to the Guest River, in the Clinch River Sub-basin. The facility is considered a major municipal WWTF. Permit limits are as follows:

VPDES Permit Limits					
Flow MGD	BOD₅ mg/l	TSS mg/l S/W	D.O. mg/l	pH	TRC mg/l
4.0	20/25	30/30	7.0	6.0-9.0	Non-Detect

The CNW wastewater treatment facility provides secondary treatment of wastewater using the extended aeration modification of the activated sludge process. The process employed is an oxidation ditch which utilizes a 24-hour detention time.

The following treatment is provided at the WWTF: screening, grit removal, biological reactor (oxidation ditch), secondary clarification, chlorine disinfection, dechlorination, post-

aeration, aerobic sludge digestion, and sludge dewatering and disposal. A description of the treatment process follows.

Wastewater is delivered to the WWTF by the CNW interceptor, which receives flow from Wise, Coeburn, and Norton. Each locality is headed by a wastewater metering station. Influent wastewater enters the headworks building and passes through a 36 inch knife gate valve, which, when closed, can direct the wastewater flow to the controlled diversion outlet. Wastewater flows through the mechanical bar screen channel and the aerated grit collector to remove the large solids and grit or sand. Wastewater then enters the influent pump chamber and is pumped into the oxidation ditch where it is mixed with sludge and aerated for a given period of time (usually 24 hours for extended aeration). Combined sludge and water (mixed liquor) flows from the oxidation ditch to the clarifiers for separation. Sludge is allowed to settle in the clarifiers, and is then pumped back to the reactor to be mixed with the influent wastewater. The clarified wastewater flows over a saw-tooth weir in the clarifier into the chlorine contact tank for disinfection. Chlorine is fed into the contact tank's influent line. Sulfur dioxide is fed into the contact tank's effluent line to dechlorinate the wastewater after it has been disinfected. The wastewater is then re-aerated in the post-aeration tank to maintain an acceptable dissolved oxygen content prior to discharge into the Guest River. The aerated digester tanks are used to stabilize the sludge removed from the system. The stabilized sludge is then dewatered using one of two belt filter presses, and is disposed of in accordance with the sludge disposal plan.

The facility currently receives septage from septage haulers. An average of 20,000 gallons per week is received at the facility. The septage is received into the headworks.

The facility removes sludge from the wastewater train and uses aerobic digestion to stabilize the sludge. The sludge is dewatered by means of a 2.0 meter Envirex Belt Press to between 17% and 21 % solids. Current daily average sludge production is 20 - 24 tons per day. The sludge is disposed of at the Wise County Landfill.

The facility is experiencing problems with Infiltration and Inflow. During a rainfall event, the flow at the facility increases an average of 200%. When the flow reaches an uncontrollable amount, the influent wastewater maybe diverted from the terminal manhole via a controlled diversion directly into the Guest River. At present, the diversion has not been used. To date, a record one-day flow of 15 MGD has been handled by the WWTF. Since the interceptor lines were newly constructed as a part of the project, the I/I can be assumed to originate in the individual Towns of Coeburn, Norton, and Wise. An I/I abatement program was included as part of the original inter-local agreement.

Since becoming operational, the facility has been issued seven NOV's. The latest NOV was issued on December 11, 1995, for leachate discharge at the Blackwood Pump Station. The Blackwood pumping station receives sewage flow, and leachate flow from the Wise County Landfill at Blackwood. Five of the seven NOV's have been regarding the leachate discharge

at the Blackwood pumping station. It is considered to be an operational problem, which usually becomes a major problem during rainfall events.

Two other NOV's have been issued, which involved chlorine discharge at the WWTF. The permit requirement is non-detectable total residual chlorine (TRC). Power failures at the WWTF have affected the system's ability to properly dechlorinate during a power failure.

Town of St. Paul Wastewater System

The Town of St. Paul operates a sewer collection system. This system consists of approximately 20,000 linear feet of collection line.

Treatment - Sewage from the Town of Pound sewer collection system flows to the 0.40 MGD St. Paul aerated lagoon.

Pump Stations - There are no sewer pump stations on the system.

Current Operation - The current average daily flow from the Town of St. Paul is 0.06 MGD. During normal rainfall events average flow increases 70% to 0.169 MGD. While an obvious problem with infiltration and inflow exists, the lagoon system is not currently experiencing serious problems with excessive flows.

St. Paul Wastewater Treatment Facility

The Town of St. Paul operates a 0.40 MGD wastewater treatment facility located on the Clinch River. The facility discharges an average of 0.060 MGD to the Clinch River. The facility is considered a minor municipal WWTF. Permit limits are as follows:

VPDES Permit Limits				
Flow MGD	BOD₅ mg/l	TSS mg/l S/W	pH	Fecal Coliform
0.40	200	200	6.0-9.0	Non-Detect

The St. Paul wastewater treatment facility provides secondary treatment of wastewater using an aerated lagoon. The process employed utilizes an extended detention time. The units provided at the facility include the two cell lagoon, alum feed system, algicide feed system, secondary clarifier, two channel U.V. Disinfection system, 1,436 gallon sludge holding tank, and two sludge drying beds. The U.V. system was installed in 1992.

There is currently no sludge disposal plan for the facility. The treatment process is an aerated lagoon, and no sludge has ever been removed from the lagoon. The DEQ will require a sludge disposal plan if sludge is ever removed from the facility.

The facility is experiencing problems with Infiltration and Inflow. During a rainfall event, the flow at the facility increases approximately 260%. The peak flows at the facility are seasonal, and are reflective of precipitation.

No significant NOVs have been issued to the facility in the past two years.

Wastewater Treatment Facilities

There are two different types of wastewater treatment facilities in Wise County. These systems are regulated by the Commonwealth of Virginia, through one of two major programs.

The Commonwealth of Virginia Department of Health (VDH) is the regulating agency for small, privately-owned sewage treatment systems. Wise County is in the LENOWISCO Health District. The VDH operates through the local Wise County Health Department. Septic tank systems return wastewater to the environment through direct soil contact. The health department regulates and inspects permitted septic tank systems, and alternative wastewater systems.

Approximately 45% of Wise County residents are currently connected to a sanitary sewer collection system. The remaining 55% are either using private septic systems, alternative systems, or have an un-permitted discharge. There are over 4,000 permitted septic tank systems, and 28 alternative systems in use in Wise County. The Health Department denial rate for septic systems over the past three years is 11%.

The Commonwealth of Virginia Department of Environmental Quality (DEQ) is the regulating agency for systems which incorporate a point discharge to the environment, usually a stream or river. The authority for regulation is the Virginia Pollutant Discharge Elimination System (VPDES), through which discharge permits are issued. The DEQ issues two types of VPDES Permits, discussed below.

A general VPDES permit is issued to sanitary sewer systems which are designed to discharge less than or equal to 1,000 gallons of wastewater per day. These permits are issued as VAG400010, and do not vary with regard to discharge requirements. The permit holders are responsible for maintaining their systems, but are not required to submit Discharge Monitoring Reports to DEQ. The Virginia Department of Health inspects these systems for compliance with the general VPDES Permit. There are presently 41 of these permits are currently considered to be active in Wise County. Appendix C contains a sample of one of these general permits, and a current list of users in Wise County.

The DEQ also issues VPDES permits for point discharges for those systems which do not qualify for the general permit. Both municipal and industrial dischargers are required to obtain VPDES Permits.

There are presently 8 industrial and 16 municipal wastewater treatment facilities in Wise County with active VPDES permits issued through DEQ. The active Industrial permittees are shown below.

Industrial VPDES Permits		
Facility Name	Expires	Design Flow (MGD)
Appalachia WTP	08/23/2001	0.04
Big Stone Gap WTP	12/08/1999	0.049
Coeburn - Tom's Creek WTP	08/16/2001	0.018
Interstate RR, Andover Yard	01/23/2001	0.05
Kwik Wash *	09/15/1998	0.002
Pound WTP	11/13/2001	0.04
Wise County Reg. WTP (Carfax)	11/07/1999	0.053
Wise Water Treatment Plant	05/29/2000	0.045

* currently not in operation

The municipal VPDES permittees are listed below.

Municipal VPDES Permits			
Facility Name	Design Flow (MGD)	Average Flow (MGD)	Percent Capacity
C/N/W Regional WWTP	4.0	2.78	69.5

Municipal VPDES Permits			
Big Stone Gap Regional WWTP	2.0	1.56	78.0
Pound STP (future conditions)	0.50	0.390	78.0
St. Paul Aerated Lagoon	0.40	0.060	15.0
Appalachia Elementary School	0.012	0.0088	73.3
Arno #2 Mine STP	0.01	0.005	50.0
Betty B. Coal STP	0.0015	0.0003	20.0
Flatwoods CCC STP	0.028	0.0286	102.0
Lee Norse STP	0.007	0.0019	27.1
Paramount Land Co. STP	0.003	0.0008	26.6
Sheffield Acres STP	0.04	0.032	80.0
Travelers Motel	0.005	0.005	100.0
WCC, Central Shop & Whse.. STP *	0.0015	0.0	0.0
WCC, Holton Mine Complex STP *	0.015	0.0	0.0
WCC, Linden Shaft Mine STP *	0.007	0.0	0.0
Wise Correctional Unit No. 18	0.030	0.0109	36.3

* currently not in operation

The Pound, Big Stone Gap, CNW, and St. Paul facilities are discussed in the previous section. The remaining WWTFs are discussed below.

Appalachia Elementary School

The Wise County School Board operates a 0.012 MGD wastewater treatment facility at the Appalachia Elementary School. The facility is currently discharging an average of 0.0088 MGD to Mill Branch in the Clinch River sub-basin. Permit Limits are as follows:

VPDES Permit Limits					
Flow MGD	BOD ₅ mg/l	TSS mg/l S/W	D.O. mg/l	pH	TRC mg/l
0.012	30	30	5.0	6.0-9.0	Non-Detect

The facility is using an extended aeration package plant to treat the wastewater. Treatment units at the facility include a grease trap, bar screen, comminutor, aeration tank, clarifier, chlorinator, chlorine contact basin, dechlorination facility, post aeration tank, and an aerobic sludge holding tank.

Sludge disposal from the facility is a pump and haul plan to the Big Stone Gap Regional WWTF. The plan estimates that 1,400 gallons of 2% sludge will be removed every 3 months and disposed of at the Big Stone Gap Facility.

No significant NOV's have been issued to the facility over the past two years.

Arno #2 Mine STP - Westmoreland Coal Company

The Westmoreland Coal Company operates a 0.01 MGD wastewater treatment facility at the Arno #2 mine, located near Big Stone Gap. This facility is currently in operation. Westmoreland Coal Company suspended operations in Virginia in 8/95. This facility ceased discharging at that time, but is currently discharging an average of 0.005 MGD. Permit limits are as follows:

VPDES Permit Limits					
Flow MGD	BOD ₅ mg/l	TSS mg/l S/W	D.O. mg/l	pH	TRC mg/l
0.01	30	30	4.0	6.0-9.0	Non-Detect

The facility is using an extended aeration package treatment unit to treat the wastewater. The treatment train consists of a flow equalization tank, bar screen, 2 submersible grinder pumps, aeration tank, secondary clarifier, tablet chlorinator and table dechlorinator, post aeration tank, and aerobic sludge holding tank.

Sludge disposal from the facility is a pump and haul plan to the Duffield Sewage Treatment Plant. The plan estimates that 500 gallons of 2% sludge will be removed every 3 months and disposed of at the Duffield facility.

No significant NOV's have been issued to the treatment facility over the past two years.

Betty B Coal STP

The Betty B Coal Company operates a 0.0015 MGD wastewater treatment facility located in Blackwood, between Norton and Appalachia. The facility is currently discharging an average of 0.0003 MGD to the environment. Permit limits are as follows:

VPDES Permit Limits				
Flow MGD	BOD ₅ mg/l	TSS mg/l S/W	pH	TRC mg/l
0.0015	30	30	6.0-9.0	0.78 max

The facility is using an activated sludge extended aeration package treatment plant to treat the wastewater. Treatment process includes bar screen, flow equalization, aeration tank, secondary clarifier, chlorination and chlorine contact tank, post aeration facilities, dechlorination facilities, and aerated sludge holding tank.

Sludge disposal from the facility is a pump and haul plan to the Clintwood Sewage Treatment Plant. The plan estimates that 120 gallons of 2% sludge will be removed every 6 months and disposed of at the Clintwood facility.

No significant NOV's have been issued to the facility over the past two years.

Flatwoods CCC STP

The USDA Jefferson National Forest Service operates a 0.028 MGD wastewater treatment facility at the Job Corps facility near Coeburn. The plant is classified as a minor municipal

facility. The facility is currently discharging an average of 0.0286 MGD to Corder Branch of Little Stony Creek in the Clinch River Sub-basin. Permit limits are as follows:

VPDES Permit Limits						
Flow MGD	BOD ₅ mg/l	TSS mg/l	NH ₃ - N S/W	D.O. mg/l	pH	TRC mg/l
0.028	30	30	8.4/13.6	6.0	6.0-9.0	Non-Detect

The facility is currently using an aeration basin and sand filtration system to treat wastewater to secondary discharge levels.

Sludge disposal is a pump and haul plan to CNW Regional WWTP in Coeburn. The plan estimates that 1,000 gallons of 2% sludge will be removed every 14 days to the CNW facility. However, the CNW plant has not received any flow from Flatwoods to date.

Two significant NOV's have been issued to the facility in the past 2 years. BOD₅ was exceeded on 10/19/95 (61/30 mg/l). The problem has been addressed by discontinuing the use of the polishing pond. Plans have been submitted to construct a sand filter to meet the BOD₅ and TSS requirements.

The WWTP exceeded D.O. limits on 9/5/96, 5.6/6.0 mg/l. At this time the chlorine tablet addition procedure had been changed, which affected the effluent D.O. The problem has been addressed.

Lee-Norse STP

The Wise County PSA operates this 0.007 MGD STP located off Route 646 just outside the Wise Town limits. The facility is classified as a minor municipal facility. The facility is discharging an average of 0.00197 MGD to Bear Creek in the Clinch River Sub-basin. Permit limits are as follows:

VPDES Permit Limits					
Flow MGD	BOD ₅ mg/l	TSS mg/l S/W	D.O. mg/l	pH	TRC mg/l
0.007	30	30	6.5	6.0-9.0	Non-Detect

The facility is using an extended aeration package treatment plant to treat the wastewater. Treatment process includes bar screen, comminutor, aeration tank, secondary clarifier, chlorine addition and chlorine contact tank, dechlorination facilities, post aeration, and aerated sludge holding tank.

Sludge disposal is a pump and haul plan to the CNW WWTF. An average of 250 gallons per month of 2% sludge are removed to the CNW facility.

There have been no significant NOV's issued to the facility over the past two years. The DEQ recommends that the PSA join this facility to CNW due to permit limit changes in the near future. The VPDES permit expires on 12/31/2001.

Paramount Land Co. STP

The Wise County PSA operates this 0.003 MGD wastewater treatment facility located on Route 646 just outside the Wise Town limits. The WWTF is classified as a minor municipal facility. The WWTP is discharging an average of 0.00088 MGD to Bear Creek in the Clinch River Sub-basin. Permit limits are as follows:

VPDES Permit Limits					
Flow MGD	BOD ₅ mg/l	TSS mg/l S/W	D.O. mg/l	pH	TRC mg/l
0.003	30	30	5.0	6.0-9.0	0.21 max

The facility is using an extended aeration package plant to treat the wastewater. Treatment consists of bar screen, aeration tank, secondary clarifier, chlorination and chlorine contact tank, dechlorination, post aeration, and aerated sludge holding tank.

Sludge disposal is a pump and haul plan to the CNW WWTF. An average of 100 gallons per month of 2% sludge are removed to the CNW facility.

No significant NOV's have been issued to the facility over the past two years.

Sheffield Acres STP

The Town of Coeburn operates this 0.04 MGD wastewater treatment facility located in the Flatwoods area south of Coeburn at the Sheffield Acres housing development. The WWTF is considered a minor municipal facility. The WWTP is currently discharging an average of 0.03215 MGD to Corder Branch & Ramey Branch Creeks, in the Clinch River Sub-basin. Permit limits are as follows:

VPDES Permit Limits				
Flow MGD	BOD ₅ mg/l	TSS mg/l S/W	pH	TRC mg/l
0.04	30	30	6.0-9.0	Non-Detect

The facility is using an extended aeration dual train package plant to treat the wastewater. Treatment consists of a comminutor in a distribution box, aeration tank, secondary clarifier, aerated digester, chlorinator and chlorine contact tank, dechlorination facilities, effluent pumping station, and cascade aerator at the creek.

Sludge disposal is a pump and haul plan to CNW in Coeburn. Approximately 2,000 gallons per month are removed to the CNW WWTF.

No significant NOV's have been issued to the facility over the past two years. The DEQ encourages the community to connect to another public sewer when available.

Travelers Motel

This treatment facility is owned by ASSAD, Inc., and is located in Pound, Virginia. The facility is a 0.005 MGD wastewater facility, which is currently averaging 623 gallons per day, discharging into Indian Creek, in the Big Sandy River Sub-basin. Permit limits are as follows:

VPDES Permit Limits				
Flow MGD	BOD ₅ mg/l	TSS mg/l S/W	pH	TRC mg/l
0.04	30	30	6.0-9.0	Non-Detect

The WWTF is a small single treatment unit, designed for low flows. Sludge disposal is pump and haul to a local POTW, and no current plan exists.

The facility was issued an NOV on 5/20/90 for permit expiration. The permit has since been renewed and is active.

Westmoreland Coal Company

The Westmoreland Coal Company is currently permitting three wastewater treatment facilities. These are located at the Central Shop, Holton Mine Complex, and Linden Shaft Mine. All are classified as minor municipal. The Central Shop and Holton Mine are permitted a flow of 0.0015 MGD, and Linden is permitted 0.007. All have permit limits of BOD₅ 30 mg/l and TSS 30 mg/l.

The WWTFs are not currently active. Westmoreland ceased mining operation in July 1995, and these facilities have not been operating since that time. The facilities are not expected to resume operation, and will likely allow the current VPDES permits to expire.

Wise Correctional Unit No. 18

The Virginia Department of Corrections operates this 0.03 MGD wastewater treatment facility located south of Coeburn on Route 72. The facility is currently discharging an average of 0.0109 MGD to the Guest River, in the Clinch River Sub-basin. Permit limits are as follows:

VPDES Permit Limits						
Flow MGD	BOD ₅ mg/l	TSS mg/l	NH ₃ - N	D.O. mg/l	pH	TRC mg/l
0.03	30	30	1 grab/mo	6.1	6.0-9.0	Non-Detect

The facility uses an extended aeration package treatment plant to treat the wastewater. Treatment consists of bar screen, oxidation ditch, secondary clarifier, chlorination and chlorine contact tank, dechlorination facilities, cascade aeration, aerated sludge holding basin, and sand drying beds.

Sludge disposal is achieved by on-site drying beds. There are two drying beds at the facility. The sludge disposal plan indicates that 44 cu ft per day will be deposited on the drying beds, and will be disposed of at the Wise County Landfill once the sludge has dried to 20 - 25% solids. The plan calls for an estimated one trip per month. The sludge holding tank contains

6,510 gallons of sludge, which is applied to the beds once volatile solids reduction has been accomplished, and the solids content is approximately 2%.

Sludge is also hauled to the CNW plant for disposal. Currently, 4,000 to 6,000 gallons per month are delivered to the CNW plant.

No significant NOV's have been issued to the facility over the past two years.

EXISTING CONDITIONS

0206 Existing Inter-Local Agreements

The following is a brief list of some of the existing agreements between water and sewer service providers in Wise County.

WATER

Wise County PSA

- with Coeburn
- with Wise
- with Norton
- with Appalachia

St. Paul / Russell County Water & Sewer Authority

This agreement provides water service to areas of Russell County north of St. Paul along Route 63. The connection extends to the Community of Dante.

Norton / Wise

The agreement between the City of Norton and the Town of Wise is generally for emergency water purchase.

Appalachia / Keokee

The agreement is between the Town of Appalachia and the Lee County Public Service Authority.

WASTEWATER

CNW Regional WWTF

Parties to this agreement include Coeburn, Norton, Wise, Wise County PSA, and Wise County Board of Supervisors. The agreement includes a sewer use ordinance to be followed by all customers.

Big Stone Gap Regional WWTF

Parties to this agreement include Big Stone Gap, Appalachia, and Wise County Board of Supervisors. The agreement includes a sewer use ordinance to be followed by all customers.

EXISTING CONDITIONS

0207 Existing Water Needs

There are some areas in Wise County with immediate needs for new or improved water service. This section addresses 1) improvements to the existing systems, and 2) extension of water service into new areas of Wise County, both inhabited and uninhabited.

Improvements to Existing Systems

Water accountability for the public water systems in Wise County averages 61%, with a high of 84% in St. Paul and a low of 47% in Big Stone Gap. Improvements to the existing systems is necessary in order to expand service to new areas. Accountability improvements are needed for all the systems, but more so in Pound, Wise, Norton, Big Stone Gap, and Appalachia.

Accountability of the water systems is shown below:

Water Accountability			
Water Plant	Avg. Production (MGD)	Avg. Billings (MGD)	Accountability
Town of Pound	0.288	0.187	65 %
Town of Appalachia	0.397	0.258	65 %
Town of Big Stone Gap	2.130	1.000	47 %
City of Norton	0.921	0.543	59 %
Town of Wise	0.829	0.580	70 %
Town of Coeburn	0.428	0.350	82 %
Wise Co. PSA Carfax	0.528	0.400	75 %
Town of St. Paul	0.273	0.229	84 %
TOTALS	5.79	3.54	61 %

As the cost of water treatment increases and the need for additional supplies grows, it is becoming more and more cost-effective to improve water accountability. In a well run system, water accountability will be between 85 and 90%. The causes for less than desirable water accountability are:

- Inaccurate Master Meters
- Inaccurate Customer Meters
- Leaks
- Unauthorized Use
- Unmetered Connections
- Hydrant Use
- Street Flushing
- Water Line Flushing
- Improper Readings

Each system should examine its own water accountability and pursue improvements as necessary.

Specific information regarding existing system improvements is indicated below:

Pound Planning Area

Town of Pound - Population in the Pound planning area is expected to grow 0.5 % over the next 25 years due to the influence of the Red Onion Prison. The following water needs require consideration.

Accountability Improvement - Water accountability for the Pound water system is 65%. Water accountability must be increased in order to provide a more cost-efficient water system. A goal of 85% is recommended.

Line Upgrade - Line sizes and types throughout the Town of Pound are insufficient for the Town to extend water service. Additionally, older pipes are often the cause of water leaks in the system. A line upgrade, which would involve increasing line sizes and replacing older pipes, will help the Town to provide better water service.

Plant Upgrade - The water treatment plant is currently in poor condition. The Virginia Department of Health has issued an NOV to the Town for failure to meet reliability and responsibility. Specifically, there are structural repairs required at the plant. The Town has also been instructed by DEQ to discontinue direct discharge of backwash water to the environment and to discharge the backwash water to the sewer collection system.

Emergency Tie-in - The Town of Pound is not currently connected to any other water system. This makes the citizens of Pound fully reliant upon the Pound water plant. If a failure at the plant occurs, the Town will be without water service. An emergency tie-in to the Town of Clintwood and/or the Wise County PSA needs to be considered.

Appalachia Planning Area

Town of Appalachia - Population in the Appalachia planning area is not expected to grow over the next 25 years. The following water needs of the area will require consideration.

Reservoir Capacity - The Town of Appalachia water treatment plant receives raw water from the Ben's Branch Reservoir. The WTP is capable of operating at 1.0 MGD, but the safe yield of the reservoir is 0.7 MGD.

Accountability Improvement - Accountability for the Appalachia water system is 65%. Water accountability must be increased in order to provide a more cost-efficient water system. A goal of 85% is recommended.

Storage Renovation - There are 14 water storage tanks on the Appalachia water system, which combine for a total of 2.8 million gallons. Some of the tanks are old, and in need of repair to ensure efficient operation and to prevent water loss due to leaks. The Town has recently entered into a maintenance program with a private contractor.

Emergency Tie-In - The Town of Appalachia is not currently connected to any other water system. This makes the customers of the Appalachia water system fully reliant upon the Appalachia WTP. If a failure at the plant occurs, the Town will be without water service. An emergency tie-in to the Big Stone Gap Water System and/or the Wise County PSA needs to be considered.

Big Stone Gap Planning Area

Town of Big Stone Gap - Population in the Big Stone Gap planning area is expected to grow 1.0 % over the next 25 years, due to the influence of the Wallens Ridge Prison. The following water needs will require consideration.

Reservoir Capacity - The Big Stone Gap WTP receives raw water from the Big Cherry Reservoir. The safe yield of the reservoir is assumed to be 3.2 MGD. Big Cherry Dam will require major work on its spillway and structure to bring it into compliance with state regulations regarding dam safety. The project cost of these repairs is estimated to be \$1,000,000. The WTP is currently rated at 4.0 MGD at 5 gpm/sf. The safe yield of the reservoir is a limiting factor.

Plant Renovations - The Big Stone Gap WTP is currently operating at 54% of capacity. However, renovations are required to the existing facility. Specific repairs include the filter console, valve controllers, and pipe gallery. Other general repairs need to be made to improve efficiency at the plant.

Accountability Improvement - Accountability for the Big Stone Gap water system is 47%. Water Accountability must be increased in order to provide a more cost-efficient water system. A goal of 85% is recommended.

Emergency Tie-In - The Town of Big Stone Gap is not currently connected to any other water system. This makes the customers of the Big Stone Gap water system fully reliant upon the Big Stone Gap WTP. If a failure at the plant occurs, the Town will be without water service. An emergency tie-in to the Norton Water System and the Town of Appalachia needs to be considered. Any connection should be routed through areas currently unserved with water.

Line Extensions - Extensions into the Seminary and Jasper areas of Lee County appear to be feasible. In addition to increasing customer base, the extensions would allow a potential interconnection between Big Stone Gap and several Lee County systems.

Norton Planning Area

City of Norton - Population in the Norton planning area is expected to grow 1.5 % over the next 25 years. The following water needs will require consideration.

Accountability Improvement - Accountability for the Norton water system is 59 %. Water accountability must be increased in order to provide a more cost-efficient water system. A goal of 85% is recommended.

Reservoir Capacity - The Norton WTP receives raw water from two impoundments on Benges Branch. The safe yield of the reservoirs is assumed to be 1.5 million gallons. The WTP is currently rated at 1.44 MGD, and is limited in its upgrades by the safe yield of the reservoir. The WTP will require a supplemental water source to increase its treatment capacity.

Emergency Tie-in - The City is currently connected to the Wise PSA system. Additional connections with Big Stone Gap and Appalachia should be considered.

Line Extension - The Norton water system current serves 6,053 people through 2,423 connections. Areas not currently served by the water system could be added to the system. Line extensions into these areas will permit the City to increase its customer base, and thus provide more cost-efficient service.

Wise Planning Area

Town of Wise - Population in the Wise planning area is expected to grow 1.5 % over the next 25 years, due to the influence of Clinch Valley College. The following water needs will require consideration.

Accountability Improvement - Accountability for the Wise water system is 70 %. Water Accountability should be increased in order to provide a more cost-efficient water system. A goal of 85% is recommended.

Reservoir Capacity - The Wise WTP receives raw water from the Wise Reservoir. The safe yield of the reservoir is 1.0 million gallons. The WTP is currently rated at 1.5 MGD. The safe yield of the reservoir is a limiting factor. A supplemental water source of 0.5 MGD is available at Bear Creek. The source does not flow to the WTP but is pumped into the reservoir.

Line Extension - The Wise water system current serves 3,685 people through 1,478 connections. Areas not currently served by the water system could be added to the system. Line extensions into these areas will permit the Town to increase its customer base, and thus provide more cost-efficient service.

Coeburn Planning Area

Town of Coeburn - Population in the Coeburn planning area is expected to grow 0.5 % over the next 25 years. The following water needs will require consideration.

Main Line Upgrade - The main distribution line from the Toms Creek water plant is 10-inch diameter. The flow rate from the plant could be increased substantially by supplementing the existing 10-inch pipe with another 8- or 10- inch pipe.

Line Extension - The Coeburn water system current serves 3,202 people through 1,392 connections. Areas not currently served by the water system which could be added to the system. Line extensions into these areas will permit the Town to increase its customer base, and thus provide more cost-efficient service.

Emergency Tie-In - The Town of Coeburn is currently connected to the Wise County PSA Water Plant at Carfax. The Town of Coeburn and Wise County PSA buy and sell water to each other. An emergency tie-in to the City of Norton should be considered by the Town of Coeburn. This is also a likely area for line extensions.

Source Utilization - Potentially the Jenny Spring Supply could provide raw water for an expanded service area. The reliable yield of this source should be verified and the supply utilized if feasible.

Wise County PSA

Line Extension - The Carfax WTP currently serves 3,965 people through 1,416 connections. The PSA needs to consider extending water service to more areas of Wise County to serve more residents with water. The PSA can therefore increase its customer base and provide better water service.

St. Paul Planning Area

Town of St. Paul - Population in the St. Paul planning area is expected to grow 0.5 % over the next 25 years. The following water needs will require consideration.

Plant Upgrade - The Town of St. Paul operates a 0.50 MGD Water Treatment Plant. The plant is currently operating at 54% of capacity. The plant currently uses a rapid rate filter loading of 2.0 gpm/sf. The output of the WTP could be doubled by increasing to a high loading rate of 4.0 gpm/sf, and increasing the size of the pumps and other ancillary equipment. The plant could then serve northern and southern communities in the area in need of water service.

Storage Expansion - There are four water storage tanks on the St. Paul water system, which combine for a total of 913,338 gallons. An increase in storage capacity would better serve the water system.

Extension of Water Service

Approximately 74% of Wise County Residents are served with public water. Some areas of Wise County are not currently served with water, and water line extensions into those areas could be performed. These areas are detailed in section 0400, Water System Alternatives.

Water Projects Under Construction

The following is a list of major water projects currently under construction in Wise County.

Stone Mountain Water Project, Wise County PSA

This project provides new water service to residents living on Stone Mountain in the Coeburn planning area.

Appalachia Elementary School, Wise County PSA

This project extends water service to the Appalachia Elementary School on Route 58A between Appalachia and Norton.

EXISTING CONDITIONS

0208 Existing Sewer Needs

There are several areas in Wise County with immediate needs for new or improved sanitary sewer collection and wastewater treatment facilities. This section addresses 1) improvements to the existing systems, and 2) extension of sewer service into new areas of Wise County, both inhabited and uninhabited.

Improvements to Existing Systems

The needs of the existing systems include renovations to the wastewater treatment facilities and improvements to the sewer collector systems. Extension of sewer service into previously unserved areas is also a necessary improvement.

An obvious improvement to any sewer system is the elimination of Infiltration and Inflow. Infiltration and Inflow are commonly referenced together as “I/I.” Both are detrimental to the sanitary sewer system - particularly with respect to cost of treatment and excessive wear on equipment.

Inflow results for the four major WWTFs in Wise County is shown on the table on the following page. The information was compiled by dividing peak daily flow during wet weather by average daily flow. Infiltration is always present in sewer lines and cannot be computed without a detailed study.

Inflow			
Facility	Average Flow (MGD)	Maximum Flow (MGD)	Percent Inflow
Pound STP	0.099	0.169	170%
St. Paul Lagoon	0.06	0.16	267%
Big Stone Gap WWTF	1.56	3.24	208%
CNW WWTF	2.78	5.61	202%
TOTAL	4.49	9.17	204%

Pound Planning Area

Town of Pound - Population in the Pound planning area is expected to grow 0.5 % over the next 25 years, due to the influence of the Red Onion Prison. The following sewer needs require consideration.

I/I Correction - The sewer collection system in the Town of Pound contains several pipes which are extremely old. I/I is averaging 170% during a rainfall event at the Pound WWTP. An effective I/I abatement program must be implemented by the Town.

Line Extension - The Pound WWTF currently averages a flow of 99,000 gpd. Once the Red Onion Prison begins operation, the flow is expected to reach 350,000 gpd. Several areas around Pound could be added to the system. Line extensions will permit the Town to increase its customer base, and thus provide more cost-efficient service.

Wastewater Treatment Facility Expansion - The Pound WWTF is expected to receive an average daily flow of 0.39 MGD. The facility capacity is 0.50 MGD. When the average daily flow reached 90%, or 0.45 MGD, for three consecutive months the town is required to begin plans for an upgrade. Construction of the proposed sewer line extension projects will have an adverse affect on capacity of the facility and may create the need for an expansion.

Appalachia Planning Area

Town of Appalachia - Population in the Appalachia planning area is not expected to grow over the next 25 years. The following sewer needs of the area require consideration.

Line Extensions - Several coal camps located near the Town do not have sewage collection systems. This situation has resulted in serious potential health and water quality problems. Line extensions into these areas must be considered.

I/I Correction - The sewer collection system in the Town of Appalachia contains several pipes which are extremely old. I/I is averaging 208% during a rainfall event at the Big Stone Gap WWTP, some of which can be attributed to the Appalachia collector system. An effective I/I abatement program must be implemented by the Town.

Big Stone Gap Planning Area

Town of Big Stone Gap - Population in the Big Stone Gap planning area is expected to grow 1.0 % over the next 25 years, due to the influence of the Wallens Ridge Prison. The following sewer needs require consideration.

I/I Correction - The sewer collection system in the Town of Big Stone Gap contains several pipes which are extremely old. I/I is averaging 208% during a rainfall event at the Big Stone Gap WWTP. An effective I/I abatement program must be implemented by the Town.

Line Extension - The Big Stone Gap WWTF currently averages a flow of 1.56 MGD. Once the Wallens Ridge Prison begins operation, the flow is expected to reach 1.76 MGD. Some areas around Big Stone Gap could be added to the system. Line extensions will permit the Town to increase its customer base, and thus provide more cost-efficient service.

Norton Planning Area

City of Norton - Population in the Norton planning area is expected to grow 1.5 % over the next 25 years. The following sewer needs require consideration.

I/I Correction - The sewer collection system in the City of Norton contains several pipes which are extremely old. I/I is averaging 81% during a normal rainfall event, as indicated at the Norton metering station for CNW. An effective I/I abatement program must be implemented by the City.

Line Extension - Several areas are not currently served by the sewer system. Line extensions will permit the City to increase its customer base, and thus provide more cost-efficient service. The City will upgrade the line that serves the Esserville Industrial Park and contributing shopping and residential areas in 1998. Plans have received VDH approval.

Wise Planning Area

Town of Wise - Population in the Wise planning area is expected to grow 1.5 % over the next 25 years, due to the influence of Clinch Valley College. The following sewer needs require consideration.

I/I Correction - The sewer collection system in the Town of Wise contains several pipes which are extremely old. I/I is averaging 114 % during a rainfall event, as indicated at the Wise metering station for CNW. An effective I/I abatement program must be implemented by the City.

Line Extension - Several areas around Wise are not currently served by the sewer system. Line extensions will permit the Town to increase its customer base, and thus provide more cost-efficient service.

Coeburn Planning Area

Town of Coeburn - Population in the Coeburn planning area is expected to grow 0.5 % over the next 25 years. The following sewer needs require consideration.

I/I Correction - The sewer collection system in the Town of Coeburn contains several pipes which are extremely old. I/I is averaging 114 % during a rainfall event, as indicated at the Coeburn metering station for CNW. An effective I/I abatement program needs to be implemented by the Town.

Line Extension - Several areas around Coeburn are not currently served by the sewer system. Line extensions will permit the Town to increase its customer base, and thus provide more cost-efficient service.

CNW Authority - The CNW Authority provides wastewater treatment and disposal for Coeburn, Norton, and Wise. This facility is therefore critical with regards to future development in Wise County.

Increased Customer Base - The CNW Authority currently serves Coeburn, Norton, Wise, and Wise County at Riverview. Each locality pays CNW a flat rate for treatment. An increase in the number of customers served by CNW can assist the Authority in providing more reliable wastewater service.

I/I Reduction - The CNW Regional WWTF experiences operation problems during rainfall events due to the amount of inflow received. CNW's four customers need to begin aggressive I/I abatement programs to alleviate the wet weather strain on the facility.

An "I/I Surcharge" for excessive flows is part of CNW's rate structure. However this surcharge has not been implemented by the CNW Board. If flows are not decreased, this surcharge will need to be implemented to pay for equipment repair.

St. Paul Planning Area

Town of St. Paul - Population in the St. Paul planning area is expected to grow 0.5 % over the next 25 years. The following sewer needs require consideration.

I/I Correction - The sewer collection system in the Town of St. Paul contains several pipes which are extremely old. I/I is averaging 267% during a rainfall event at the WWTF. An effective I/I abatement program needs to be implemented by the Town.

Wastewater Treatment Facility Expansion - The projected wastewater flow to the St. Paul wastewater plant is 0.11 MGD in the year 2025. The plant capacity is 0.4 MGD. Unless the Castlewood/ Temple Hill area decides to construct a sewer system, no plant expansion is envisioned for a long time.

Extension of Sewer Service

Approximately 45% of Wise County Residents are served with public sewer. Extension of sewer service into several areas of the County needs consideration. There is an environmental need in most of these areas. There is also a developmental need, since growth typically cannot occur without proper public water and sewer. These areas are discussed in Section 0503.

Wastewater Projects Under Construction

There are no wastewater projects currently under construction.

SECTION 3 FUTURE CONDITIONS 0301 Population Trends & Flow Projections

Population Trends

The United States Census Bureau estimated in the 1990 Census that Wise County will experience a 4.5% decrease in population over the next 15 years. The 1995 "head count" supported this estimate. However, since 1995, some changed conditions will affect the population in Wise County.

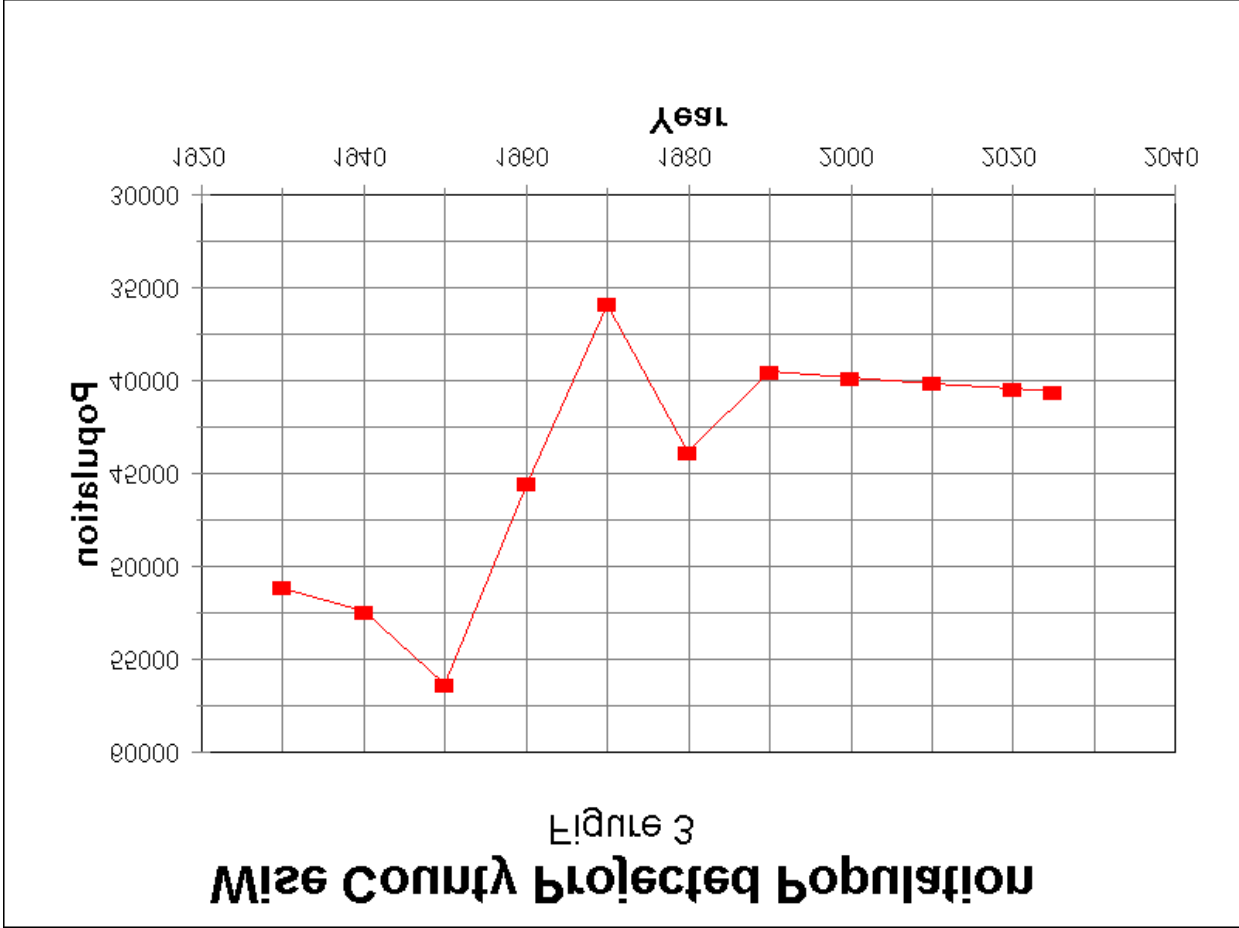
The most notable changes are that the Red Onion Prison and the Wallens Ridge Prison have begun construction, and will be complete before the year 2000. In addition, the Federal Prison at Hickory Flats in Lee County has begun design, and will be completed during the year 2000. Population increases can be expected in the western and central portions of Wise County as a result.

Population estimates for the purposes of this study were estimated by the LENOWISCO Planning District and the Water & Sewer Study Advisory Committee.

The following is an estimation of the population trend for the next 35 years. The percentage increase is not an annual increase, but is an increase from 1990 to 2025.

Population Trend			
Planning Area	1990 Population	35-Year Trend	2025 Population
Pound	995	0.5% increase	1,029
Appalachia	1,996	0.0% change	2,000
Big Stone Gap	4,722	1.0% increase	5,138
Norton	4,247	1.5% increase	4,813
Wise	3,193	1.5% increase	3,603
Coeburn	2,165	0.5% increase	2,249

Population Trend			
Planning Area	1990 Population	35-Year Trend	2025 Population



St. Paul	1,007	0.5% increase	1,042
Wise County	21,248	0.5% increase	22,326
TOTAL	39,573	6.65% increase	42,200

Based on the projected population, it can be estimated that 42,207 persons will be living in Wise County by the year 2025. The current population of Wise County is 39,573. The current population served by public water is 33,241, or 84 %. The current population served by public sewer is 17,807, or 45 %. The population projection is shown graphically below:

Projected water and wastewater flows based on the above data are shown on the following page.

Flow Projections

The following table provides an estimate of the future water demand as based upon the estimated increase in population. Growth average daily flow (ADF) has been scaled using the same percentage increase as population data for the planning areas.

Water Demand Projections						
Provider	Current ADF (MGD)	Growth ADF (MGD)	2025 ADF (MGD)	2025 MDF (MGD)	Plant Capacity (MGD)	Safe Yield (MGD)
Pound	0.29	0.05	0.34	0.5	0.5	0.5
Appalachia	0.40	0.05	0.45	0.7	1.0	0.7
Big Stone	2.13	0.10	2.23	3.4	4.0	3.2
Norton	0.92	0.15	1.07	1.6	1.44	1.5
Wise	0.83	0.15	0.98	1.5	1.5	1.0
Coeburn	0.43	0.10	0.53	0.8	1.15	0.75
PSA	0.53	0.35	0.88	1.3	2.0	2.0 (30.7)†
St. Paul	0.27	0.05	0.32	0.5	0.50	0.50 (28.3)†
TOTAL	5.80	1.00 *	6.80	10.3	12.1	10.65

* Existing Population - Service Expansion 0.50 MGD, New Population - 0.25 MGD, Industrial & Commercial Allowance 0.25 MGD

† Permitted flow shown, 1Q30 model-based flow in parentheses

The above table indicates that a maximum daily flow of 10.3 MGD will be required in 2025. Current plant capacities are 12.1 MGD, which indicates that there will be sufficient water production capability to meet the demand. The City of Norton may have some difficulty meeting the maximum day flow, but the plant capacity will be adequate to meet average daily flow.

The following page contains the wastewater flow projection data.

Wastewater Flow Projections				
Provider	Current ADF (MGD)	Growth ADF (MGD)	2025 ADF (MGD)	WWTF Capacity

Wastewater Flow Projections				
Provider	Current ADF (MGD)	Growth ADF (MGD)	2025 ADF (MGD)	WWTF Capacity
Pound	0.39*	0.05	0.44	0.5
Appalachia (BSG)†	0.32	0.26	0.58	
Big Stone Gap (BSG) †	1.24	0.47**	1.71	
Big Stone Gap WWTF	1.56	0.73	2.29	2.0
Norton (CNW)†	1.1	0.05	1.15	
Wise (CNW)†	0.75	0.10	0.85	
Coeburn (CNW)†	0.35	0.05	0.4	
Wise Co. PSA (CNW)†	0.15	0.98	1.13	
Wise County (CNW)†	0.10	0.0	0.10	
CNW WWTF	2.45	1.18	3.63	4.0
St. Paul	0.06	0.05	0.11	0.4
TOTAL	4.79	2.01	6.80	6.90

* 0.30 MGD from Red Onion included

** 0.30 MGD from Wallens Ridge included

† Receiving WWTF in parentheses

The above table indicates that a total average daily flow of 6.8 MGD will be received in 2025. VDH requires expansions to WWTFs when average daily flow reaches 90% of capacity. There will therefore not be sufficient wastewater treatment capacity in 2025 to treat the wastewater flow.

Plant expansion will be quite difficult at both the CNW plant and the Big Stone Gap plant for the following reasons which apply to both plants.

- This is insufficient physical space available for plant expansion.
- Any expansion beyond the permitted flow will require an increase in treatment level which will be very expensive.

FUTURE CONDITIONS

0302 Policies, Regulations, and Agreements

Policies

Each water and sewer provider currently maintains water and sewer use ordinances. These ordinances are all similar in nature. The ordinances define the minimum bill, the costs per thousand gallons of water purchased or sewer treated, and the costs of connection to the systems. The sewer use ordinances further define what items cannot be discharged to the sewer collection system and provide penalties for violation. No changes are required to the ordinances in effect in Wise County at this time.

There are no mandatory hookup requirements for any of the providers in Wise County. A mandatory hookup ordinance is essential in generating as much revenue as possible to cover the debt service incurred after each water or sewer project. Recently Rural Development has been requiring mandatory hookup ordinances as a condition for funding. The competition for funding is keen and the communities willing to enact the mandatory hookup ordinance exceeds the available funds. Furthermore, wastewater treatment is much more efficient and less harmful to the environment when performed at a treatment facility rather than through a septic tank or some other type of local discharge. A mandatory hookup ordinance must be considered by all providers in Wise County.

VDH regulations state that “At such time as the water production of a community waterworks reaches 80% of the rated capacity of the waterworks for any consecutive three-month period, the owner shall cause plans and specifications to be developed for expansion of the waterworks to include a schedule for construction: however, if it can be shown by the owner that growth within the service area is limited and will not exceed the rated capacity of the waterworks or if unusual transient conditions caused production to reach the 80% level, preparation of plans and specifications for expansion will not longer be required.” This regulation will affect some communities in Wise County. Improvements in accountability can reduce the rated capacity that is required.

Regulations

The following Regulations will have an impact on the future of water and wastewater service in the Commonwealth of Virginia over the next 25 years.

Water

1996 Safe Drinking Water Act (SDWA) Amendments

The 1996 SDWA Amendments addressed a number of issues including funding, source water protection, capacity development, operator certification, and regulatory changes. The creation of the new state revolving loan fund (SRLF) is one of the most important provisions in the amendments. A total of \$9.6 billions is authorized for the SRLF through 2003. The funding will be disbursed as 30-year loans, with a maximum of 30% of the loan debt which can be forgiven. A total of \$30 million has been appropriated for the Commonwealth of Virginia over the next two years.

Surface Water Treatment Rule

The Commonwealth of Virginia began enforcing a determination for surface water influence of drinking water sources in 1993. The 1993 Waterworks Regulations included the surface water influence determination in accordance with SDWA requirements.

Disinfection By-Products Rule

This rule has not yet been adopted. The rule is under consideration for adoption in November 1998. The rule will require a lower Trihalomethanes (THM) discharge standard. The current standard is 100 and the proposed change will be in two stages of 80 and then 40. The rule will also add haloacetic acid and bromate maximum contaminant levels (MCL). The rule have an effect on daily operation of the water treatment facilities and some of the facilities may require upgrades or additional treatment units to meet the standard.

Interim Enhanced Surface Water Treatment Rule

This rule has not yet been adopted. The rule provides for regulation of cryptosporidium. The discharge standard will be non-detectable. The rule is under consideration for adoption in November 1998. A 2- to 3-year implementation period can be expected, meaning that all water producers will be required to meet the requirement by 2001. This will likely create the need for additional treatment units at many water treatment plants, or upgrades to existing units.

Groundwater Disinfection Rule

This rule has not yet been adopted. The rule is under consideration for adoption in November 1998. The rule may require CT criteria and virus monitoring for water well systems. The CT criteria may require chlorine contact tanks to be constructed at the well sites. Virus monitoring will require either

additional sampling or instantaneous monitoring equipment.

Information Collection Rule

This rule has not yet been adopted. The EPA has determined that more information regarding giardia is necessary to ensure complete water treatment. This rule will require many facilities to collect more information regarding giardia, which amounts to unfunded research for the EPA. Some Wise County plants may be required to collect this information.

Wastewater

Chlorine Ban

The use of chlorine for disinfection has been banned by the Department of Environmental Quality for the Clinch River, Powell River, or any of their tributaries. Disinfection of wastewater effluent must therefore be performed using the U.V. Light Disinfection process, or some other non-chlorine method.

Agreements

Future agreements between localities in Wise County would include water service connections between some of the providers.

Proposed Agreements which should be investigated include:

1. Town of Big Stone - City of Norton: Water sales
2. Town of Big Stone - Town of Appalachia: Water sales
3. Town of Coeburn - City of Norton: Water sales
4. Town of Appalachia - Wise PSA: Sewer service to coal camps
5. Town of Pound - Town of Clintwood - John Flanagan Water Authority - Wise PSA: Water sales
6. Town of Big Stone Gap - Lee County PSA: Water sales to Seminar/Jasper Areas.

SECTION 4

WATER SYSTEM ALTERNATIVES

0401 Water Source & Supply Alternatives

The water treatment plants in Wise County are producing average daily flow at a combined 49% of total plant capacities. The City of Norton WTP is operating at the highest percentage of 64%. The population projections through 2025 indicates that a total of 10.3 MGD of maximum daily flow water production will be required for the entire county.

Eight water supply alternatives for supplying Wise County with water over the next 25 years were evaluated. Each alternative includes all upgrades and expansions that are required for water supply production and transmission. Under each alternative, each water provider would continue to maintain its current and future water distribution system and would continue to pay its own debt service. These alternatives evaluate the physical facilities and their operation. Each alternative would serve the total number of connections in the County 13,434. Management alternatives for the physical facilities are included in Section 0404.

The alternatives are as follows:

1. Each water provider continues to maintain and operate its own water treatment facility, including upgrades and expansions.
2. All water in Wise County is supplied from Carfax.
3. Carfax produces water for Pound, Wise, Coeburn, St. Paul, and the PSA's customers. Norton, Appalachia, and Big Stone Gap maintain and operate their own systems.
4. Carfax produces water for Wise, Coeburn, St. Paul, and the PSA's customers. Pound, Norton, Appalachia, and Big Stone Gap maintain and operate their own systems.
5. Carfax produces water for Norton, Wise, Coeburn, St. Paul, and the PSA's customers. Pound, Appalachia, and Big Stone Gap maintain and operate their own systems.
6. Appalachia, Big Stone Gap, Coeburn, and Norton combine to use the Jenny Spring supply with a membrane filtration plant. Carfax, Pound, Wise, and St. Paul remains separate and are individually upgraded.
7. The Jenny Spring supply is used for a combined Appalachia, Big Stone Gap, Coeburn, and Norton plant. The Carfax plant is upgraded and expanded to serve Pound, Wise, St. Paul, and the PSA service area.

8. The Jenny Spring supply is developed as a supplemental supply for Alternative #1, separate plants. The Coeburn supplemental transmission main is increased to 16-inch diameter and the Jenny Spring supplemental supply is conveyed via system interconnections which must be constructed. Under this alternative, only the additional water required by each provider is conveyed, not the entire supply.

The facilities are shown schematically in Figures 4 through 11 and the cost data is shown in Table 4-1 at the end of this Section. Detailed cost information is in the Appendix. A description of each alternative follows.

Alternative # 1

This is the separate systems alternative. Each water provider continues to produce and distribute water to its service area. The population projections (Section 0301) indicate that expansions will not be required until near the end of the planning period. Improvements in water accountability may help to postpone a VDH order for a plant to expand. The Virginia Department of Health requires action when water production reaches 80% of capacity for three consecutive months. Expansion of the plant may not be required if accountability improvements are able to reduce the water production or if the provider can demonstrate that growth of the system is limited.

The Big Stone Gap Water Plant needs new filter consoles, valve controllers, pipe gallery improvements, and the Big Cherry Reservoir needs spillway repairs. The Coeburn 10" transmission main line from the Toms Creek Water Plant does not convey sufficient flow. A second parallel 8" line needs to be installed to supplement the flow to Coeburn and the Wise County PSA.

The potential treatment capacity at some of the water plants exceeds the safe yield. This may require water conservation measures to be taken during periods of drought. Improvements in water accountability can increase the available supply by reducing the water use.

The Big Cherry Reservoir in Big Stone Gap needs to have the safe yield determined. At the current time, the water plant would be limited by the safe yield of the reservoir during drought conditions. The safe yield is assumed to be 3.2 MGD and the plant capacity is 4.0 MGD.

The Bear Creek Reservoir in Wise is limited to a safe yield of 1.0 MGD. The water plant is capable of producing 1.5 MGD but would be limited by the safe yield of the reservoir during drought conditions. A supplemental water source exists at Bear Creek which is capable of 0.5 MGD. This supplemental source is pumped to the reservoir as required.

The safe yield of several reservoirs is based on existing reports and information. More detailed evaluations should be undertaken to better define the safe yields of the Appalachia, Norton, Wise, and Big Stone Gap supply systems.

The Town of Pound has been issued an NOV from VDH to improve reliability at the water treatment plant. This specifically involves repairs to the clarifier and other structures at the plant. DEQ has

also issued an NOV requiring the plant to connect to the Pound sewer collection system and discontinue the water plant's VPDES Permit. Since an increase in population due to the impact of the new Red Onion Prison is expected soon, these items must be addressed in the near future. The plant repair plus cleaning the transmission main from the reservoir are estimated to cost \$250,000 by the project engineers, Maxim Engineering.

When the Enhanced Surface Water Treatment Rule (Section 0302) becomes effective, all eight water producers will be required to meet cryptosporidium removal requirements. This alternative assumes that all eight treatment plants will be required to upgrade existing equipment using membrane filtration. Installation of membrane filtration equipment at all the water plants is a known solution but technological improvements may reduce the actual cost.

The total costs for this alternative are:

Construction Project Cost =	\$16,870,000
Annual Debt Service (4-1/2% - 40 yrs)	\$ 916,000
Operation & Maintenance Cost	<u>1,564,000</u>
TOTAL Annual Cost	\$2,480,000

Alternative #2

Under Alternative #2, all water in Wise County be supplied by the Wise County PSA's Carfax Water Plant. Water would be pumped throughout the county and sold wholesale to each water distribution system provider. Existing treatment plants would be abandoned and sold or converted to another use when possible.

The Carfax water plant is currently rated at 2.0 MGD. The 1Q30 model shows an available volume of 30.7 MGD, so water volume is not a problem. A withdrawal permit would be required to withdraw additional water from the river. A new membrane filtration plant would be required, with the existing plant renovated to operate as a pre-treatment facility to remove most of the turbidity from the river water.

A new main transmission line will be constructed from the Carfax plant towards Coeburn, routed through Bull Run along Route 58A. The main transmission line will leave the plant as a 24" diameter pipe towards Coeburn and an 8" toward St. Paul. The existing 14" through Dry Fork would remain in operation. The line becomes 20" west of Coeburn and continuing to Norton. A 16" will split just east of Norton to Wise, and an 8" will continue on to Pound. The 20" main will split west of Norton, with an 8" leading towards Appalachia and a 16" leading towards Big Stone Gap. About 262,000 LF (50 miles) of new pipe would be installed and four booster pump stations would be required.

These pipeline sizes and the sizes selected for all alternatives have been based on preliminary desk-top engineering calculations. These calculations have selected pipe diameters which will produce a

friction head loss of 2 to 3 feet per 1000 feet of pipeline and water velocities of 2 to 4 feet per second. These values are normally encountered in water transmission systems. If this or any other transmission alternative is implemented, more rigorous analysis using computerized hydraulic modeling should be done during the preliminary engineering stage.

These pipeline are designed to convey maximum day flow. Distribution storage compensates for diurnal variations in demand, generally draining during the peak use hours and refilling during low use night hours. Because several maximum or near maximum days of use generally occur at the same time during hot summer dry periods, local storage would be depleted if maximum day flow were not conveyed.

If implemented, this alternative or any other alternative that replaces existing treatment plants should be completed by 2001 or a few years thereafter if extensions are granted by VDH. Therefore, the transmission alternatives cannot be phased over the 25 year planning period. They must be completed within the next few years to comply with the new SDWA regulations.

The total costs for this alternative are:

Construction Project Cost =	\$51,180,000
Annual Debt Service (4-1/2% - 40 yrs)	\$2,779,000
Operation & Maintenance Cost	<u>1,845,000</u>
TOTAL Annual Cost	\$4,624,000

Because the Carfax Plant would be the only source of water for Wise County, a provision for temporary water service during emergencies is necessary and prudent. A connection with the John Flannagan Reservoir in Dickenson County was considered. The capital cost of this connection would be excessive. An estimated 110,000 LF of 20" pipe, 58,000 LF of 8" through 20" pipe, 3 pump stations, and flow reversal systems at the existing pump stations would be required. The capital cost of this emergency connection is estimated to be \$29,000,000. Another cost would be that the John Flannagan Water Plant would require an expansion to provide the required flow. An emergency connection with the John Flannagan Reservoir is not recommended.

Emergency water supply would be achieved by constructing additional emergency water storage in the system. A total of seven million gallons of storage would have a capacity equal to one day average flow (2025) and the existing storage tanks in each town could help to extend the capacity. This alternative includes the cost of constructing the emergency water storage.

Alternative #3

Alternative #3 would combine Carfax with St. Paul, Coeburn, Wise, and Pound into a single system supplied by Carfax. Norton, Appalachia, and Big Stone Gap would retain their own systems as in Alternative #1. A new 4.6 MGD water plant would be constructed at Carfax to supply the necessary water and would incorporate technology to comply with the 1996 SDWA.

A new main transmission line would be constructed from the Carfax plant towards Coeburn, routed through Bull Run along Route 58A. The main transmission line will leave the plant as a 14" diameter pipe towards Coeburn and an 8" toward St. Paul. The line becomes 16" west of Coeburn and continuing to Wise, and an 8" will continue on to Pound. Approximately 166,000 LF (31 miles) of new pipe will be installed and four booster pump stations will be required.

The total costs for this alternative are:

Construction Project Cost =	\$30,325,000
Annual Debt Service (4-1/2% - 40 yrs)	\$1,647,000
Operation & Maintenance Cost	<u>1,619,000</u>
TOTAL Annual Cost	\$3,266,000

Alternative #4

Alternative #4 is similar to Alternative #3, except that the Town of Pound would not be included in the Carfax regional system. The Pound WTP would be upgraded as in alternative #1. The new Carfax Plant would be rated at 4.1 MGD. An enhancement would be for Pound to connect with Clintwood as an emergency backup water source. This cost has not been included in this alternative.

The total costs for this alternative are:

Construction Project Cost =	\$26,380,000
Annual Debt Service (4-1/2% - 40 yrs)	\$1,432,000
Operation & Maintenance Cost	<u>1,633,000</u>
TOTAL Annual Cost	\$3,065,000

Alternative #5

Alternative #5 is similar to Alternative #4, except that Norton would be included in the Carfax Regional System. The new Carfax Plant would be rated at 5.6 MGD. An additional 12" pipe would be installed from Coeburn to Wise.

The total costs for this alternative are:

Construction Project Cost =	\$32,605,000
Annual Debt Service (4-1/2% - 40 yrs)	\$1,770,000
Operation & Maintenance Cost	<u>1,633,000</u>
TOTAL Annual Cost	\$3,403,000

Three alternatives were evaluated to see if the Jenny Spring Supply near the Coeburn supply would provide a lower cost regional system. This supply is currently used by Coeburn as a supplemental supply. It reportedly is a significant source of water. The spring is closer to the use location than Carfax, requires less treatment than the Clinch River, and has lower transmission and pumping costs.

Alternative #6

Under Alternative #6, the Jenny Spring Supply northeast of Coeburn is used for Coeburn, Norton, Big Stone Gap, and Appalachia. This supply is more economical to treat than the Clinch River source and does not require as much pumping and transmission. The other plants, Carfax, Pound, Wise, and St. Paul are individually upgraded and physically remain separate.

The total costs for this alternative are:

Construction Project Cost	\$37,130,000
Annual Debt Service (4-1/2% - 40 years)	2,016,000
Operation and Maintenance Cost	<u>1,296,000</u>
TOTAL Annual Cost	\$ 3,312,000

Alternative #7

Under Alternative #7, the Jenny Spring Supply is used for Coeburn, Norton, Big Stone Gap, and Appalachia. The Carfax plant is upgraded and expanded to serve Pound, Wise, St. Paul, and the Carfax service area.

The total costs for this alternative are:

Construction Project Cost	\$48,545,000
Annual Debt Service (4-1/2% - 40 years)	2,636,000
Operation and Maintenance Cost	<u>\$ 1,220,000</u>
TOTAL Annual Cost	\$ 3,856,000

Alternative #8

Under Alternative #8, the Jenny Spring Supply is developed as a supplemental supply for Alternative #1, separate plants. As further discussed below, there is some concern regarding the safe yield of several reservoirs. The Jenny Spring Supply under this alternative would be developed to 3 MGD capacity. The capacity was selected because the largest individual user, Big Stone Gap, has a projected demand of approximately 3 MGD. The transmission facilities would be able to convey the

3 MGD to Coeburn, Norton, Big Stone Gap, and the 2025 MDF (0.7 MGD) to Appalachia. Some savings would be realized because the Coeburn transmission main under Alternative #1 would be increased to convey the Jenny Spring flow. The Jenny Spring plant would be supplemental and, therefore, the operating costs only slightly higher than Alternative #1. The supplemental supply would provide additional reliability not available under Alternative # 1 in which the facilities are separate.

The total costs for this alternative are:

Construction Project Cost	\$36,000,000
Annual Debt Service (4-1/2% - 40 years)	1,955,000
Operation and Maintenance Cost	<u>1,609,000</u>
TOTAL Annual Cost	\$ 3,564,000

Preliminary sizing and costing was performed for the eight water supply alternatives. Each alternative would provide the same level of wholesale water service for the existing municipal water providers. Table 4-1 summarizes the capital and annual cost (debt service plus operational costs) for each alternative.

Alternatives 2 through 8 were evaluated to determine if the economies of scale could assist in reducing the supply and treatment cost of water in Wise County. This was not the case due to the significant cost of pipeline and pump station capital cost. The continued operational costs of pipeline and pump maintenance are not offset by the lower water production cost. In Alternatives 2 through 8 the municipalities would be required to continue paying their existing debt services for facilities which would be abandoned. This additional cost is not reflected in the above table.

Another unattractive part of Alternative 2 through 8 is that a full capacity emergency backup source of water for the system could not be constructed due to cost constraints. Under Alternative #1, several interconnections can be utilized so that no system is a sole source of water.

Alternative #1 is still the most cost-effective alternative, especially when the additional treatment requirements anticipated at all plants are based on regulations yet to be promulgated. The treatment costs also may be lower than estimated because of technological advances. The current situation should remain in place with each provider continuing to produce and distribute water.

Table 4-1 Water Supply Alternatives (Annual Cost)							
ITEM	2025 Flow	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Capital Costs ⁽¹⁾							
Treatment Cost (MDF)	10.3	\$15,750	\$13,650	\$15,500	\$15,850	\$15,935	\$15,200
Transmission Cost		\$1,120	\$37,530	\$14,825	\$10,530	\$16,670	\$21,930
Total Construction		\$16,870	\$51,180	\$30,325	\$26,380	\$32,605	\$37,130
Annual Debt Serv. ⁽⁵⁾		\$916	\$2,779	\$1,647	\$1,432	\$1,770	\$2,016
Operation & Maintenance Cost ⁽¹⁾							
Treatment Cost (ADF)	6.33	\$1,564	\$1,465	\$1,429	\$1,453	\$1,418	\$1,166
Transmission Cost		-	\$380	\$190	\$180	\$215	\$130
Total Annual O&M		\$1,564	\$1,845	\$1,619	\$1,633	\$1,633	\$1,296
Project Totals ⁽¹⁾							
Annual Debt Serv.		\$916	\$2,779	\$1,647	\$1,432	\$1,770	\$2,010
Total Annual O&M		\$1,564	\$1,845	\$1,619	\$1,633	\$1,633	\$1,296
Total Annual Cost		\$2,480	\$4,624	\$3,266	\$3,065	\$3,403	\$3,312

(1) In Thousands

However, there is some concern regarding the safe yield of some supplies because they are not based on long-term records. The safe yields in question are Big Stone Gap, Appalachia, Norton, and Wise. The later three communities have had to supplement their raw water in the past to meet existing demand. There is nothing wrong with having to supplement existing demand provided that it is planned. Actions that each of these communities can or have taken to supplement supplies are:

Big Stone Gap - If water accountability were increased from 47% (present) to 70%, the estimated 2025 maximum day demand would decrease from 3.4 MGD to 2.30 MGD, a decrease in supply requirements of 1.1 MGD.

Norton - If water accountability were increased from 59% to 70%, the estimated 2025 maximum day demand would decrease from 1.6 to 1.4 MGD, decrease in supply requirement of 0.2 MGD. Norton can also supplement its supply by its connections to the PSA.

Wise - Accountability is 72.4% and presents some opportunity for a decrease in demand. However, Wise has recently connected Bear Creek to its reservoir so that the creek can be skimmed to keep the Town reservoir as full as possible. Wise is also connected to the PSA for a supplemental source.

Appalachia - Accountability is 65% and improvement presents some opportunity for a demand decrease. Appalachia is not interconnected with any other system. An interconnection with Big Stone Gap combined with an improvement in the accountability of Big Stone Gap provides a way for Appalachia to strengthen its supply.

The safe yields of the other systems in the study area are discussed below:

Pound - Accountability is 65% and improvement presents some opportunity for demand decrease. The North Fork Lake source is stable source but is limited to 0.5 MGD. The proposed systems improvements which include cleaning the transmission main to the plant will be further stabilize the 0.5 MGD source. Pound should look to an interconnection with Clintwood as a means to expand both its service area and system reliability.

Coeburn - With the construction of the recommended supplemental transmission main and the use of the Jenny Mine as a supplemental supply, Coeburn can improve its source reliability.

St. Paul - The St. Paul supply is the Clinch River which has a flow significantly in excess of its requirements. St. Paul's supply is only limited by its withdrawal permit which is based upon its need.

PSA - The Carfax supply is the Clinch River which has a flow significantly in excess of its requirements. The Carfax supply is only limited by its withdrawal permit which is based upon its needs. The Carfax projected 2025 MDF requirement is 1.3 MGD and its supply permit is for 2.0 MGD.

In summary, each provider can improve its source reliability through accountability improvement, transmission main construction/improvement, or construction of an interconnection. These actions are much more cost-effective than implementing a new source (Jenny Spring), significantly expanding an existing source (Carfax), and constructing the required pumping and transmission facilities to convey the new/expanded sources throughout the County.

Methods to implement these recommendations as discussed Section 0404, Management/Operation alternatives.

WATER SYSTEM ALTERNATIVES

0402 DISTRIBUTION SYSTEM ALTERNATIVES

The water distribution systems in Wise County are currently serving 74% of the population of Wise County with water. The Wise County Water & Sewer Advisory Committee has set a goal of 90% service by the year 2025. This section discusses the major aspects of water distribution systems within Wise County. There are few alternative ways to serve new areas within the County. These areas can generally be served by water line extensions along existing roads.

Accountability

Water accountability is an important aspect of operating a water distribution system. Maintaining accurate records is necessary for monitoring accountability in a system. In existing systems accountability may have decreased over time creating the need for further assessment of portions of the system. One way to increase accountability is through a leak detection program. Each system should undergo a thorough leak detection program to identify and correct existing problem areas which will assist in returning the system to an acceptable accountability level. Leak detection services are available through outside sources or system personnel can be used for identifying problem areas. Leak detection service by an outside firm cost about \$400/mile provided the utility assists with line identification and valve operation. As the existing problems are corrected, monitoring and record keeping should be implemented as part of daily maintenance operations to identify future problems. In addition, a routine check of the system specifically for leaks should help maintain accountability at an acceptable level.

Master meters should be calibrated for accuracy and corrected if inaccurate. Individual meters should be monitored and replaced as they become less accurate. As they age, individual meters tend to underregister the amount of water furnished to the customer. Thus, the utility underbills for the water actually provided. As old meters are replaced, the utility can anticipate customers complaining about increased water bills when, in fact, the customers are now being properly billed for the water that they use. This accurate billing generally results in customers fixing their own leaks and reducing their own consumption.

The following diagram shows gallons lost per size of leak and the cost of producing that water at \$2/1000 gal.

PIPE LEAK SIZE	GALLONS LOST		COST OF PRODUCING WATER
	PER DAY	PER YEAR	
• 3/32"	360	131,400	\$262.80
• 1/8"	3,096	1,130,040	\$2,260.08
• 5/32"	8,424	3,074,760	\$6,149.52
• 3/16"	14,952	5,457,450	\$10,914.96

Emergency Interconnections

There are some areas in Wise County that have limited or no emergency water supply in the event the primary sources become incapacitated. To be effective in case of a substantial supply outage, the emergency connection should supply flow that approximates the average daily usage. This flow can only be provided by a sufficiently sized pipeline. Short-term emergency supply (1 or 2 days) can be provided by the addition of additional storage if it is not available. This additional storage will be useful in case of a fuel spill, stream discharge, or other short term situation.

Emergency interconnections should be considered for Pound, Appalachia, Big Stone Gap, and St. Paul. Pound is planning to connect to Clintwood at the Dickenson County line as part of the Bold Camp Phase I project. Appalachia and Big Stone can connect at a cost of about \$400,000 for 10,000 LF of 8" pipe. St. Paul could connect to the Wise County PSA at Carfax at a cost of about \$880,000 for 22,000 LF of 8" pipe. Big Stone Gap could connect to Norton with an estimated 12,500 LF of 8" pipe for \$700,000. Norton, Wise, and Coeburn are connected to the Wise County PSA system which provides a supplemental supply.

The recommended interconnection area summarized below:

Pound - Clintwood	Part of Bold Camp I	--
Appalachia-Big Stone	Construct Emergency Interconnection	\$400,000
St. Paul - Carfax	Construct Emergency Interconnection	\$880,000
Norton-Big Stone	Construct Emergency Interconnection	\$700,000

These line sizes are based on desk-top calculations. Final size determination should be based on computerized hydraulic modeling during the project study phase. The interconnections are based on providing an 8" pipe between the systems. If Water Source and Supply Alternatives #2 through #8 are implemented, larger pipelines will be required. Before any interconnection is implemented, the sizing should be further checked by more detailed engineering.

Distribution Line Planning

As Wise County grows and population increases, the water demand will also rise. It has been projected that approximately 2,500 new water connections will be added to the systems throughout Wise County by the year 2025 because of service expansion and population growth. The increased number of users could potentially place some of the existing waterlines over capacity. To minimize future problems of undersized waterlines, each water distribution system needs to begin planning now for the future demands. Waterlines that are now at capacity must be paralleled if future development in these areas is to take place. Interconnections should be adequately sized with considerations for the future. Main transmission lines in areas of anticipated growth should be evaluated and new lines or extensions in these areas properly sized.

WATER SYSTEM ALTERNATIVES 0403 FUTURE SERVICE AREAS

Nine potential service areas have been identified. A list and brief description of these areas follows. The number of connections in these areas are existing homes compiled using a USGS quadrangle. Flow estimates are based on 400 gallons per day per equivalent residential connection.

Pound Planning Area

Bold Camp Phase I - This potential service area is located south and east of Pound. The project will serve the Bold Camp Phase I area along Route 632, the Killen Hollow area to the west, and the Meade Fork area to the north and east. This project will include a connection to the Clintwood system and loop the eastern part of the town system via Fairview Church. The project has been funded and is scheduled for construction in 1998. The probable project cost based on the Maxim Engineering PER is \$2,595,000. The project includes 83,800 LF of pipeline, a 200,000 gallon tank, and 2 pumping stations. The project will serve 375 connections.

Bold Camp Phase II - The potential service area is located south of Pound on Route 632, adjacent to the Phase I portion of the project. The project would consist of approximately 18,000 LF of 8" water line to serve 80 connections. Phase II of the Bold Camp Water Project was halted by the Virginia Department of Health in 1996. The project will be allowed to proceed only after the Pound water plant is upgraded to meet reliability requirements.

Upper Indian Creek - This potential service area is planned for service by the Wise County PSA. It extends northward along Rt. 873 from the Tennessee Valley divide to Riner School. The project will also serve Hash Hollow. The project will require 26,250 LF of distribution line and a 200,000 gallon storage tank. The estimated project cost is \$1,283,000 and 119 connections will be served.

Lower Indian Creek - This potential service area continues north along Rt. 23 from Riner School to the present terminus of the Pound System near Lick Branch. Water would be supplied from the Wise County PSA. The project will require 27,650 LF of distribution line. The estimated project cost is \$1,022,000 and 120 connections will be served.

Birchfield Creek/Dotson Creek - This potential service area will serve east of Rt. 23 from Riner School along Rt. 634 to its intersection with Rt. 636. It includes the Bear Gap, Baker Hollow, and the Dotson Creek area. It will require 24,400 LF of water distribution line, cost an estimated \$800,000 and serve 54 customers.

South Fork - This area is west of Rt. 23 and includes several areas along Rt. 671 and Rt. 621. The major areas served will be Dewey, Gilley, Flat Gap, and Cumberland. About 75,000 LF of distribution line will be required to serve 510 connections. The estimated cost is \$3,000,000.

Most of the information in the Pound Planning area has been supplied by Maxim Engineering, Inc.

Big Stone Gap Planning Area

Seminary (Lee County) - The potential service area is located west of the Wise County line along Route 58 Alternate. Big Stone Gap would supply water to the area. The project would consist of approximately 32,000 LF of 8" water line to serve 162 connections. An out-of-county water rate might apply to the connections in this area.

Jasper (Lee County) - The potential service area is located west along Route 23 just across the Wise County Line. Big Stone Gap would supply water to the area. The project would consist of approximately 36,000 LF of 8" water line to serve 264 connections. An out-of-county water rate might apply to the connections in this area.

Norton Planning Area

Hoot Owl Hollow - The potential service area is located west of Norton. The Wise County PSA would supply water to the area. The project would consist of approximately 9,400 LF of 8" water line to serve 27 connections.

Coeburn Planning Area

Virginia City - The potential service area is located between Coeburn and St. Paul along Route 58. Either the Wise County PSA or the Town of St. Paul could provide water to the area. The Wise County PSA is the most logical and least expensive option. The project would consist of approximately 34,800 LF of 8" water line to serve 105 connections.

St. Paul Planning Area

The Castlewood/Temple Hill area in Russell County currently is served by springs which have been declared under the influence of surface water. A Preliminary Engineering Report for the Town of Castlewood investigated supply from St. Paul which would require an expansion of the St. Paul plant, service from the Wise County PSA which would have required a long pipeline from Carfax, and construction of a membrane filtration plant was the recommended alternative based on the lowest cost.

Depending upon future regionalization, the Castlewood/Temple Hill area might find it more economical to obtain service from St. Paul/Wise County PSA. Because this is wholesale supply not in Wise County, no future service area is shown on the maps.

The future water service areas are summarized below.

Future Water Service Areas				
Location	LF of Pipe	Cost	Connections	Cost/Conn.
Bold Camp Phase I	83,800	\$2,595,000	375	\$6,570
Bold Camp Phase II	18,000	\$720,000	80	\$9,000
Upper Indian Creek	26,250	\$1,283,000	119	\$10,782
Lower Indian Creek	27,650	\$1,022,000	120	\$8,517
Birchfield/Dotson Creek	24,400	\$800,000	54	\$14,815
South Fork	75,000	\$3,000,000	510	\$5,882
Seminary (Lee County)	32,000	\$1,280,000	162	\$7,901
Jasper (Lee County)	36,000	\$1,440,000	264	\$5,455
Hoot Owl Hollow	9,400	\$376,000	27	\$13,925
Virginia City	34,800	\$1,392,000	105	\$13,257

WATER SYSTEM ALTERNATIVES

0404 Management/Operation Alternatives

There are several management and operations alternatives for the ownership and operation of the water systems in Wise County. Management does not relate to the location of the physical facilities.

A regional management/operation system can operate several “local” facilities. The major water alternatives are listed below.

- 1) Continue the current practice of municipal ownership and operation of the water systems. Expansion in the County continues to be implemented by the PSA.
- 2) Combine certain specialized services currently performed by each provider as a joint effort. These services include operations that each system must perform but which require specialized experience and do not require a full-time staff. Examples of these services would include billing, laboratory analysis, leak detection, and meter inspection and repair. Combining these efforts would be more efficient and cost-beneficial to each provider.
- 3) Expand the responsibilities of the Wise County PSA to include operation of all the water treatment facilities within the County. The PSA would employ most of the personnel from the existing facilities. A single work force would replace the separate work forces. Operators from one facility would be able to work at another facility during emergencies, weekends, vacations, and holidays. Duplicate facilities needs as laboratories would be eliminated.
- 4) Expand the operations of the PSA to include ownership of the water treatment plants.
- 5) Expand the operations of the PSA to include distribution system operation, maintenance, and repair.
- 6) Establish a county-wide agency to own and operate all water operations including water production and distribution. This could be done by expanding the Wise County PSA, creating a new authority, or by privatization of the operation and/or ownership of all facilities. Privatization is the hiring of an outside firm to provide services normally provided by the municipal authority.

Several considerations must be reviewed before recommending a management/operation alternative. These are as follows:

- Communities are possessive of their water systems and generally are reluctant to relinquish these responsibilities to others.
- Communities must be shown a significant economic benefit to make changes.

- There is generally little if any benefit to refinancing existing debt services. Because most of the debt is with the U.S. Government, transferring of debt services may not be legal.
- Combined operations are generally more efficient and cost-effective from an operations and maintenance standpoint. Specialized skills are more fully utilized with larger operations.
- There are existing rivalries in Wise County that date back to the coal camp era. However, the CNW Regional Wastewater Treatment Authority is a model of regional cooperation and proves that the localities in Wise County are receptive to working together.
- The source/treatment alternative analysis showed that a regional physical system was not economically feasible within the planning period.
- People tend to follow small successful operations with large successful operations.

Based on the alternatives available and the above mentioned considerations, the Wise County communities should begin moving towards a regional operation of the water facilities. The suggested steps to implement this are as follows:

- 1) Form a joint committee with a representative of each provider to explore ways to share special services. Then formalize the sharing of special services with a written agreement which will include cost sharing provisions.
- 2) Continue to expand the shared special services until the municipalities work well together and it makes sense to transfer operations. The Wise County PSA could be the lead agency in this effort.
- 3) Continue to expand shared operations as prudent.

An alternative to utilizing municipal government is the use of contract operations. Several communities have successfully employed contract operation firms to operate the water and/or wastewater systems. Local communities are Bristol, Tennessee and Pikeville, Kentucky.

The first step in exploring cost savings by shared special services is to form a committee and have that committee set goals and have its progress monitored by the Board of Supervisors and Town Councils. We suggest that the chairman of that committee be the Executive Director of the LENOWISCO Planning District Commission and the committee be composed of the Town (City) Manager or Director of Utilities of each water provider. The committee would be therefore be composed of 9 members. We also suggest that a representative of the VDH participate with the committee as a non-voting member.

The suggested initial goals of the committee are to formalize committee officers, establish meeting dates, record keeping procedures, a budget and funding and reporting procedures to the Board of Supervisors and other elected officials in Wise County. Thereafter, the committee should review the

potential tasks that it could undertake, establish priorities, assign responsibilities, and establish a schedule for task completion.

Potential tasks, some of which may require outside engineering services, are as follows:

1. Investigate joint billing efficiencies by centralizing operations and combing bills.
2. Investigate joint laboratory analysis at a centralized site. Laboratory analysis will be more important as more tests are required for the 1996 SDWA requirements. The specialized expertise will become more difficult to obtain.
3. Some providers such as Big Stone Gap need to improve accountability more than others providers. These providers should take the lead in obtaining leak detection equipment and making it available to other providers.
4. Standardization of meter types and reading procedures is a suggested long term goal. With the advent of automated reading techniques such as touch and especially radio-read systems, efficiencies can be realized. One of the major expenditures in a radio read meter system in the reading van, equipment, and software. If meters are read monthly, this equipment is generally ideal a significant portion of the time. Providers could eventually share radio-read systems, billing software, and staff. In order to standardize on automated meter reading, it will be necessary to standardize on meter type and manufacture. Changeout will be a long-term project but it must start with the first provider to purchase new meters. A large purchasing base will result in more competitive prices. Meter standardization will also reduce spare parts, staff training, and permit one meter repair/calibration facility to serve the entire county.
5. During this study, safe yields were based on existing information. More detailed work and records are necessary for better estimates. If records are not available, the committee or individual providers should establish record keeping procedures so that the estimates can be improved. The committee could engage one engineer to determine the safe yield of several systems and by doing this, may have the work done more economically.
6. During this study, alternatives were investigated to provide a more reliable source. In particular, the Jenny Spring was proposed as an additional source. Because this source would benefit several providers, the committee could undertake a study to determine the safe yield and quality of the Jenny Spring source.
7. Several of the providers are currently interconnected and more interconnections are recommended. The recommended sizes in this study are based on planning level calculations. We believe that a county-wide hydraulic model could be of significant use in finalizing the interconnection sizes and future planning. This computerized hydraulic model would be a worthwhile goal of the committee.

8. Within the next decade, treatment plant upgrades will likely be required. It is anticipated that there will be several treatment technologies becoming available to meet the upgrade requirements. If several or all providers agree on our technology,

spare parts, training, and operation more interchangeability will be easily accomplished.

The committee could also examine ways to reduce operation and maintenance costs. These savings are generally achieved through staff reduction by attrition, better training, cross-training, remote operation, bulk purchase, and bottom-up management. Contract operation companies claim savings of 15 to 20% or more by applying these techniques. However, several utilities have obtained similar improvements when productivity is challenged by outside firms. Typically, contract operations companies retain and retrain existing staff and supplement the team with technical and management support. Experienced management can apply computerized management methods to equipment maintenance to minimize premature failures and process control to minimize chemical usage and disposal. If the committee is interested in exploring contract operations, we recommend that several potential providers be contacted and invited to discuss their capabilities with the committee. The more systems that join to use the same operations contractor, the greater the savings may be.

In the last few years, there have been several methods of increasing the efficiency of utilities. In 1996, the Association of Metropolitan Sewerage Authorities (AMSA) published a checklist to assist utility managers and elected officials address the questions regarding the most effective ways to provide wastewater services. This study examined:

- Internal reengineering (reorganization)
- Contract Operations, and
- Asset sales.

The study, which also can be applied to water utilities concluded that all three options have potential to reduce the cost of operating wastewater treatment facilities in the near term. However, questions remain about the stability of cost savings, transfer of costs elsewhere within local government, risks to the environment, and effects on employees.

Managed competition, public versus private operations, is a current philosophy in the water and wastewater industry. AMSA has concluded that neither public nor private operations are intrinsically more efficient. In an effort to investigate other methods than managed competition, AMSA and the American Association of Water Authorities (ASWA) are jointly preparing a handbook for water and wastewater utilities entitled "Thinking, Getting and Staying Competitive: A Public Sector Handbook." This book will explore internal processes that have resulted in significant improvements in operating costs, and more productive work forces in both large and small water and wastewater utilities. A series of regional work shops are planned beginning in the spring of 1998.

In summary, the committee could investigate several methods of operation/consolidation.

Another process that the committee could initiate is "benchmarking" studies under the AWWA QualServe procedure. In the QualServe programs, a team composed of key personnel from other utilities visits the utility being evaluated and prepare, a report evaluating the subject utility. The

report is then presented to management for implementation as appropriate. The committee could do this on a less formal scale by discussing operation methods with each other.

As may be seen from the above discussion, there are several methods to assist in O&M cost reductions. It would be up to the Committee or an outside consultant to examine the organizations and propose specific changes. An idea of this savings available might be determined by discussions with contract operations companies.

If savings are substantial, the next step would be the implementation phase. This may require the creation of another authority, expanding the PSA, or other institutional arrangements. For example, the committee could evaluate formation of a Central Wise Authority consisting of those who provide water from similar reservoir supplies.

There are many opportunities. The first step is getting together and beginning. Frequently, the first step is the hardest.

SECTION 5

WASTEWATER SYSTEM ALTERNATIVES

0501 Wastewater Treatment Alternatives

The four major wastewater treatment facilities in Wise County are operating at a combined 60% of their total capacities. The population projection through 2025 indicates that a total of 6.83 MGD of wastewater treatment capacity will be required. A total capacity of 6.90 MGD exists. The Virginia Department of Health requires treatment facility expansions when 90% of the flow capacity has been reached. Therefore, there will not be sufficient wastewater treatment capacity in 2025 for the projected population.

An immediate expansion of the Big Stone Gap Regional Wastewater Treatment Facility or an I/I reduction program must be considered. The Big Stone Gap facility is currently operating at 78% of capacity. The additional flow from Wallens Ridge Prison in 1998 will further decrease spare capacity of the WWTF. Population increases as a result of the prison and line extensions will create the need for an expansion. The Big Stone Gap WWTF is experiencing a significant problem with I/I. Any expansions to the facility should be preceded by an I/I study and abatement project.

An expansion of the CNW Wastewater Treatment Facility should be considered towards the end of the planning period. The CNW facility is currently operating at 69.5% of capacity. Most of the wastewater system extensions in Wise County are expected to occur in the CNW receiving area. The CNW WWTF is experiencing a significant problem with I/I, due to inflow problems at each of the localities. Any expansions to the facility should be preceded by an I/I study and abatement project.

Plant expansion is will be quite difficult at both the CNW plant and the Big Stone Gap plant for the following reasons which apply to both plants:

- There is insufficient physical space available for plant expansion.
- Any expansion beyond the permitted flow will require an increase in treatment level which will be very expensive.

For these reasons, it is critical that an effective infiltration/inflow abatement program be implemented and maintained in the service area of both these plants. Expansion and the resultant required upgrade should not be considered until absolutely necessary.

WASTEWATER SYSTEM ALTERNATIVES

0502 COLLECTION SYSTEMS

The sewer collection systems in Wise County are currently serving 45% of the population of Wise County with wastewater service. The advisory committee has set a goal of 75% service by the year 2025.

All of the sewer collection systems in Wise County are experiencing significant problems with infiltration and inflow. It was noted in Section 0207 that both infiltration and inflow are problems which adversely affect wastewater treatment cost and efficiency. Wastewater treatment providers should encourage I/I abatement by imposing charges which recover the cost of excess flow during rainfall events.

As Wise County population increases, there will be an increased need for sewer service infrastructure. As with water distribution systems, sewer service extension should be planned for the capacity that will be required to serve future upstream tributary areas.

WASTEWATER SYSTEM ALTERNATIVES

0503 Future Service Areas

Twenty-three potential new service areas have been identified. A list and brief description of these areas follows. The estimated number of connections was compiled from the USGS quadrangles, based on the number of houses not currently being served by sewer.

Pound Planning Area

Bold Camp - The potential service area is located southeast of Pound. The project would consist of approximately 49,900 LF of 8" collection line to serve 203 connections. An additional 0.051 MGD will be required at the Pound WWTF. The total cost of this alternative is estimated to be \$2,744,000.

Indian Creek (Wise to Pound) - The potential service area is located along the U.S. Route 23 corridor between Wise and Pound. The project would consist of approximately 44,000 LF of 8" collection line serving 201 connections. An additional 0.050 MGD will be required at the Pound WWTF. The total cost of this alternative is estimated to be \$2,420,000.

Note: An additional 0.101 MGD additional flow would be received by the Pound WWTF. The average daily flow is expected to be 0.390 MGD at the 0.50 MGD facility. Therefore, a total of 0.491 MGD will be received by the facility. *If the above projects are constructed, then an expansion at the Pound WWTF will need to occur.*

Appalachia Planning Area

Imboden/Exeter Option 1 - The potential service area is located southwest of Appalachia. The community of Exeter consists of about 140 homes bunched into a small area. A conventional gravity collection system would collect the wastewater in Exeter. A pump station would pump the wastewater from Exeter to Lower Exeter and on to Imboden. Individual homes along the route would pump into the force main line through individual grinder pumps. The wastewater would flow by gravity from Imboden to Appalachia. A total of 20,000 LF of gravity sewer and 14,000 LF of force main sewer will be required to serve 223 connections. An additional 0.056 MGD would be required at the Big Stone Gap Regional WWTF. The total cost of this alternative is estimated to be \$2,045,000.

Imboden/Exeter Option 2 - The potential service area is the same, except that an on-site package treatment plant would be constructed. A total of 20,000 LF of gravity sewer line would be required to serve 143 connections in Exeter and 50 connections in Imboden. Lower Exeter would not be served under this option. A new package wastewater treatment facility would be constructed at the eastern end of Exeter. The total cost of this alternative is estimated to be \$1,950,000.

Based on the above costs, Option 1 is the recommendation. There is no significant benefit from constructing a local WWTF for the wastewater flow in Exeter. Treatment will be more cost-beneficial at a regional facility.

Andover/Arno/Derby - The potential service area is located west of Appalachia. The Andover community is located adjacent to the existing sewer line in Appalachia. A gravity collection system would collect the wastewater in Derby which would flow to Arno. A pump station at Arno would pump the wastewater to the new gravity system at Andover. A total of 14,000 LF of sewer line will be required to serve 127 connections. An additional 0.031 MGD would be required at the Big Stone Gap Regional WWTF. The total cost of this alternative is estimated to be \$1,410,000.

Stonega - The potential service area is located northeast of Appalachia. A gravity collection system would collect the wastewater in Stonega which would flow to Andover. A total of 24,300 LF of sewer will be required to serve 165 connections. An additional 0.041 MGD would be required at the Big Stone Gap Regional WWTF. The total cost of this alternative is estimated to be \$2,875,000.

Osaka/Roda - The potential service area is located northwest of Appalachia. A gravity collection system would collect the wastewater in Roda, which would gravity flow to Osaka and to the Stonega/Andover gravity collection system. A total of 18,700 LF of sewer line will be required to serve 118 connections. An additional 0.030 MGD would be required at the Big Stone Gap Regional WWTF. The total cost of this alternative is estimated to be \$2,337,000.

Note: An additional 0.158 MGD of additional flow would be required at the Big Stone Gap Regional Wastewater Treatment Facility if the above projects are constructed.

Big Stone Gap Planning Area

Wildcat/Irondale - The potential service area is located south of Big Stone Gap along Route 23. The project would consist of approximately 52,500 LF of 8" sewer line, 7,500 LF of 4" force main, and a sewer pump station to serve 377 connections. An additional 0.094 MGD would be required at the Big Stone Gap WWTF as a result. The total cost of this alternative is estimated to be \$3,230,000.

Powell Valley - The potential service area is located northeast of Big Stone Gap in Powell Valley. The project would consist of 92,200 LF of 8" sewer line and a sewer pump station to serve 355 connections. An additional 0.089 MGD would be required at the Big Stone Gap WWTF as a result. The total cost of this alternative is estimated to be \$5,061,000.

East Stone/Cracker Neck - This potential service area is located east of East Stone Gap. The project would consist of 60,500 LF of 8" sewer line to serve 473 connections. An additional 0.12 MGD would be required at the Big Stone Gap WWTF as a result. The total cost of this alternative is estimated to be \$3,933,000.

Note: An additional 0.301 MGD of additional flow will be required at the Big Stone Gap Regional Wastewater Treatment Facility if the above projects are constructed. If the projects in the

Appalachia Planning area are also constructed, then an additional 0.46 MGD would be required at the Big Stone Gap facility. The average daily flow at the Big Stone Gap facility is 1.56 MGD at the 2.0 MGD facility. The additional flow will cause the average daily flow to become 2.02 MGD plus the 0.30 MGD from Wallens Ridge in 1998 which will increase the total to 2.32 MGD. An expansion of the Big Stone Gap facility will be required if all of the above projects are constructed.

Norton Planning Area

Blackwood - The potential service area is located between Norton and Appalachia in the Norton Planning Area. A pump station serving the Blackwood Industrial Park already exists in the community. Approximately 4,000 LF of sewer line, 1,500 LF of force main sewer, and a sewer pump station would be required to serve 20 connections. An additional 0.005 MGD would be required at the CNW wastewater treatment facility. The total cost of this alternative is estimated to be \$437,000.

Josephine - The potential service area is located in the Josephine area west of Norton. A gravity sewer originally constructed to convey the flow from the Blackwoods Pump Station to the Josephine Pump Station passes through the Josephine area. There are approximately 75 houses in the area which could be connected to the sewer system using 10,100 LF of pipe at an estimated total cost of \$873,000. An additional .019 MGD would result from this service area.

Thacker's Branch - The potential service area is located west of Norton. A total of 8,800 LF of sewer line would be required to serve 56 connections. The sewer would flow into the Josephine pump station. An additional 0.014 MGD would be required at the CNW facility. The total cost of this alternative is estimated to be \$704,000.

Dorchester/Needmore - The potential service area is located west of Norton. A total of 23,900 LF of sewer line would be required to serve 141 connections. The sewer would flow into the Josephine pump station. *An expansion and upgrade to the Josephine Pump station would likely be required as a result.* An additional 0.035 MGD would be required at the CNW facility. The total cost of this alternative is estimated to be \$1,434,000.

Guest River - The potential service area is located north of Norton along the Guest River. A total of 48,900 LF of sewer line would be required to serve 281 connections. The sewer would flow by gravity into the City of Norton collection system. An additional 0.070 MGD would be required at the CNW facility. The total cost of this alternative is estimated to be \$3,912,000.

Note: An additional 0.13 MGD would be required at the CNW facility if the above projects are constructed.

Wise Planning Area

Glamorgan/Stephens/Rock Switch - The potential service area is located west of Wise. A total of 21,000 LF of sewer and a sewer pump station would be required to serve 232 connections. An

additional 0.058 MGD would be required at the CNW facility. The total cost of this alternative is estimated to be \$1,410,000.

Coeburn Mountain Phase One - The potential service area is located east of Wise along Route 646. The Coeburn Mountain Project would be completed in two phases. A total of 36,500 LF of sewer and a sewer pump station would be required to serve 317 connections. An additional 0.079 MGD would be required at the CNW facility. The total cost of this alternative is estimated to be \$2,201,000.

Coeburn Mountain Phase 2 - The potential service area is located on Pole Bridge Road north of Route 646. The Coeburn Mountain Project would be completed in two phases. A total of 24,100 LF of sewer and two sewer pump stations would be required to serve 183 connections. An additional 0.046 MGD would be required at the CNW facility. The total cost of this alternative is estimated to be \$1,866,000.

Note: An additional 0.202 MGD would be required at the CNW facility if the above projects are constructed.

Coeburn Planning Area

Tacoma - The potential service area is located west of Coeburn along Route 58A. The existing CNW interceptor currently runs through Tacoma, but no connections were made. A total of 10,000 LF of sewer line will be required to serve 144 connections. An additional 0.036 MGD would be required at the CNW facility. The total cost of this alternative is estimated to be \$550,000.

Cranes Nest - The potential service area is located north of Coeburn along Route 72. A total of 19,300 LF of sewer line will be required to serve 199 connections. An additional 0.050 MGD would be required at the CNW facility. The total cost of this alternative is estimated to be \$1,061,000.

Banner - The potential service area is located east of Coeburn along old Route 58A. A total of 14,500 LF of sewer line will be required to serve 169 connections. An additional 0.043 MGD would be required at the CNW facility. The total cost of this alternative is estimated to be \$1,160,000.

South Coeburn/Sheffield Acres - The South Coeburn service area is located south of Coeburn along Route 72. A total of 42,300 LF of gravity sewer, 8,000 LF of force main sewer, and a sewer pump station would be required to serve 180 connections. Sheffield Acres already has a gravity collection system and package treatment unit. A new pump station would be constructed to pump the flow towards Coeburn. A total of 8,000 LF of force main would be required to add on 18 new connections, and about 80 existing connections. An additional 0.070 MGD would be required at the CNW facility. The total cost of this alternative is estimated to be \$3,046,000.

Timberville Acres - The potential service area is located south of Coeburn along Route 72. A total of 9,800 LF of sewer line would be required to collect the wastewater in this area. A pump station with 7,000 LF of 4" force main would pump the wastewater to the new Sheffield Acres Pump

Station. The project would serve 42 connections and an additional 0.011 MGD would be required at the CNW facility. The total cost of this alternative is estimated to be \$947,000.

Note: An additional 0.210 MGD would be required at the CNW facility if all of the above projects are constructed. A grand total of 0.536 MGD would be required if all projects in the Norton, Wise, and Coeburn planning areas are constructed.

Crab Orchard/Dry Fork/Bull Run - The potential service area is located southeast of Coeburn. A new wastewater treatment facility would be constructed along the Clinch River near Carfax, downstream of the Carfax Water Plant raw water intake. A total of 70,000 LF of gravity sewer, 3,000 LF of force main sewer, and one sewer pump station would be required to serve 385 connections. A 0.20 MGD wastewater treatment facility would be required to treat the flow. The WWTF would be capable of handling the existing possible connections as well as future connections. The total cost of this alternative is estimated to be \$5,295,000.

St. Paul Planning Area

Castlewood - The potential service area is located in Russell County east of St. Paul. The Town of Castlewood has voted to un-incorporate.

A few years ago a PER was done which recommended sewer service for the entire town in seven phases. The flow was to have been treated at the St. Paul WWTF.

Because of the recent vote, it is questionable when sewer infrastructure would be constructed. This service is needed for industrial growth and public health if the septic systems begin to fail.

St. Paul should check to see if this area desires to have its flow treated at its plant if expansion plans are considered. Because this area would be wholesale service from outside the County, no specific future service area is shown on the maps.

Estimated costs for the wastewater options with the cost per connection is shown on the below:

Future Sewer Line Projects By Planning Area

Location	No. of Connections†	LF of Pipe	Special Construction	Cost	Cost per Conn.
Bold Camp	203	49,900	none	\$2,744,000	\$13,517
Indian Creek	201	44,000	none	\$2,420,000	\$12,039
Imboden/Exeter	223	34,000	Pump Sta.	\$2,045,000	\$9,170
Andover/Arno/Derby	127	14,000	Pump Sta.	\$1,410,000	\$11,102
Stonega	165	24,200	none	\$3,037,000	\$18,409
Osaka/Roda	118	18,700	none	\$2,337,000	\$19,805
Wildcat/Irondale	377	60,000	Pump Sta.	\$3,230,000	\$8,568
Powell Valley	355	92,200	Pump Sta.	\$5,061,000	\$14,256
East Stone/Cracker Neck	473	60,500	none	\$3,933,000	\$8,315
Blackwood	20	5,500	Pump Sta.	\$437,000	\$21,850
Josephine	75	10,100	none	\$873,000	\$11,640
Thacker's Branch	56	8,800	none	\$704,000	\$12,571
Dorchester/Needmore	141	23,900	none	\$1,434,000	\$10,170
Guest River	281	48,900	none	\$3,912,000	\$13,922
Glamorgan/Stephens/Rock Switch	232	21,000	none	1,410,000	\$6,077
Coeburn Mtn. Phs 1	317	40,000	Pump Sta	\$2,201,000	\$6,943
Coeburn Mtn. Phs 2	183	28,100	Pump Sta (2)	\$1,866,000	\$10,199
Tacoma	144	10,000	none	\$550,000	\$3,819
Cranes Nest	199	19,300	none	\$1,061,000	\$5,334
Banner	169	14,500	none	\$1,160,000	\$6,863
South Coeburn/Sheffield	258	59,800	Pump Sta. (2)	\$3,046,000	\$11,806
Timberville Acres	42	16,800	Pump Sta.	\$947,000	\$22,548
Crab Orchard/Dry Fork/Bull Run	385	77,000	Pump Sta. New WWTF	\$5,295,000	\$13,753

† Based on USGS House Count

The total connections in the future sewer projects is 4,744 based on house count from the USGS maps. This would result in an additional flow at the County plants of 1.19 MGD. With the addition of Wallens Ridge, the flow increases to 1.49 MGD. Growth projections in Section 0301 allow 2.01 MGD by the year 2025. The 0.52 MGD will be comprised of in-fill of existing and proposed systems.

WASTEWATER SYSTEM ALTERNATIVES

0504 Management/Operation Alternatives

The current management of the Wise County wastewater systems is on a semi-regional basis. Two of the four major WWTFs are part of regional systems. CNW treats flow from Coeburn, Norton, Wise, and the Wise County PSA. The Big Stone Gap WWTF treats flows from Big Stone Gap and Appalachia. St. Paul and Pound treat their own wastewater. It does not appear feasible that physical consolidation of these system is efficient or cost-beneficial.

There does not appear to be any responsibility assigned to extend sewer service within the County. In the past lines have been extended adjacent to the boundaries. The result is that sewer service is only provided in and near the population centers.

There are some areas of the county that need sewer service because of health concerns. Other areas are sufficiently densely populated that extension of sewer service is economically feasible. Because these areas are not adjacent to municipalities, sewer service has not been provided. The ultimate responsibility of providing sewer service in Wise County is with the Board of Supervisors because the Board is responsible for everything within the County. The Board has the ability to delegate the authority to act to others but cannot delegate the ultimate responsibility.

The Wise County Board of Supervisors should delegate the authority to provide sewer infrastructure to all appropriate areas of the County outside of the towns and Norton to the Wise County PSA or a newly created similar-type agency. An alternative would be to assign this responsibility to the CNW Regional Wastewater Treatment Authority. The Board should monitor progress of sewer service to the County.

The CNW Authority is experiencing significant inflow from its contributing system. Because of this inflow, the CNW Authority has received Notices of Violations. CNW needs adequate control implemented to assure that its customers actively pursue I/I abatement projects. One suggestion is to enforce the surcharge charges for excessive flows currently in place.

A mandatory connection ordinance should be strongly considered for all wastewater providers in Wise County. Some state and federal funding agencies are now requiring a mandatory connection ordinance before funding will be given for any wastewater project. Because of public reaction to the “mandatory” aspect, it would be prudent to consider the ordinance on a project-by-project basis.

As with water, there are economics to be realized by joint operations. In Section 0404, there was a detailed discussion of the several opportunities for reduction in costs through shared services and potentially, contact operations, benchmarking, and managed competition. These same opportunities apply to wastewater. In fact, the combination of both water and wastewater operations in a suggested long-term goal. Many of the same Management Staff involved in water operations are also involved in wastewater. In order to examine potential savings at the County’s two larger

wastewater treatment plants, the CNW and Big Stone Gap staff should begin discussions regarding joint operations. If a significant opportunity exists, the CNW Authority could be expanded to include representatives of Big Stone Gap, Appalachia, and the County PSA. This expanded Authority would be charged with the provision of wastewater service and expanded sewer infrastructure for all areas of the County. St. Paul and Pound could enter later as the need arises.

In order to implement this suggestion, a wastewater committee should be formed including the Executive Director of LENOWISCO as chairman, the Town Managers from Coeburn, Norton (City), Wise, Big Stone Gap, Appalachia, and the Executive Directors of the CNW Authority and County PSA. Representatives of the VDH and DEQ are suggested as non-voting members of the Committee. This Committee would be composed of 8 members. The Committee would report progress to the Board of Supervisors and Town (City) elected officials.

The steps to form the Committee are the same as listed in Section 0404. Immediate goals would be :

- * Determine the feasibility of an expanded Authority.
- * Develop a program to assist communities to effectively remove infiltration /inflow.
- * Reduce operation and maintenance costs using the methods discussed in Section 0404.

Because many of the same staff are involved in both water and wastewater, a County water & wastewater authority could be examined. Because Pound and St. Paul may remain separate, the Authority may service only central Wise County.

WASTEWATER SYSTEM ALTERNATIVES

0505 Septage and Sludge Disposal Alternatives

Currently 55% of Wise County Residents use a septic tank, alternative sewer system, or have an unpermitted discharge. Septic tanks are currently pumped and the septage is disposed of at either the Big Stone Gap Regional Wastewater Treatment Facility or at the CNW Regional Wastewater Treatment Facility. Neither facility has indicated that septage receiving is a problem.

Sludge disposal for the major facilities in Wise County occurs at the Wise County Landfill at Blackwood. A tipping fee is charged to the wastewater facilities for the disposed sludge. An alternative disposal plan should be considered. This would be a joint land application plan for all of the treatment facilities in the county.

There are several possible locations for a land application plan in Wise County. The most obvious location for land application is an abandoned strip mine, which is greatly in need of fertilizer to assist in growing vegetation.

The most likely location for sludge disposal is therefore the Powell River Project. The Powell River Project is a research project currently being conducted by Virginia Tech on an abandoned strip mine north of the City of Norton. The project focus is on agricultural uses of reclaimed strip mines. Land application of sludge would assist the researches in the use of this type of fertilizer, and would be very cost-beneficial to the wastewater facilities.

SECTION 6

PROPOSED IMPROVEMENTS

0601 Water System Improvements

The proposed water system improvements developed in previous sections are listed and prioritized in this Section.

The improvements generally fall into the following categories:

1. Improve supply by safe yield analysis and spillway repair.
2. Improve accountability.
3. Improve reliability by emergency interconnections.
4. Extend water service into additional areas of the County, and
5. Provide additional treatment when required by VDH and the 1996 Safe Drinking Water Act.

A matrix indicating the rank of the projects and the method of scoring was prepared. The rating system is 1 through 5 points, 5 highest. The ratings are weighted. An immediate health threat is highest priority, followed by economic feasibility/economic growth potential, and the regional improvement.

The matrix indicates an overall priority when all proposed projects in the County are considered. It must be pointed out that the individual rankings are somewhat subjected and the closer two improvements are in rank, the more likely that the positions may be reversed.

The matrix has been prepared without consideration for the provider that will implement the improvements. In Section 0704, an implementation schedule is presented which details the proposed improvements by provider and time schedule.

The matrix does not include the Bold Camp I project because it has been funded and is scheduled for construction in 1998.

The proposed improvements are shown on a map in the pocket at the back of the report, Figure 12.

The map shows the areas that are proposed for service. Specific facilities design must be done during preliminary and final engineering.

Water Systems Recommendations Matrix							
Proposed Project	Health		Economic		Regional		Total
	points	x3	points	x2	points	x1	

Pound WTP Upgrade/Repair	5	15	1	2	0	0	17
Reservoir Jenny Springs Safe Yield Studies	2	6	3	6	4	4	16
Cryptosporidium Requirements (all plants)+	4	12	0	0	0	0	12
Big Stone Gap Spillway Repairs	3	9	1	2	0	0	11
Accountability Big Stone Gap	0	0	5	10	0	0	10
Bold Camp II Line Extension	2	6	2	4	0	0	10
Upper Indian Creek	2	6	2	4	0	0	10
Lower Indian Creek	2	6	2	4	0	0	10
Emerg. Connection Norton-Big Stone	2	6	1	2	2	2	10
Emerg. Connection Appalachia - Big Stone	2	6	1	2	2	2	10
Emerg. Connection Pound - Clintwood	2	6	1	2	2	2	10
Emerg. Connection St. Paul - Carfax	2	6	1	2	2	2	10
Accountability Norton	0	0	4	8	0	0	8
Birchfield/Dotson Creek	2	6	1	2	0	0	8
Jasper Line Extension	1	3	2	4	1	1	8
Seminary Line Extension	1	3	2	4	1	1	8
South Fork Extension	1	3	2	4	0	0	7
Accountability Appalachia	0	0	3	6	0	0	6
Accountability Pound	0	0	3	6	0	0	6
Virginia City Line Extension	1	3	1	2	0	0	5
Coeburn Transmission Main Line	1	3	1	2	0	0	5
Big Stone Gap Filter Console, etc.	1	3	1	2	0	0	5
Hoot Owl Hollow Line Extension	1	3	1	2	0	0	5
Accountability Wise	0	0	2	4	0	0	4
Accountability Wise Co. PSA	0	0	1	2	0	0	2
Accountability Coeburn	0	0	1	2	0	0	2
Accountability St. Paul	0	0	1	2	0	0	2

+ Assumes 1996 SDWA requirement to upgrade.

PROPOSED IMPROVEMENTS

0602 Wastewater System Improvements

The proposed wastewater system improvements developed in previous sections are listed and prioritized in this section.

The improvements generally fall into the following categories:

1. Increase plant capacity by infiltration/inflow abatement because plant expansion will be very difficult and costly.
2. Extend sewer infrastructure based on health need and economic benefit.

A matrix indicating the rank of the projects and the method of scoring was prepared. The rating system is 1 through 5 points, 5 highest. The ratings are weighted. An immediate health threat is highest priority, followed by economic feasibility/economic growth potential and regional improvement.

The matrix indicates an overall priority when all projects in the County are considered. It must be pointed out that the individual rankings are somewhat subjective and the closer to improvements are in rank, the more likely that the positions may be reversed.

The matrix has been prepared without consideration for the provider that will implement the improvements. In Section 0704, an implementation schedule is presented which details the proposed improvements by provider and time schedule.

In this table, we have shown I/I abatement that flows to a specific plant by listing that plant. It must be pointed out that most of the I/I abatement must be done by the contributing communities.

The proposed improvements are shown on a map in the pocket at the back of the report, Figure 13.

Wastewater Systems Recommendations Matrix							
Proposed Project	Health		Economic		Regional		Total
	points	x3	points	x2	points	x1	
Imboden/Exeter Line Extension (Option 1)	5	15	4	8	1	1	24
Andover/Arno/Derby Line Extension	5	15	3	6	1	1	22
I/I Abatement - Big Stone Gap/Appalachia	4	12	3	6	3	3	21
Banner Line Extension	3	9	5	10	1	1	20
Stonega Line Extension	5	15	2	4	1	1	20
Osaka/Roda Line Extension	5	15	2	4	1	1	20
I/I Abatement - CNW System	3	9	2	4	3	3	16
Coeburn Mountain Phase II Line Extension	2	6	4	8	1	1	15
Joint Sludge Land Application Project	1	3	4	8	3	3	14
Coeburn Mountain Phase I Line Extension	1	3	5	10	1	1	14
Glamorgan/Stephens/Rock Switch Line	1	3	5	10	1	1	14
Cranes Nest Line Extension	1	3	5	10	1	1	14
Tacoma Line Extension	1	3	5	10	1	1	14
Josephine Line Extension	2	6	3	6	2	2	14
Powell Valley Line Extension	2	6	3	6	1	1	13
Guest River Line Extension	2	6	3	6	1	1	13
East Stone/Cracker Neck Line Extension	1	3	4	8	1	1	12
Wildcat Line Extension	1	3	4	8	1	1	12
Dorchester/Needmore Line Extension	1	3	4	8	1	1	12
Bold Camp Line Extension	1	3	3	6	1	1	10
Indian Creek Line Extension	1	3	3	6	1	1	10
Thacker's Branch Line Extension	1	3	5	6	1	1	10
South Coeburn/Sheffield Line Extension	1	3	3	6	1	1	10
Crab Orchard/Bull Run/Dry Fork Project	1	3	3	6	1	1	10
Timberville Acres Line Extension	2	6	1	2	1	1	9
I/I Abatement - Pound	2	6	1	2	0	0	8
Blackwood Line Extension	1	3	1	2	1	1	6
I/I Abatement - St. Paul	1	3	1	2	0	0	5
Expand CNW WWTF	0	0	1	2	1	1	3
Expand BSG WWTF	0	0	1	2	1	1	3

PROPOSED IMPROVEMENTS

0603 Septage and Sludge Disposal Improvements

The proposed septage and sludge disposal improvements have been discussed in the wastewater sections. These are briefly described below.

There are no proposed improvements for septage handling in Wise County. However, completion of the sewer line extensions will eliminate some septic tanks. This will decrease the need for maintenance, and lessen the load of septage received at the major WWTFs in the County. Additionally, the line extensions will help to eliminate potential environmental hazards due to inefficient septic tanks or illegal discharges.

The Joint Sludge Land Application Project is a the sludge handling recommendation. The current procedure of disposing sludge at the Wise County Landfill is not a cost-efficient operation when compared to the potential of land applying sludge. The Joint Sludge Land Application Project should be investigated further by the Joint Committee and implemented if effective.

SECTION 7

PROJECT FINANCING

0701 Current Debt Analysis

Existing water and sewer debt is listed below for each service provider in Wise County.

<u>Town of Pound</u>	<u>Amount Remaining</u>
Water Project (issued 6/7/88 by GE Capital Corp. Loan)	\$89,056
Sewer Project (issued 4/5/76 by GE Capital Corp. Loan)	\$550,632
Sewer Project (issued 2/29/96 by VRLF)	\$491,364

<u>Town of Appalachia</u>	<u>Annual Payment</u>
Water System	\$9,801
Sewer System	\$4,000

<u>Town of Big Stone Gap</u>	<u>Amount Remaining</u>
Water Treatment Plant (Issued 8/28/80)	\$2,434,700
Wastewater Treatment Plant (Issued 9/1/93)	\$6,056,195
Wallens Ridge Water & Sewer Bond	
\$590,363	

	<u>Annual Payment</u>
Water Treatment Plant	\$175,200

Wastewater Treatment Plant	\$314,665
Wallens Ridge Water & Sewer Bond	
\$43,620	

<u>City of Norton</u>	<u>Amount Remaining</u>
Water Debt Service (through 12/18/2027 by USDA-Rural Development)	\$1,415,028
Sewer Debt Service (through 12/1/2009 by VRLF)	\$591,998

	<u>Annual Payment</u>
Water Debt Service	\$88,380
Sewer Debt Service	\$37,000

<u>Town of Wise</u>	<u>Amount Remaining</u>
Water Improvements Project (9 yrs remaining USDA-Rural Development)	\$327,779
Water Improvements Project (11 yrs remaining USDA-Rural Development)	\$195,684

<u>Town of Coeburn</u>	<u>Amount Remaining</u>
No outstanding debt	0

<u>Wise County PSA</u>	<u>Amount Remaining</u>
Water Project (through 1/31/2013 by USDA-Rural Development)	\$186,749
Water Project (through 10/18/2014 by USDA-Rural Development)	\$20,625
Water Project (through 1/4/2019 by USDA-Rural Development)	\$292,482
Water Project (through 4/20/2023 by USDA-Rural Development)	\$172,035
Water Project (through 11/5/2027 by USDA-Rural Development)	\$380,160
Water Project (through 8/24/2029 by USDA-Rural Development)	\$438,232
<u>CNW Regional Wastewater Treatment Authority</u>	<u>Amount Remaining</u>
Original Loan (1992)	\$10,859,833
Laurel Mills Loan (1992)	\$337,140
	<u>Annual Payment</u>
Original Loan (1992)	\$374,477
Laurel Mills Loan (1992)	\$12,041
	<u>Amount Remaining</u>
<u>Town of St. Paul</u>	
Wastewater Plant Loan (through 1/1/2013)	\$73,750
	<u>Annual Payment</u>
Wastewater Plant Loan	\$6,963

Analysis

Many of the bonds used to finance existing facilities will be paid during the planning period. Each provider should, to the extent possible, schedule improvements after this debt is repaid. In this manner, debt service will be levelized and the effect on rates will be minimized. Short-term financing may assist in this levelization process.

PROJECT FINANCING

0702 Rate Structure and Impact

Water & Sewer Rate Structure

Rate structure is one important aspect of water and sewer operations. A rate structure must be developed and utilized to assure the water and/or sewer provider that sufficient funds will be generated to operate the system, pay debt retirement, and set aside capital improvements funds. In Wise County, the rates vary with each provider. The following are the residential rates now in effect in Wise County and the City of Norton. The rates are for a typical usage of 4,200 gallons per month:

	In-Town <u>Water</u>	Out-of-Town <u>Water</u>	In-Town <u>Sewer</u>	Out-of-Town <u>Sewer</u>
<u>Wise County</u>				
Appalachia Town	\$23.18	\$31.43	\$24.70	\$31.72
Big Stone Gap Town	13.70	27.40	22.02	40.60
Coeburn Town	15.06	22.59	15.06	22.59
Pound Town	15.46	24.03	23.57	31.20
St. Paul Town	10.76	16.14	8.07	N/A
Wise Co. PSA N/A	30.90	N/A	18.45	
Wise Town	15.95	23.95	23.93	35.93
 <u>Norton City</u>				
	18.84	23.28	21.06	46.56

Impact

The rates in Wise County compare favorably with the rates in the surrounding rural counties in southwest Virginia.

Rural Development is the leading funding agency in southwest Virginia. Their rules and regulations allow for a grant/loan funding package for water and sewer projects. To obtain the maximum grant (75%), the locality must meet certain criteria. Part of the criteria is the average monthly bill for water or sewer services. The determining user fee to receive the maximum grant is approximately \$25.00 per month for 4,200 gallons. For a bill less than \$25.00, the amount of grant monies may be reduced. With low user fees, grant monies may not be available.

The in-town rates in Wise County range from \$10.76 to \$23.18 for water, and the sewer bills range from \$8.07 to \$24.70 for 4,200 gallons per month. Wise County PSA rates are \$30.90 for water and \$18.45 for sewer service. As can be seen by the wide range in monthly bills, the availability of Rural Development grant monies can be expected to vary significantly with each provider. To receive loan monies, low rates may have to increase, while providers eligible for grant monies may be able to finance a project without a rate increase.

PROJECT FINANCING

0703 Funding Sources

The financing of water and wastewater projects can come from numerous sources. The major sources presently used or that could be used to produce the funds for the recommended project are classified into three categories as follows:

1. Federal grants and loans
2. State grants and loans
3. Local funding sources

Federal construction grants are a decreasing source of funding for water and wastewater projects. However, a combination loan and grant programs are still available for southwestern Virginia. The programs available for use are indicated below.

Federal Grants and Loans

USDA - Rural Development (RD)

Rural Development (formerly Farmer's Home Administration) is a source of grants and loans for water and wastewater projects. Wise County is eligible to apply for RD grants and loans to finance projects that provide water and wastewater service to rural areas in Wise County and to promote the well-being of these areas. Rural Development is a primary source of funding for Wise County.

The RD loan programs are backed by bonds purchased by RD with a life of 40 years. These bonds may be general obligation bonds, revenue bonds, or a combination of the two. The RD loan rates are typically/

1. 5 percent
2. A market rate which tracks the municipal bond index
3. An intermediate rate between 5 percent and the market rate

The median household income of the project planning area will determine the loan interest rate. The direct cost of issuing the bonds is lower than those costs associated with a local bond issue. An RD grant usually accompanies the loan. The percent grant funding is also based upon the median income in the project planning area.

Economic Development Administration (EDA)

EDA provides a 50/50 matching grant up to a maximum of \$750,000 primarily to promote economic activity in areas of high unemployment. To be eligible for grants, the County must first develop an “Overall Economic Development Program” (OEDP). This plan is usually developed with the assistance of the local planning district (LENOWISCO) and identifies potential projects which will enhance the overall economic structure of the County.

Appalachian Regional Commission (ARC)

The ARC provides federal grant funding for rural areas in the Appalachian Mountains from West Virginia to North Carolina. The ARC has grant funds available up to \$500,000 for water and wastewater projects. The ARC considers projects based upon the same guidelines as Rural Development. The primary function of ARC is to provide funding for projects that provide or retain jobs in the Appalachian Mountain area.

Coalfield Water Development Fund, Inc. (CWDF)

The CWDF is a non-profit 501(c)(3) charitable organization providing grant assistance for water system construction in the counties of Lee, Scott, Wise, Dickenson, Russell, Tazewell, Buchanan and the City of Norton. The seed funding for the CWDF endowment was provided through a federal grant and will be supplemented with private contributions. The endowment income will be used to make construction grants in the coal-producing counties of Southwest Virginia.

The CWDF will be known as a “gap financing” fund. Applications must leverage the maximum funding from traditional financing sources and only utilize grants from the CWDF to fill the gaps in funding needed for project construction. Projects which can be funded totally utilizing other federal programs will not be considered as CWDF projects.

In 1996 each applicant can receive one \$10,000 grant. Applicants can be local government, public service authority, or non-profit organization. These funds can be used for essentially any portion of the project cost. The program rating criteria and their respective relative weights in descending order of importance are:

1. Need for funding to complete project
2. Level of commitment
3. Public health and safety
4. Regional water development advanced/additional projects accelerated
5. Job creation encouraged/maintained
6. Application data provided

State Grants and Loans

Virginia Department of Housing and Community Development (DHCD)

The DHCD provides grant funding in the form of Community Development Block Grants (CDBG). The program consists of federal funds administered by the Commonwealth of Virginia. Competitive grants of up to \$750,000 for water and wastewater projects are available through DHCD. Grants of up to \$4,250,000 are available for comprehensive projects that combine water, wastewater, street improvements, storm drainage improvements, indoor plumbing, and housing rehabilitation. Some areas of Wise County will qualify for a comprehensive DHCD project. The benefits are generally targeted to the low- and moderate-income (LMI) areas. An application also has a greater chance of being funded if funds have already been committed by the local entity or by another state or federal agency.

Virginia Resources Authority (VRA)

The VRA issues bonds in large amounts (\$100 million) and lends the proceeds to state localities for water and sewer projects. Since the bonds are backed by the Commonwealth of Virginia, the obtainable interest rates are very favorable.

Although a VRA loan is technically the same as a locality placing a private bond issue, there are advantages to financing projects through VRA. Compared to a private placement, issuance costs and bond discount are less. The major advantage to a VRA loan is the waiver of a debt service reserve. Typically this reserve must equal one year's debt service and can add as much as 20 percent to the total debt amount. This reserve can be waived by VRA due to the Commonwealth's participation in the pool program.

Virginia Department of Environmental Quality Revolving Loan Fund (VRLF)

The Environmental Protection Agency (EPA) provides funds for the revolving loan program. The funds are supplemented by state appropriations to finance wastewater projects. The DEQ administers the program through VRA, determines which localities receive loans, and sets the interest rate for each loan. The interest rate is based upon the median household income in the project planning area and can range from 0% to just below market rates.

The project being considered by VRLF must first be placed on a priority list. An application is then submitted to DEQ.

Areas that are designated "Health Hazards" by the Virginia Department of Health receive high priority for eligibility. However, health hazards do not receive preferential treatment in setting of interest rates. Due to the federal involvement, the application approval process is long and can take as long as one year. Also, the applicant must comply with federal requirements such as wage determinations, environmental statements, and infiltration/inflow studies.

The Hardship Grants Program for Rural Communities

The U.S. Environmental Protection Agency (EPA) has developed guidelines for a new grant program to help small, disadvantaged rural communities address their wastewater treatment needs. The 1996 Congressional Appropriations Act reserved \$50 million from Clean Water State Revolving Fund appropriations to start the new program.

Many rural communities lack the resources to afford the full cost of Clean Water State Revolving Fund loans to improve their outdated or failing wastewater treatment services. The Hardship Grants Program is designed to complement the Clean Water State Revolving Fund Program, which allows states to make loans to communities and individuals for high-priority water-quality projects. States are provided a high degree of flexibility in how they manage the new Hardship Grants Program, and are responsible for selecting projects.

Under the new program, EPA will award grants to the state, which in turn will provide hardship assistance to small communities. EPA's guidelines encourage the states to assist rural communities by supplementing Clean Water State Revolving Fund loans with hardship grant assistance.

States may award hardship assistance to qualifying communities for the planning, design, and construction of publicly owned treatment works or alternative wastewater services, such as on-site treatment systems (including septic). States may also use hardship assistance to provide training, technical assistance and educational programs on the operation and maintenance of wastewater treatment systems. Under the Hardship Grants Program, any rural community with fewer than 3,000 residents can qualify for hardships assistance from its state program if it meets the following criteria:

1. The community lacks access to centralized wastewater treatment or collection systems, or needs improvements to on-site wastewater treatment systems;
2. The proposed project will improve public health or reduce environmental risk;
3. The community's per capita income rate is less than 80% of the national average; and
4. Its unemployment rate exceeds the national average by one percentage point or more.

Drinking Water State Revolving Fund

The 1996 Safe Drinking Water Act authorized funds for the individual states to provide a funding program for water projects. The initial grant to Virginia was \$29,442,400. The states will utilize this appropriation to address public health problems, compliance with the provisions of the SDWA. Funding under this program may not be utilized to satisfy growth demands. Each year a funding priority list is established and applicants must reapply each year. There are special provisions for assistance to waterworks that serve less than 10,000 people and to disadvantaged waterworks that serve less than 3,300 people when the median household income is less than 80% of the state average.

Southeast Rural Community Assistance Project, Inc. (SE/R-CAP)

SE/R-CAP is the former Virginia Water Project, Inc. SE/R-CAP receives funds from Rural Development. SE/R-CAP provides limited grant funds for water projects to low- to middle-income

rural residents. Grant funding is available for up to \$400 per connection in the project planning area. The loan program provides up to \$100,000 per project at between 3% and 7% interest. SE/R-CAP can also provide grant funding for preparation of preliminary engineering reports for water and/or wastewater systems.

Abandoned Mine Land (AML)

Abandoned Mine Land funds are available through the Surface Mining Control and Reclamation Act. Projects that meet the criteria developed under the Act may receive funds to construct or upgrade water systems which have been adversely impacted by mining activities. Eligible project costs include engineering, inspection, surveying, and construction of water facilities.

Local Funds

Local funds may always be contributed to water and wastewater projects. Many funding programs provide additional consideration when local funds are included in a project. Addition of local funds implies a special interest in the project on the part of the locality. Use of local funding also lessens the potential loan amounts required, which reduces the debt service required by loans.

Summary of Funding Options

The most frequently obtained funding sources in Wise County are from USDA - Rural Development and DHCD in the form of Community Development Block Grants. These sources should continue to be pursued for funding of future water and wastewater projects. Criteria for RD and DHCD have not changed for some time and it is not anticipated that the criteria will change. The CWDF should help smaller projects that have projects that, in the past, were marginal. The funding budget for fiscal year 1997 (FY97) for these programs was essentially the same as for FY96.

0700 PROJECT FINANCING

0704 Implementation Schedule

The Water and Sewer Improvements Priorities were developed and presented in Sections 0601 and 0602 respectively. These priorities were utilized to develop the Implementation Schedules which are presented following these introductory comments.

The Implementation Schedules list immediate (1998) projects along with five year budgeting periods. The projects are listed by provider. Several providers can be working on projects within Wise County at the same time.

The Implementation Schedules plan are a concise “business plan” of the recommended actions that each provider should take by the end of the planning period, 2025.

It must be noted that some projects have a high (greater than \$10,000) cost per connection. These projects have been scheduled for the later portions of the planning period. At that time, population growth may make the projects more feasible or the public health need may justify the additional expenditures.

As a general guide to project feasibility, we have listed the cost per connection in Sections 0403 and 0503. For each project, there are several funding, public health, and operating cost scenarios. For example, on some projects, Rural Development may provide the major grant/loan financing and supplemental funding may be provided by the EDA, ARC, or other agencies which are discussed in Section 0703. If the additional wastewater flow is within the allocations at the CNW plant, the project may result in no additional charges caused by the project.

The monthly capital charge for a project with a \$10,000 connection cost and 60% grant is \$18. To this must be added the operating cost. If the connection cost increases to \$15,000, the monthly capital charge is \$27. Unless additional grant funding is obtained or the public is able to pay the higher costs, projects beyond the \$10 - 15,000 cost per connections are not feasible.

Water Project Implementation Schedule 1998-2025

Provider	Year	Project Description	Estimated Cost ¹ (Thousands \$ ²)	
Pound	1998	WTP Repair/Upgrade	250	
		Bold Camp Ph. I Ext. & Clintwood Interconn.	<u>2,595</u>	2,845
	2000	SDWA Plant Upgrade ³	750	
		Bold Camp Ph. II Extension	<u>720</u>	1,470
	2005	Accountability Study	<u>15</u>	<u>15</u>
				4,330
Appalachia	1998	Safe Yield Study	<u>25</u>	25
	2000	SDWA Plant Upgrade ³	<u>1,050</u>	1,050
	2005	Big Stone Gap Interconnection ⁴	<u>200</u>	200
	2010	Accountability Study	<u>15</u>	<u>15</u>
				1,290
Big Stone Gap	1998	Safe Yield Study	30	
		Accountability Study	50	
		Dam Spillway Repairs	<u>1,000</u>	1,080
	2000	SDWA Plant Upgrade ³	4,250	
		Norton Interconnection ⁴	<u>350</u>	4,600
	2005	Appalachia Interconnection ⁴	<u>200</u>	200
2010	Plant Filter Control, Etc., Upgrade	<u>1,000</u>	<u>1,000</u>	
				6,880
Norton	1998	Safe Yield Study	<u>25</u>	25
	2000	SDWA Plant Upgrade ³	2,000	
		Big Stone Gap Interconnection ⁴	<u>350</u>	2,350
	2005	Accountability Study	<u>30</u>	<u>30</u>
				2,405
Wise	1998	Safe Yield Study	<u>15</u>	15
	2000	SDWA Plant Upgrade ³	<u>1,875</u>	1,875
	2005	Accountability Study	<u>15</u>	<u>15</u>
				1,905
Coeburn	2000	SDWA Plant Upgrade ³	<u>1,200</u>	1,200
	2010	Supplemental Transmission Main	<u>1,120</u>	1,120
	2015	Accountability Study	<u>15</u>	<u>15</u>
				2,335
St. Paul	2000	SDWA Plant Upgrade ³	<u>750</u>	750
	2015	Carfax Interconnection ⁵	-	-
	2020	Accountability Study	<u>10</u>	<u>10</u>
				760

**Water Project Implementation Schedule (Cont'd)
1998-2025**

Provider	Year	Project Description	Estimated Cost ¹ (Thousands \$ ²)	
Wise Co. PSA	2000	SDWA Plant Upgrade ³	<u>1,625</u>	1,625
	2005	Upper Indian Creek	1,283	
		Lower Indian Creek	1,022	3,105
		Birchfield/Dotson Creek	<u>800</u>	
	2010	Jasper Line Extension	1,440	
		Seminary Line Extension	1,280	5,720
		South Fork Line Extension	<u>3,000</u>	
	2015	Virginia City Line Extension	<u>1,392</u>	
	2020	Hoot Owl Line Extension	<u>376</u>	<u>376</u>
County Water Committee	1998	Implement Committee	-	
		Jenny Springs Investigation	40	
		County Hydraulic Model	<u>50</u>	<u>90</u>
				90
Total Water Projects Through the Year 2025				32,213

- Notes:
1. Mandatory connection ordinance will likely be required on a project-by-project basis to obtain Rural Development funding.
 2. Costs are in 1997 dollars.
 3. SDWA (1996 Safe Drinking Water Act) plant upgrades when required by VDH.
 4. Each provider - 50% cost.
 5. With Virginia City Extension.

Wastewater Project Implementation Schedule 1998-2025

Provider	Year	Project Description	Estimated Cost ¹ (Thousands \$ ²)	
Pound	2000	I/I Abatement Study	10	10
	2015	Bold Camp - Ph. I & II Area	<u>2,744</u>	<u>2,744</u> 2,754
Appalachia	1998	I/I Abatement Study	20	20
Big Stone Gap	1998	I/I Abatement Study	50	50
	2025	Expand Plant If Required	-	<u>-</u> 50
Norton	2000	I/I Abatement Study	50	923
		Josephine Line Extension	<u>873</u>	
Wise	2000	I/I Abatement Study	50	50
Coeburn	2000	I/I Abatement Study	30	30
St. Paul	2015	I/I Abatement Study	10	10
CNW Authority	2005	Joint Sludge Land Application Permit	15	15
	2025	Expand Plant, If Required	-	<u>-</u> 15
Wise Co. ³	1998	Imboden/Exeter Line Extension	2,045	3,455
		Andover/Arno/Derby Line Extension	<u>1,410</u>	
	2000	Stonega Line Extension	3,037	6,534
		Osaka/Roda Line Extension	2,337	
	2005	Banner Line Extension	<u>1,160</u>	5,477
		Coeburn Mountain Phase II Extension	2,201	
		Coeburn Mountain Phase I Extension	1,866	
	2010	Glamorgan/Stephans/Rock Switch Line Ext.	<u>1,410</u>	12,722
		Cranes Nest Line Extension	1,061	
	-	Tacoma Line Extension	550	9,583
		Powell Valley Line Extension	5,061	
		Guest River Line Extension	3,912	
		Dorchester/Needmore Line Extension	1,434	
		Thacker Branch Line Extension	<u>704</u>	
	2015	East Stone/Cracker Neck Line Extension	3,933	9,288
		Wildcat Line Extension	3,230	
	2020	Indian Creek Line Extension	<u>2,420</u>	437
South Coeburn/Sheffield Line Extension		3,046		
2025	Timberville Acres Line Extension	947	47,496	
	Crab Orchard/Bull Run/Dry Fork Project	<u>5,295</u>		
		Blackwood Line Extension	<u>437</u>	
County Sewer Committee	1998	Implement Committee	-	-
Total Wastewater Projects Through the Year 2025				51,348

SECTION 8

STORMWATER RUN-OFF CONSIDERATIONS

0801 Identification of Problems

In studying the water and wastewater needs and availability for any area, stormwater is important to consider. Stormwater run-off can have an adverse effect on water quality in surface waters and potentially in ground water sources. When planning for stormwater run-off two conditions should be considered: developed lands and undeveloped lands.

The 1990 Census shows that 46% of the population in Wise County resides in one of the six incorporated towns or the City of Norton. Construction is continuing on the U.S. Route 58 Alternate Bypass. The Red Onions and Wallens Ridge Prisons are currently under construction and a third prison in Wise County is in the design phase. Continued growth in land development in Wise County can have an impact on stormwater run-off patterns. Areas previously covered with foliage become replaced with structures, buildings, parking areas and cleared parcels.

With growing development, the need for stormwater management becomes increasingly important. Provisions must be made for additional stormwater run-off resulting from the development. Downstream land areas and waterways must be considered when new projects are proposed to protect the nature and quality of the surrounding resources in Wise County.

The mining industry is a major user of undeveloped land in Wise County with the potential to affect water quality as a result of stormwater run-off. While mining operations do not develop land, mining practices can alter natural terrain and will often utilize water in the operations. The effects stormwater run-off as a result of mining operations have been greatly reduced over time as technology and regulations have increased. However, the issue must continually be addressed as long as mining continues in Wise County.

For development to continue in Wise County, it should be understood that stormwater management will be a necessary challenge. Similarly the mining industry, by nature, will continue to be challenged by the need to control and minimize stormwater run-off. The major public water supplies in the County rely on surface waters for their raw water sources. The impact of stormwater run-off on Wise County water supplies will become increasingly important in the future as development results in a rising demand for public water.

STORMWATER RUN-OFF

0802 General Recommendations for Solutions

Public awareness of environmental issues is continually increasing, and the impact can be seen at

national, state, and local levels. The effects of stormwater run-off on the environment are not an exception. The problem of stormwater run-off in Wise County must be addressed for both undeveloped areas where the mining industry is prevalent and for areas of increasing commercial development in the County.

As development in Wise County increases, the County and localities must be involved in minimizing the adverse effects of stormwater run-off by use of erosion and sediment control measures. Stormwater run-off due to construction and development is typically addressed in terms of flow, erosion, and sediment control. The quality of the run-off is addressed indirectly by the control of flow, erosion and sediment. The Virginia Department of Conservation and Recreation (DCR) reviews and administers stormwater management plans and practices for new construction. Counties, localities, and municipalities can become directly involved in plan review and stormwater management enforcement by accreditation through DCR.

Stormwater run-off from construction is addressed by the DCR in the Virginia Erosion and Sediment Control Law. The Virginia Erosion and Sediment Control Handbook provides guidelines for implementation of the standards set forth in the Virginia Erosion and Sediment Control Law. The Virginia Erosion and Sediment Control Law includes 19 minimum standards to control soil erosion, sediment deposition and nonagricultural run-off.

Minimum Standard 19 addresses stormwater run-off specifically. Minimum Standard 19 includes requirements for concentrated run-off leaving a development site be discharged into an adequate receiving channel. Natural channels are required to be analyzed to determine the capacity to convey the run-off and appropriate improvements shall be implemented as necessary. Rate of run-off is restricted by Minimum Standard 19 based on pre-development storm flows and post-development conditions. Stormwater detention or retention with appropriate outlet structures may be an option in some cases. Adherence to and enforcement of Minimum Standard 19 is critical to maintaining the quality of stormwater run-off.

In continuing development throughout Wise County, careful review of stormwater management plans for new construction will be necessary. Inspections of stormwater management structures and measures during construction and routine inspections and maintenance after construction will aid in reducing the adverse effects of stormwater run-off.

In addition to the problem of stormwater run-off resulting from construction and development, run-off from mining practices in the County must be considered. Coal Mining is a major industry in seven counties in Southwest Virginia. Mining operations in these counties are subject to the requirements of the Surface Mining Laws. Mines must obtain a joint permit from the Virginia Department of Mines Minerals and Energy (DMME) prior to initiating operation. The joint permit consists of two parts; the Surface Mining Control and Reclamation Act (SMCRA), and the National Pollutant Discharge Elimination System (NPDES). The NPDES portion of the permit is unique for the mining industry in that it is issued through the Department of Mines Minerals and Energy. With the exception of the mining industry, NPDES permits are normally administered through the Virginia Department of Environmental Quality.

The joint permit and Surface Mining Laws detail the specific requirements that must be met by a mine regarding stormwater management. The requirements include routing of stormwater and treatment to meet technology based limits. Prior to 1992, the joint permit was limited to the mining process and operations leaving access roads, haul routes, and portions of the initial set up to be addressed separately. The 1992 joint permit revisions now allow various stormwater management considerations for a mining operation to be addressed under one permit, making the process easier for both the industry and regulatory agencies.

Awareness of the impacts of stormwater run-off to the environment, and the laws, regulations, and permit requirements for stormwater management is essential for growth and development in Wise County. Continued oversight and enforcement of existing stormwater requirements, and involvement in stormwater management practices should be encouraged as development in Wise County continues to grow.