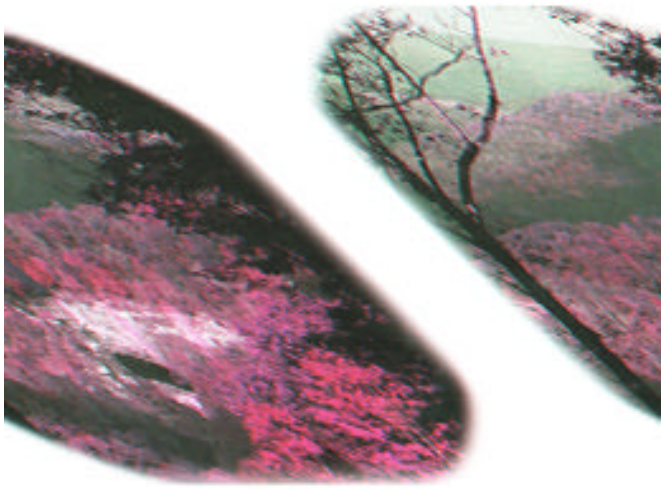
VIRGINIA COALFIELDS REGIONAL WATER STUDY

FOR

Cumberland Plateau Planning District

LENOWISCO PLANNING DISTRICT



NOVEMBER 1998

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Virginia Coalfields Regional Water Study
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EXECUTIVE SUMMARY

As a result of House Joint Resolution No. 590, the LENOWISCO Planning District Commission (PDC One) and the Cumberland Plateau Planning District Commission (PDC Two) were the recipients of an appropriation from the Virginia General Assembly for the completion of a comprehensive regional water supply and service study for Virginia's Coalfields region. The Virginia General Assembly funded this study to perform a regional needs assessment for rural communities and to address appropriate funding and implementation strategies.

This study, hereafter referred to as the Virginia Coalfields Regional Water Study (VCRWS), is the result of a combined effort by the LENOWISCO and Cumberland Plateau Planning District Commissions. The purpose of the Virginia Coalfields Regional Water Study is to develop and evaluate, without regard to geographical or political boundaries, alternatives for regionalized water systems capable of providing water service to previously unserved areas and improving service to areas currently served. The alternatives include interconnections between existing and proposed systems located within the two planning districts. The intent of this study is to look at interconnections which would provide service to large groups of currently unserved citizens who would not be candidates for inclusion in traditionally funded projects. In so doing, improved service to existing systems in the form of improved reliability provided by secondary sources will be achieved.

When regional projects are considered, various economies of scale are realized. Economies of scale are observed as projects increase in size. Combining several smaller projects into one larger regional project results in savings in many ways, particularly when multiple systems share the same source of water. Larger projects usually result in lower prices for the construction work. Administration, legal and engineering costs are smaller percentages of larger projects. Long term operation and maintenance costs are lower for each consumer if the number of consumers is higher. Costs may be as much as ten to fifteen percent lower for one larger project than for several separate projects serving the same customers.

Of special importance is finding ways of providing service to these large groups of households which do not currently have clean, safe drinking water. Unless special attention is given to these areas, public water supply may never be practical due to the distances and obstacles which must be overcome, and the high costs of providing water service.

Nine regional projects were identified within the region. The total capital cost of all nine projects is $83,352,669. The regional projects have been ranked in priority based on factors such as cost per connection, construction feasibility, level of service, and degree of health hazard eliminated. Each project is considered as a "stand-alone" project. However, a general look at overlap implications is included. The total project cost has been presented for each project. Also, the present worth per new connection has been presented to provide a comparative measure of the cost to benefit ratio of each project. The present worth analysis provides a mechanism for accounting for all of the costs of the system in the analysis. Present worth, as used in this report, is defined as the amount of money which must be placed on deposit today at eight percent interest for twenty years to pay all the capital and operation and maintenance costs for the planning period.

A brief description of each of the projects, followed by a summary table illustrating the costs of each is listed below.

Project 1 - Tri-County Water Project

This project considers constructing water mains to serve areas in Dickenson County, western Russell County, and southeastern Wise County. The water mains would interconnect the existing systems of the Wise County Public Service Authority, the Russell County Water and Sewerage Authority systems of Dante and Castlewood, the Town of St. Paul, the Town of Haysi, and the Town of Clinchco.

Project 2 - Eastern Russell County Water Project

This project considers constructing water mains to serve areas in eastern Russell County and western Tazewell County. The water mains would interconnect the existing systems of the Town of Honaker, the Swords Creek Public Service Authority, the Town of Lebanon, the Tazewell County Public Service Authority systems of Raven-Doran and Wardell, and the Town of Richlands.

Project 3 - Haysi to Honaker Water Project

This project considers constructing water mains to serve areas in Dickenson County, southern Buchanan County, and eastern Russell County. The water mains would interconnect the existing systems of the Town of Honaker, the Swords Creek Public Service Authority, and the Buchanan County Public Service Authority, which serves the Town of Haysi.

Project 4 - Western Russell County Water Project

This project considers constructing water mains to serve areas in western Russell County and southeastern Wise County. The water mains would interconnect the existing systems of the Wise County Public Service Authority, the Russell County Water and Sewerage Authority systems of Dante and Castlewood, the Town of St. Paul, and the Town of Lebanon.

Project 5 - Clintwood to Pound Water Project

This project considers constructing water mains to serve areas in Dickenson County and Wise County. The water mains would interconnect the existing systems of the Wise County Public Service Authority, the Town of Clintwood, and the Town of Pound.

Project 6 - Big Stone Gap - Appalachia - Norton - Lee County - Duffield Water Project

This project considers constructing water mains which would combine the existing systems of Big Stone Gap, the City of Norton, and Appalachia into a regional system with the potential of serving the Seminary and Olinger Communities in Lee County and potentially the Town of Duffield in Scott County.

Project 7 - Clinch River Water Project

This project considers the construction of a new water treatment plant (WTP) on the Clinch River to serve the Scott County Communities of Rye Cove, Daniel Boone, and the Towns of Clinchport, Duffield, Gate City, and Weber City (Moccasin Gap). The Clinch River WTP will be capable of providing water service to previously unserved areas and also to serve as a backup water source for the existing water systems. Also included in this project is the construction of a water main which would interconnect the existing water systems of Gate City and the Moccasin Gap Water Authority. The interconnection would provide a backup water source for each of the systems.

Project 8- Lee County - Jonesville West Water Project

This project considers constructing water mains to serve rural areas in western Lee County, with a connection to the Jonesville, Rose Hill water system, and the Lee County Public Service Authority systems in Ewing and Gibson Station.

Project 9 - Tazewell County - Wardell/Claypool Hill to Tazewell Water Project

This project considers constructing water mains to serve rural areas in central Tazewell County, with a connection to the Tazewell County PSA system at the Town of Tazewell system and the Wardell/Claypool Hill system, serving the area along Routes 19 and 460.

The following tables have been provided to list the potential costs and potential sources and providers of water supply for the projects studied in this report.

Virginia Coalfields Regional Water Study
Cost Summary

Project Number	Project Name	Project Cost	Present Worth	Estimated Number of New Connections	Present Worth Per New Connection
1	Tri-County Water Project	$ 6,200,000	$ 8,990,000	541	$ 16,617
2	Eastern Russell County Water Project	$ 17,328,000	$ 23,071,500	2,425	$ 9,514
3	Haysi to Honaker Water Project	$ 8,290,800	$ 10,804,800	1,380	$ 7,830
4	Western Russell County Water Project	$ 9,235,600	$ 11,861,700	1,404	$ 8,449
5	Clintwood-Pound-Wise County PSA Water Project	$ 3,491,700	$ 4,234,900	239	$ 17,719
6	Big Stone Gap-Norton-Appalachia-Lee County-Duffield Water Project	$ 9,058,569	$ 9,976,200	605	$ 16,490
*7	Clinch River Water Project	$9,740,300	$ 11,228,000	572	$ 19,629
8	Lee County - Jonesville West Water Project	$ 14,865,100	$ 17,687,700	1,008	$ 17,547
9	Tazewell County - Wardell/Claypool Hill to Tazewell Water Project	$ 5,142,600	$ 5,507,200	165	$ 33,377
TOTAL		$ 83,352,669	$ 103,362,000	8,339	$ 12,395 (average)

* Combination of Projects 7 and 7a.

Virginia Coalfields Regional Water Study
Water Sources / Providers

Project Number	Project Name	Water Source	Provider
1	Tri-County Water Project	Clinch River	Wise County PSA
2	Eastern Russell County Water Project	Clinch River/ Little River	Richlands / Tazewell Co. PSA
3	Haysi to Honaker Water Project	Flannagan Reservoir	John Flannagan Water Authority
4	Western Russell County Water Project	Clinch River / Big Cedar Creek	Wise County PSA / Lebanon
5	Clintwood-Pound-Wise County PSA Water Project	Flannagan Reservoir / Clinch River	John Flannagan Water Authority / Wise County PSA
6	Big Stone Gap-Norton-Appalachia-Lee County-Duffield Water Project	Clinch River / Tributaries of Powell & Guest Rivers	Big Stone Gap / Appalachia / Norton / Wise Co. PSA / Duffield Development Auth.
7	Clinch River Water Project	Clinch River	Scott County Water & Sewerage Authority
8	Lee County - Jonesville West Water Project	Powell River	Jonesville / Arthur Sewanee
9	Tazewell County - Wardell/Claypool Hill to Tazewell Water Project	Clinch River / Little River	Tazewell County PSA

PRIORITIZATION

Based on the existing needs and the future water and sewer demands presented in this report there is a significant need for water facility development within the Coalfields area over the 20-year planning period. A need has been identified to rank the projects in order to maximize the benefits to the area.

Ranking criteria have been developed in order to assist in the prioritization of the proposed water development projects identified in this report. These criteria were utilized in order to evaluate each project with respect to the number of new water connections served, present worth per new residential connection, elimination of health hazards, construction feasibility, the number of new residential connections which may be eventually served by the new network of lines provided in this study, and industrial/commercial growth potential. Each criteria was assigned a point value, which was utilized to measure how well a proposed project meets and/or addresses the intent of the criteria. A maximum of 100 points can be awarded to a project which satisfactorily meets and/or addresses the intent of all of the ranking criteria. Weighting factors are built in to each of the evaluation criteria based on their relative importance. The criteria were selected based on ranking criteria utilized by various funding agencies that provide funding for water projects. The following sections address the intent and related point values for each of the criteria.

Number of New Residential Customers Served by the Project (25 points)

The total number of new residential customers served by the project will be evaluated for each project. Since the objective of this study is to serve new customers, projects that serve more customers will receive more points.

This criteria shall be evaluated in accordance with the following point system:

0 to 499 new connections	=	5 points
500 to 999 new customers	=	10 points
1,000 to 1,499 new customers	=	15 points
1,500 to 1,999 new customers	=	20 points
more than 2,000 new customers	=	25 points

Present Worth per Connection

The total present worth of a proposed project (including construction, related, and annual O&M costs) will be evaluated with respect to the potential number of connections that will be served by the proposed project. The lower the cost per connection the more points that project will receive under this criteria.

This criteria shall be evaluated in accordance with the following point system:

$0 to $4,999 per connection	=	25 points
$5,000 to $9,999 per connection	=	20 points
$10,000 to $14,999 per connection	=	15 points
$15,000 to $ 19,999 per connection	=	10 points
$20,000 or more per connection	=	5 points

Elimination of Identified Health Hazards

If a proposed project will minimize/eliminate an existing health hazard, a maximum of 10 points will be awarded. Health hazards may include, but are not limited to, existing water systems with boil water notices or well sources that have been determined to be surface water influenced. Additionally, if a proposed project will provide potable water to an area that has poor water quality and/or poor water quantity, a maximum of 10 points will be awarded. Poor water quality hazards may include, but are not limited to, existing private well systems that have been contaminated by failing septic systems. Poor water quantity hazards may include, but are not limited to, residential areas that haul water or rely on cisterns. Proposed projects which do not target an identified health hazard will be awarded 0 points with respect to this criteria.

Construction Feasibility

Construction feasibility considers whether a proposed project will be connected to an existing system or whether it will be connected to another proposed project. If a proposed project can be connected to an existing water treatment plant without requiring modifications to the existing plant it will be awarded 10 points. If modifications are required to the existing water treatment plant prior to construction of the proposed facilities, the project will be awarded 5 points. If proposed treatment facilities must be constructed in order to provide a connection point for the project being evaluated 0 points will be awarded.

Residential Service Growth Potential

If a proposed project will potentially provide a source of water to permit the construction of other facilities adjacent to the project as outlined in this study, it will be given a higher score.

This criteria shall be evaluated in accordance with the following point system:

0 to 499 potential connections	=	4 points
500 to 999 potential customers	=	8 points
1,000 to 1,499 potential customers	=	12 points
1,500 to 1,999 potential customers	=	16 points
more than 2,000 potential customers	=	20 points

Industrial/Commercial Growth Potential

If a proposed project will potentially provide service to designated industrial/commercial growth areas as well as residential customers, it will be awarded 10 points. If a project will potentially provide service to commercial growth areas as well as residential customers, but has little significant industrial site development potential, it will be awarded 5 points. Projects that offer little to no potential for economic growth of any significance will be given 0 points.

The following is a ranking table showing the scores for each of the projects:

Virginia Coalfields Regional Water Study
Ranking Matrix

Project Number	Project Name	Residential Customers	Present Worth per Connection	Health Concerns	Construction Feasibility	Potential Residential Growth	Potential Commercial/ Industrial Growth	Total Score	Potential Rank
1	Tri-County Water Project	10	10	10	10	4	5	49	6
2	Eastern Russell County Water Project	25	20	10	5	8	10	78	1
3	Haysi to Honaker Water Project	15	20	10	10	4	0	59	4
4	Western Russell County Water Project	15	20	10	5	8	5	63	3
5	Clintwood-Pound-Wise County PSA Water Project	5	10	10	10	4	5	44	7
6	Big Stone Gap-Norton-Appalachia-Lee County-Duffield Water Project	10	10	10	5	8	10	53	5
7	Clinch River Water Project	10	10	10	0	8	5	43	8
8	Lee County - Jonesville West Water Project	15	10	10	10	8	10	63	2
9	Tazewell County - Wardell/Claypool Hill to Tazewell Water Project	5	5	0	10	4	10	34	9

The table which follows shows the priority ranking for each of the nine projects under consideration:

Virginia Coalfields Regional Water Study Priority Ranking	
Ranking	Project
1	Eastern Russell County
2	Lee County - Jonesville West
3	Western Russell County
4	Haysi to Honaker
5	Big Stone Gap - Norton - Appalachia - Lee County - Duffield
6	Tri-County
7	Clintwood - Pound
8	Clinch River
9	Wardell to Claypool Hill

INTRODUCTION

As a result of funding from House Joint Resolution No. 590, the LENOWISCO Planning District (PDC One) and the Cumberland Plateau Planning District Commission (PDC Two) were the recipients of an appropriation from the Virginia General Assembly for the completion of a comprehensive regional water supply and service study for the Virginia Coalfields Regional area. The Virginia General Assembly funded this study to perform a needs assessment for rural communities and to address appropriate funding and implementation strategies. Also, as a result of House Joint Resolution No. 592, the Virginia Water Resources Research Center at Virginia Polytechnic Institute and State University is preparing a companion report which will study innovative technologies and other options for providing drinking water to individual households and small communities in southwest Virginia unlikely to be served by public water.

The intent of the comprehensive water study is to develop, without regard to geographical or political boundaries, regional alternatives for water supply throughout planning districts one and two. This study, hereafter referred to as the Virginia Coalfields Regional Water Study (VCRWS), is the result of a combined effort by the LENOWISCO and Cumberland Plateau Planning District Commissions.

In order to evaluate the Coalfields Regional Study Area (CRSA), an assessment of the needs of rural citizens with little hope of water service from established central water providers is required. Thompson + Litton was hired to assemble the necessary engineering and cost information to evaluate potential sources of funding which might be available. Thompson + Litton has supplemented the team with the engineering firms of Dewberry and Davis, Lane Engineering, and Kendrick Engineering to assist with the preparation of the study.

To assist with the definition of the existing needs within the CRSA and to guide the engineering team throughout the study, an advisory/review committee was established. The Planning District Commissions felt it important that a representative sample of the stakeholders be involved in the preparation of this report. This committee was comprised of Public Service Authorities (PSA) staff, municipalities management staff, and Planning District Commission personnel from the affected areas. Several members of political governing bodies with a potential stake in the study were also invited to sit on this advisory committee. This committee was instrumental in defining the projects that have been evaluated herein. A list of committee members is attached.

Purpose and Scope

Purpose

The purpose of the Virginia Coalfields Regional Water Study is to develop and evaluate alternatives for regionalized water systems capable of providing water service to previously unserved areas and improving service to areas currently served. The alternatives include interconnections between existing and proposed systems located within the two planning districts. The intent of this study is to look at interconnections which would provide service to large groups of citizens who would not be candidates for inclusion in traditionally funded projects. In so doing, improved service to existing systems in the form of improved reliability provided by secondary sources will be achieved.

Interconnections imply that existing water providers would be hooked together to provide service to previously unserved areas. As an incidental impact, the reliability of each of the existing water systems would be improved, permitting transfer of water from one to the other in times of water shortage. The study area has been evaluated by looking for the largest and most reliable sources of water. The most reliable sources in the study area have been identified as the Clinch River, the Powell River, the North Fork of the Holston River, and Flannagan Reservoir. Findings of the study indicate that water is available in sufficient quantity in these sources to meet the needs of the citizens. Several of these sources are existing Water Treatment Facilities with excess capacities, while others include undeveloped or underdeveloped sources such as the Clinch River.

The study included a cooperative development of a list of projects to be studied. In addition to the projects proposed by the study team, the planning districts' staff and advisory committee provided input relative to the particular alternatives slated for evaluation. Inventories of existing systems will not be provided in this report. Data developed by the 604(b) studies and other preliminary engineering reports has been referenced in this study without being reproduced. Preliminary screening by the study team and the advisory committee identified nine regional interconnection projects which have been studied in sufficient detail to propose potential routes, capital and operational costs, and implementation strategy.

Scope

Thompson + Litton has been commissioned to prepare this study with an emphasis on obtaining data to be used in securing funding for regional projects which will have a maximum impact on the region. As a planning document, the study only evaluates each regional project in sufficient detail to assemble cost estimates. Use was made of the available 604(b) planning documents which had previously been prepared for Lee County, Wise County, Russell County, and Tazewell County. Reference has also been made to several Preliminary Engineering Reports recently prepared for system improvements within the study area. Broad brush preliminary engineering has been performed for the areas which had not previously been studied.

Uniform cost estimating methodology was developed to prepare estimates for the projects studied herein. Recognizing that construction costs may vary to some degree within the study area, uniform unit pricing has been used to justify cost estimates. Unit pricing was developed by averaging recent bid data from the entire area.

A detailed analysis of traditional funding sources has been performed. The means and methods of securing funding as well as program goals and objectives of each of the traditional funding sources have been examined.

Potentially, the most challenging issue in implementation of the regional projects described in this study is the determination of ownership and operation procedures for the large water distribution systems which will result when a project is completed. In many cases, it may be desirable to create authorities which cross over traditional political boundaries. In other projects, it may be more desirable to create an authority which governs only the transfer of water from one current owner to another. It may also be possible for the individual owners to create agreements which govern their working relationships with one another. Input has been obtained from the advisory committee relative to these issues, which, in many cases, will not be resolved during the production of this study. The goal of the study will be to present as many workable options as can be found to give the participants a base for beginning discussions at the inception of the project development.

METHODOLOGY

Present Worth Analysis

The cost of water system ownership can easily be separated into two categories. The first category is capital cost, which is the measure of the cost to install a new system. Capital costs are composed of "hard" costs, which include the price of new materials and the cost to install them. "Soft" capital costs are those which are related to the construction costs, such as engineering, legal, rights, and administration costs. A second cost of ownership of water systems is the annual operation and maintenance cost. This is the continuous cost of operating the system and keeping it in good repair. The present worth analysis provides a mechanism for accounting for all of the costs of the system in the analysis. Present Worth, as used in this report, is defined as the amount of money which must be placed on deposit today at eight percent interest for twenty years to pay all the capital and operation and maintenance costs for the planning period.

Project Overlap

Ten potential projects have been identified within the CRSA. Each of the projects has been studied as if it were a stand alone project. Impacts on existing sources of water were computed for each project as if it were the only project which would impact that source.

However, in several instances, more than one project would have impact on a specific source of water. For instance, the Tri-County, Western Russell County, and the Big Stone Gap-Appalachia-Norton-Lee County-Duffield Water projects all look to the Wise County PSA (Carfax) Water Treatment Plant near St. Paul as a potential source. If, for example, Carfax ends up being the most logical source for the Wise County-Lee County-Duffield project, then Lebanon and Castlewood may end up being a better choice for the Western Russell County project, which may then impact the choice of a source for the Eastern Russell County project. Since one of the major goals of this study is to maximize the use of our limited sources of water through cooperative efforts, it is most important that all water providers coordinate their planning efforts as these projects are addressed.

Accountability

Varying degrees of water system accountability may be found in the existing systems which were evaluated in this study. Accountability is a severe problem in some systems in the study area, many accounting for less than half of the water they produce. Determining the cause and cost of leak repair is beyond the scope of this study. However, as each project enters a more serious study phase, the effects of water leakage must be carefully considered. In many projects, it may be found less expensive to repair leaky systems than to construct additional treatment capacity. For the purposes of this study, the effects of leak repair and accountability improvement were not considered, and existing production rates for current users were maintained into future projections.

John Flannagan Water Authority

The United States Army Corps of Engineers has notified the John Flannagan Water Authority of various concerns relating to increasing the rate of withdrawal of raw water from the Flannagan Reservoir. Several of the proposed projects would require an increase in this withdrawal rate. The Corps of Engineers is currently studying the potential impacts. However, the results of the study will not be available for inclusion in this study. Potential impacts could include a purchase price for raw water, for which there is currently no charge. The impact of such a raw water charge has not been factored into this study.

Engineering Assumptions

Several engineering assumptions have been made while developing the costs for the projects in this study. The Virginia Department of Health (VDH) requires that detailed engineering studies commence when a treatment plant reaches a daily production averaging more than eighty percent of its rated capacity. Also, the requirement for beginning construction of expansion is tied to daily production averaging ninety percent of rated capacity. Some of the proposed projects in this study may cause the production at existing facilities to exceed the eighty or ninety percent capacities. For the purposes of the study, the assumption was made that one hundred percent of the capacity of existing facilities may be used in developing the new systems. Detailed engineering studies during project planning should explore the effects of these rules on the proposed projects.

Another basic engineering assumption relates to sizing of storage tanks. Virginia Department of Health Waterworks Regulations require that a minimum of 200 gallons of water be stored for each connection to a public waterworks. Storage tanks for the proposed projects in this study were sized using this criteria. However, in many cases, the volume of storage derived will not be sufficient to provide fire flows. Also, water line sized to transfer water to meet domestic demands will not be large enough to permit fire flows. For the purpose of the study, the assumption was made that fire flow capability was not essential. Some fire flow may be possible in portions of some of the projects, but fire flow was not used as the basis for design. Detailed hydraulic analysis was not performed on any of the proposed projects. Planning for the proposed projects should consider fire flow as each project develops.

New Regulations

The State of Virginia has the authority to regulate waterworks under the legislation Title 32.1, Chapter 6, Article 2, of the 1950 Code of Virginia, entitled "Public Water Supplies." The state agency established as the primary enforcement of the Safe Drinking Water Act is the Department of Health. This department has the responsibility of creating, amending, and repealing regulations that ensure a supply of safe, pure drinking water. The document that establishes the policies for all waterworks located within the State is known as the "*Commonwealth of Virginia State Board of Health Waterworks Regulations*".
The Environmental Protection Agency (EPA) sets drinking water standards as required by the Safe Drinking Water Act, amended in 1996. Several contaminant regulations have since been implemented by the EPA. These regulations are listed below and include a

brief explanation, as well as the impact of these rules on the potential water systems evaluated in this study.

Surface Water Treatment Rule

The Surface Water Treatment Rule requires that all utilities served by surface water and/or groundwater under the direct influence of surface water must comply with the requirements of this rule. The rule establishes criteria which provide optimum protection from contamination due to microbial invasion. The "Waterworks Regulations" previously required filtration of all surface water supplies. The primary impact will be on spring and well sources that are deemed by the State to be surface water influenced. Once a source is considered surface water influenced, the waterworks has eighteen months to do one of two things: provide filtration for the water supply, or find an acceptable alternate supply.

A small protozoan organism, known as Cryptosporidium, is included in the Enhanced Surface Water Treatment Rule. Public concern of disease outbreaks caused by Cryptosporidium has lead to the encouragement of regulation of the organism. If this rule is modified to require a higher degree of filtration, it could have an impact on all potential water treatment plants within the study area.

Total Coliform Rule

Maximum contaminant levels for total coliform bacteria, known as the Total Coliform Rule, was created in December of 1990. Both surface water and groundwater must be monitored, with the sampling requirements being based on the population served.

This regulation does not have a significant impact on public waterworks systems since it has been successfully implemented over time, but some unchlorinated private systems may require the use of chlorination to consistently meet this rule.

Lead and Copper Rule

Waterworks must provide non-corrosive water to their customers through the requirements of the Lead and Copper Rule. This rule was established in order to prevent soluble lead and copper contamination. A requirement of this rule states that the water supplier must obtain samples from the customer's interior plumbing system at locations appearing to be most susceptible to corrosion problems. Treated water with low pH, hardness, and alkalinity values is the most likely to have problems meeting this requirement. Waterworks exceeding the level of 0.015 mg/l lead or 1.3 mg/l copper must implement a corrosion treatment plan and begin a public education program.

Phase II and V Rules

The Phase II and V Rules establish maximum contaminant levels for 76 contaminants including synthetic organic chemicals (SOCs), volatile organic chemicals (VOCs) and inorganic chemicals. This regulation requires that the water system be tested for inorganic contaminants once per year for surface waters and once every three years for groundwater. It also requires that the water system be monitored quarterly for three years for organic chemicals.

Radionuclides Rule

The proposed Radionuclides Rule will address contaminants such as uranium, radium, radon, gross beta particle and photon emitters and gross alpha emitters. Monitoring is required which specifies quarterly samples every four years. Finalized rules on radium and uranium are to be completed by December, 2000.

Disinfectant/Disinfection By-Product Rule

The Disinfectant/Disinfection By-Product Rule was proposed in July, 1994. This Rule contains two stage provisions and is the result of a negotiation process. Maximum contaminant levels (MCLs) must be met when using either chlorination or ozonation systems. Systems with poor raw water quality must begin sampling for Giardia and Cryptosporidium. Log removal levels will then be determined by using this data. Stage One establishes maximum contaminant levels for total organic carbon, total trihalomethanes, and total haloacetic acids.

Stage Two of this proposed rule will be based on research that will determine the most cost effective methods to reduce total contamination and by-products associated with disinfection. Stage Two will be completed before the criteria for Stage One are finalized.

Conventional systems that treat and supply water to study area residents will be required to operate with "enhanced coagulation" unless the TOC concentration in the filtered water is less than 2.0 mg/l. Enhanced coagulation will require that the system must remove a yet undetermined amount of organics in the coagulation process. Systems serving fewer than 1,000 people will not be required to meet this proposed rule until 1999.

Groundwater Disinfection Rule

The proposed Groundwater Disinfection Rule (GWDR) requires that water suppliers using groundwater as a source must provide disinfection. It is expected to require continuous chlorine residual monitoring for systems that provide service for a population of 3,300 or more. Systems can obtain a waiver to this rule if certain criteria are met, such as meeting one or more of the natural disinfection criteria and all of the other prequalifying conditions. Most public water systems provide disinfection to water before distribution, but many of the private water systems will be affected by this rule unless they qualify for the waiver previously mentioned. The conditions for receiving a waiver are contained in the Groundwater Disinfection Rule Amendment to the Safe Drinking Water Act of 1996.

Arsenic Rule

The Safe Drinking Water Act of 1996 has required that a proposed Arsenic Rule be established by January, 2000, and a final rule be in effect by January 2001. The rule is proposed to place limitations on the amount of arsenic in the water supply. However, the cost for treating low concentrations of arsenic is high and the overall health effects are not completely known. Monitoring is required and will occur once per year for surface waters and once every three years for groundwater.

Filter Backwash Recycling Rule

The purpose of the Filter Backwash Recycling Rule is to prevent the return of heavily concentrated contaminants removed by filters into a water system. This rule may be a part of the Enhanced Surface Water Treatment Rule (ESWTR).

Sulfate Rule

The purpose of the proposed Sulfate Rule is to regulate the amount of sulfate in public water systems. This rule was proposed in December, 1994. Prior to issuing a final Rule, research on the health effects of sulfate must be conducted. This research is expected to be completed by January, 1999.

FUNDING

General

To construct public utilities for any of the projects outlined in this study, significant financial assistance will be required. Financial assistance, in the form of grants and low interest loans, is available from agencies of both the Federal and State Governments. Frequently, it is a problem attempting to finance a single large project by relying on these traditional funding sources, as state and federal budgets fix the total amount of money available during the fiscal year to be spent funding water projects in the state. Significant delays in project implementation are to be expected if all project money must come from the traditional sources of funds. Therefore, a discussion of some non-traditional, as well as the traditional sources of funding have also been included.

A description follows of the traditional sources of funding normally used in funding large waterworks projects:

Traditional Funding Sources

U.S. Department of Housing and Urban Development/Virginia Department of Housing and Community Development

The U.S. Department of Housing and Urban Development (HUD) sponsors a block grant program through the Virginia Department of Housing and Community Development (VDHCD), which provides grants for projects that include water and sewer service extensions. The Community Development Block Grant (CDBG) applications are due in March each year. Any eligible community may apply for the full grant amount of $700,000 per year per project. Communities may apply for up to two grants, provided each grant is for a separate project. However, the combined total for the two grants cannot exceed $1,000,000. Regional projects that serve two or more separate communities can be funded at $700,000 per community up to a maximum of $2,100,000. A community's chances of receiving funding from CDBG are improved if leverage funds are available. Leverage funds are any monies that have already been acquired for the project or are likely to be acquired for the project. Therefore, any federal, state, or local monies that are not already committed to another project can be used as leverage funds. CDBG funds must be used within two years after being awarded and the community is not eligible to apply for a new grant until any existing CDBG funded projects are 75 percent complete. Most of the benefits of CDBG funds are intended to go to Low and Moderate Income (LMI) households. A community must have at least 51 percent of the users within the project area to qualify as LMI's to be eligible for funding from this program. However, to be competitive, at least 60 percent of potential customers must meet LMI criteria.

Rural Development

Rural Development (RD) sponsors a program to help fund the design and construction of rural water and sewer systems. If a community qualifies as financially needy, it may receive up to 75 percent of the eligible project cost as grant with the remaining 25 percent in the form of a low interest loan. A pre-application is required to arrange for Rural Development financing followed by a final application if funding is approved. Rural Development loans are secured by either General Obligation or Revenue bonds for municipalities. Rural Development loans to public utility companies and authorities that do not have taxing authority are backed by Revenue bonds. Pre-applications may be submitted at any time during the year.

Appalachian Regional Commission (ARC)

ARC administers a grant program that provides funds up to $500,000. The main focus of this program is to fund projects that will create or retain jobs. However, designated Distressed Counties can apply for ARC funds for projects that are not job related. Those counties in the Coalfields Region are Buchanan, Dickenson, Lee, Russell, and Wise. Projects must meet the criteria established by ARC to be eligible for this funding. The ARC funds are usually tied into and administered by other funding sources, such as Rural Development

Abandoned Mine Land (AML)

In 1990, Congress amended the Surface Mining Control and Reclamation Act (SMCRA) to allow funding for water projects involving protection, repair, replacement, construction, or enhancement of facilities relating to water treatment, supply, or distribution in AML affected areas.

A complete description of the funding policies and procedures is contained in the "AML Water Project Review Manual" which is available through the Commonwealth of Virginia Department of Mines, Minerals and Energy. The maximum funding available for each project is set at $750,000. All funding is in the form of a grant. A community may have only one AML grant at a time, however, once 75 percent of the funds for a project are expended, the community is again eligible to apply for new project funding.

Virginia Water Supply Revolving Loan Fund

The 1997 Virginia General Assembly enacted legislation creating the Virginia Water Supply Revolving Loan Fund. The annual appropriation to this fund is almost $30 million. Loans from this fund may only be used to alleviate problems related to drinking water with priority given to those supplies which pose a serious health risk. Interest rates for these loans range from 0 to 3.0 percent. Communities can qualify as "distressed" by meeting certain specified criteria. Distressed communities can qualify for low or "no" interest loans and thirty percent of the annual funding is set aside for "loan subsidies". These loan subsidies can include "forgiveness of principal" if certain criteria can be met. Distressed communities can also qualify for loans with up to 30 year terms. Eligibility is determined by the Virginia Department of Health and the loans are administered by the Virginia Resources Authority.

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 initial funding for the CDWF 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 1998, approximately $30,000 is available for all projects. As the program grows, as much as $300,000 to $500,000 may be available annually. 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

Virginia Resources Authority (VRA)

This source of funds may only be used for water, sewer, and drainage projects. VRA issues bonds in the national market and lends the proceeds to political subdivisions of the state. The bonds may be either General Obligation or Revenue backed dependant upon whether or not the borrower has the authority to levee taxes. By using the "moral obligation" of the State, VRA can offer favorable interest rates to the small borrower on Revenue bonds.

VRA may issue up to $300 million in revenue bonds to localities for improvements to water and/or wastewater facilities. The bonds may be either short or long term, fixed or variable rate debt with each financing structured on current market conditions and investor preference. In general, due to State backing, the VRA can obtain more attractive rates than most local governments. Localities must demonstrate the ability to repay the bonds.

Economic Development Administration (EDA)

This program is tied closely with unemployment and overall economic development. Projects are ranked based on their potential for creating new jobs, saving existing jobs, and stimulating new economic development within the project area. New projects to be funded by this source must have firm industrial committments prior to grant award. Grants from EDA range from 50 to 60 percent of total project cost. A grant from $500,000 to $750,000 per project is thought to be the typical maximum funding allowed. To obtain this funding, projects must be ranked high in the Overall Economic Development Program (OEDP) of their respective Planning District Commissions.

Southeast Rural Community Assistance Project, Inc.

The Southeast Rural Community Assistance Project, Inc.(formerly Virginia Water Project, Inc.) operates grant and loan programs for low income rural communities. The grant program provides limited funds for development of water facilities to low income rural residents. These grants will provide up to $400 each for connection fees to eligible low income households. Depending upon the income level of the community, grant funds are sometimes available for preparation of detailed preliminary engineering reports for water and/or sewer systems. The loan program provides up to $100,000 per project with interest rates ranging from 3 to 7 percent, with terms of up to 20 years.

Non-traditional Funding Options

As discussed in the previous paragraphs, there are numerous funding sources available that provide both grants and/or low interest loans for water projects. Due to the high costs of many of the proposed projects presented in this study, funding provided by traditional sources may not be adequate to reduce user costs to an affordable level.

Private Bond Sales

The Private Bond Market has become a legitimate alternative for the funding of the projects contemplated in this report for several reasons: First, interest rates on bonds continue to drop to near record levels. Second, discount rates continue to fall as more underwriters enter this new competitive market. Many of Virginia's finest investment banking firms now provide avenues for nonrated localities to access the market for selling bonds. Third, the concept of combining system resources to create regional authorities with a larger customer base makes the sale of revenue bonds on the private market a viable alternative. Finally, the process required for selling bonds on the private market requires very little red tape as compared to many of the traditional funding options with fewer restrictions on where the proceeds are spent. Therefore, it is strongly recommended that this option be evaluated for the projects under consideration. The services of a bond underwriting firm/financial advisor would need to be procured in order to proceed.

Design-build-finance (Operate):

There are many private utility companies who specialize in potable water supply and delivery in Virginia. One such company, the Bluefield Valley Water Works Company (BVWWC), has successfully operated systems in the eastern region of Tazewell County for several years. BVWWC is a subsidiary of a nationally known and publicly held potable water company known as the American Water Company (AWC). The AWC also owns and operates systems in southern West Virginia and sells water to Bland County, its supply to the Rocky Gap and Bastian, Virginia systems along I-77. AWC also owns the water system for the city of Petersburg, Virginia. The possibility of offering a franchise to a finance, design, build, and operate company could bridge the resource gap so often realized in this region.

Privatization

We have discussed some of the benefits of privatizing public systems in the implementation section of this report from an operating perspective. However, the financing possibilities of this option are no less intriguing. Many of the local government systems in southwest Virginia were paid for with substantial grants in the 1960's and 1970's when large scale grants were funded on a regular basis. Moreover, many of our localities, if not all, were eligible for low interest on subsided loans offered by the state and federal government programs. Many of these loans have been or are nearing retirement. The result of this is a large amount of equity built-up in these systems with solid customer base in place.

Privatization offers the possibility through franchising the operations and customer base on outright sale of systems to recover this equity. Proceeds from equity could then be leveraged by other state and/or federal government programs to fund the strategic links envisioned by this study. In effect, a revolving grant/loan fund is created by recovering the equity built-up in these systems and reusing these dollars to expand the customer base. This result is a greater economy of sale for rate making a more efficiently operated system.

Special Legislation

For the past 30 years, a considerable effort has been made to fully develop and extend water service throughout the Coalfields region of Virginia. Because specific financing sources are geared to specific issues, i.e. Economic Development Administration for economic development activities, Community Development Block Grant for assistance to low and moderate income persons, Appalachian Regional Commission also for economic development, the upper limits of serving additional households and linking systems with a comprehensive system has been reached using these resources alone.

The gaps between systems that now exist will not immediately generate sufficient revenue without some type of unconventional financing. None of the existing sources available would address these particular needs. The Commonwealth of Virginia could make a compelling argument for an investment for state general fund dollars to assist in these strategic linkages, primarily transmission lines.

This would obviously require appropriations by the Virginia General Assembly, hopefully with the support of the Governor, and could not be done in any single year biennium. It is an initiative which could be pursued as a recommendation of the Joint Subcommittee studying drinking water supply problems and funding mechanisms to correct drinking water deficiencies in southwestern Virginia (HJR 104), and by extension, the Virginia General Assembly as something to be considered.

A more effective and financially creative way to generate these construction dollars would be the issuance of bonds by the Virginia Resource Authority (or some similar organization authorized to issue bonds). Debt service for the bonds would be funds appropriated by the General Assembly. The bond proceeds would thus appear as a grant to construct these key regional linkages.

In the short term, the General Assembly might consider a one-time appropriation to finance actual preliminary engineering reports (for Health Department approval), environmental assessments, intermunicipal agreements, and other required technical work. This would accelerate these regional projects from a conceptual planning stage to readiness for construction. As with this particular study, the two PDCs would be the fiscal agents to receive and disburse these funds. A budget request of $ 500,000 is hereby recommended.

IMPLEMENTATION

General

One of the vital issues to the success of a regional water supply system is implementation. Two major questions must be answered before the project can progress: 1) What organization will own and operate the system after it is installed?, and 2) How will the users pay for their share of the project? These questions must be resolved early in the planning stages of the project if it is to succeed. For most of the projects described in this report, there are several ways that implementation may be handled. A brief description of the optional implementation methods follows:

Regional Authority

One option which should be considered for each of the projects described in this study is the Regional Authority. Such a Regional Authority could be established which could cross any political boundary such as public service authority, county, town, city, or planning district. In this option, each of the owners of existing water systems would give up their systems to form a regional authority which would own and operate all of the existing and new facilities and serve all the customers within the service area. Each of the original system owners would have a seat on the new authority. Each newly served area would also have representation on the authority.

Several advantages would arise from such a plan. Each of the individual existing system owners would be able to get out of the water supply business and allow the authority to deal with the issues that arise. The authority would assume the debts of each of the existing owners. Rates could be set uniformly across the service area. An economy of scale would be realized by allowing one operations and maintenance staff to serve the entire area rather than duplicating staff in each of the individual areas.

There are several disadvantages of the regional authority. The individual water owner will no longer have exclusive control of the water system. Rates will be set by the authority rather than by the individual system owner.

Intermunicipal Agreements

Another option for implementation of a regional transmission and distribution system would entail the negotiation of contracts between the owners of individual existing systems to facilitate interconnections. In this option, the owners of existing systems would retain ownership of their water systems and agree to sell and/or buy water from their neighbors in order to regionalize water service in the area. One of the individual authorities, such as a public service authority or a town, would be the lead agency. It is necessary for one agency to take the lead in order to facilitate the financing of the project and the installation of the new capital improvements.

Advantages to the individual water owners would include retaining control of their waterworks, retaining the ability to establish (or negotiate) rates, and the ability to maintain their existing staffs.

Several disadvantages can be found in using intermunicipal agreements, however. Financing will be easier for large regional authorities to obtain than for individual water system owners. Some difficulties may be encountered in working across political subdivisions in this manner. Multiple operations staffs will be required in this mode, which will not realize the benefits of a larger economy of scale.

Privitization

Another potential alternative for regionalizing systems could entail the involvement of private utility operating companies and their capital. There is a trend across the country toward "cashing in" on the equity and customer buildup in public utilities. This trend is being driven by ever increasing regulatory requirements that place operating burdens beyond the ability and resources of many local governmental bodies. There is also a desire on the part of elected officials to leverage their public dollars to the greatest extent possible. Equity and customer bases are more attractive today on the open market than ever. This creates the possibility of private/public partnerships on large scale regional systems such as those contemplated in this report.

Placing selective systems (or their customers) for sale to private entities could generate additional capital for matching grants and loans from public services to fund strategic links between individual systems.

There are advantages to this alternative of implementation. If a private company owns and operates a public utility such as a water distribution system, the user rates must be approved by the State Corporation Commission. This would ensure a fair process in rate setting. Also, each individual owner may not be maintaining their own system. It may also be possible for a private company to raise capital for water system extensions, making system expansions easier. A private owner of a larger system could also enjoy the economy of scale in operation of the system with resulting rates being lower than that possible for individually operated systems.