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INFORMATION FOR STATES ON DEVELOPING AFFORDABILITY CRITERIA FOR DRINKING WATER

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Preface

The 1996 Amendments to the Safe Drinking Water Act (SDWA) recognize that the affordability of drinking water may be an issue for some water systems, especially small systems. The Amendments provide State drinking water programs with important new tools to help address affordability concerns. The provisions of the Amendments which most explicitly address affordability are variances, exemptions, and the Drinking Water State Revolving Fund (DWSRF).

Small system variances will, under certain circumstances, allow systems which cannot afford to comply through other means to utilize more affordable "variance technology." Exemptions will offer small systems facing compelling economic factors up to nine additional years to achieve compliance. The DWSRF will provide financial assistance to systems to assist them in achieving compliance. Affordability considerations play an important role in the implementation of each of these provisions. States wishing to take full advantage of these provisions will need to develop affordability criteria.

The 1996 Amendments require the United States Environmental Protection Agency (EPA) publish, within eighteen months of the statute's enactment, information to assist the States in developing affordability criteria. The statute requires that EPA develop this information in consultation with States and the Rural Utilities Service (RUS) of the U.S. Department of Agriculture. In order to fulfill this mandate and to ensure consideration of all key stakeholder ideas, EPA, through its National Drinking Water Advisory Council (NDWAC), established a broad based working group, whose members included States and RUS, to guide development of this information document. This document reflects the thorough review by both the working group and NDWAC, as well as public comment solicited through a Federal Register notice (62FR62308 (November 21, 1997)).

Under the 1996 SDWA Amendments, States have complete discretion in developing their affordability criteria. States are not required to submit their affordability criteria to EPA for any type of review or approval. Once States have formulated their affordability criteria, RUS suggests that they seek comment from their Rural Development State Director.

1. Affordable Paths to Compliance

The Safe Drinking Water Act (SDWA) Amendments of 1996 recognize that the affordability of drinking water may be an issue of concern for some systems, especially small systems. Three important provisions of the Act speak directly to affordability. Section 1415(e) provides for affordability-based variances, under certain circumstances, for small drinking water systems. Section 1416 allows for exemptions that provide systems facing compelling economic factors additional time to comply with SDWA requirements. Small systems could receive as long as nine additional years to comply. Finally, section 1452(b) provides that affordability on a per household basis shall be one of the three factors used to prioritize systems for assistance from the new Drinking Water State Revolving Fund (DWSRF).

The Act provides small water systems with alternative paths to compliance, as depicted in Figure 1. Each path incorporates consideration of affordability — the ability of a water system and its customers to support the cost of compliance.

The first path leads to compliance via technologies considered affordable according to federal criteria. This path is generally outside the scope of this information document. The second and third paths involve the application of State-developed affordability criteria, which are the focus of this document. The second path leads to compliance via alternative water sources and structural changes in utility operations (such as interconnection with another system). The third path leads to compliance through a conditional variance.

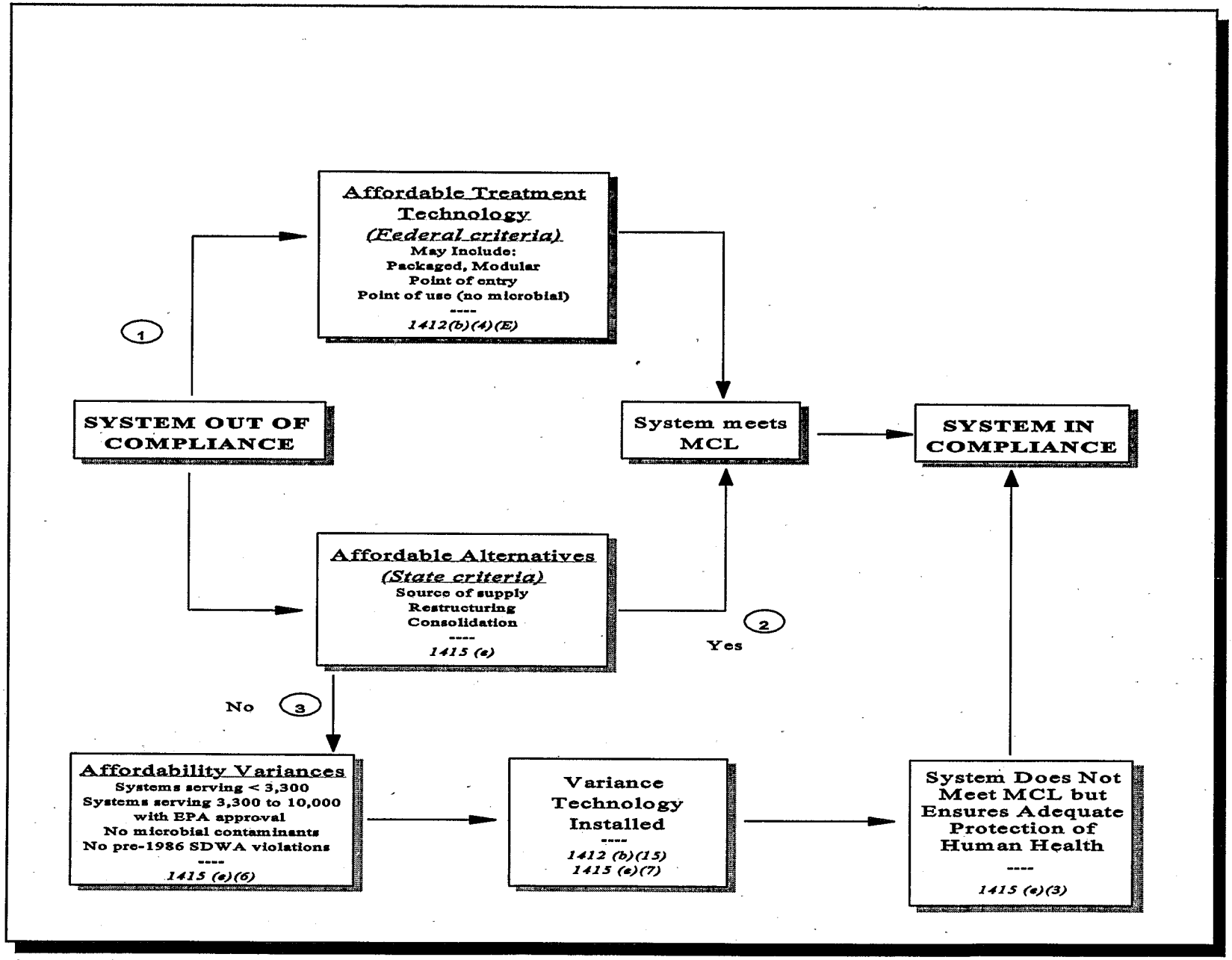

Figure 1. Paths to Compliance for Small Water Systems Pursuant to the 1996 SDWA.

Section 1415 of SDWA as amended in 1996 allows States with primary enforcement responsibility (or the United States Environmental Protection Agency (EPA) for States that do not have primary enforcement responsibility) to grant variances for compliance with requirements specifying a maximum contaminant level (MCL) or treatment technique. See Table 1 for a summary of the decision framework for variances pursuant to the 1996 Amendments to SDWA.

Variances can be granted to:

- Public water systems serving 3,300 or fewer persons and
- Public water systems serving more than 3,300 but fewer than 10,000 persons with the approval of the EPA Administrator.

Table 1. Decision Framework for Variances Pursuant to the 1996 SDWA Amendments

General Eligibility	1. Systems serving fewer than 3,300 persons. 2. Systems serving more than 3,300 but fewer than 10,000 persons (with the approval of the EPA Administrator).
Affordability Conditions of Variance	3. Compliance through treatment installation is not affordable according to State affordability criteria. 4. Compliance through development of an alternative water supply is not affordable according to State affordability criteria. 5. Compliance through restructuring or consolidating with another water system is not affordable according to State affordability criteria, or is deemed by the State not to be practicable.
Health Conditions of Variance	6. The variance cannot apply to microbial contaminants or to standards established prior to 1986. 7. The terms of the variance must ensure adequate protection of human health.
Technology Conditions of Variance	8. The system must install, operate, and maintain a variance technology.

In accordance with affordability criteria established by the State (or EPA if the State lacks primacy), a system is eligible for a variance *if it cannot afford to comply* with a national primary drinking water regulation by:

- installing a water treatment method;
- developing an alternative water supply; or
- restructuring or consolidating with another water system (unless the State makes a written determination that restructuring or consolidation is not practicable).

Granting variances is subject to public health considerations. When granting a variance, the primacy agency must be satisfied that the terms of the variance will ensure adequate protection of human health. Variances are not available for microbial regulations or for standards established before 1986.

Variance technologies will be identified by EPA only in those circumstances where nationally affordable compliance technologies cannot be identified. The list of variance technologies must be reviewed by EPA every seven years, or following the submission of a petition supported by substantial information. Variance technologies will be affordable but they will not necessarily achieve the quality standard set by the MCL. Variance technologies must achieve the maximum reduction that is affordable, considering system size and source water quality. Again, the variance technology selected must ensure adequate protection of public health.

Water systems must comply with the conditions of the variance within three years. Two additional years may be allowed if the State determines that additional time is necessary to implement capital improvements or to allow the system to obtain financial assistance. The Act specifies that each system granted a variance must be reviewed at least every five years after the compliance date established in the variance to determine whether the system remains eligible for the variance and is conforming to each condition of the variance (§1415 (e)(5)).

Systems are not the only thing subject to reexamination. SDWA specifies that "affordability criteria shall be reviewed by the States not less often than once every five years to determine if changes are needed to the criteria" (§1415 (e)(7)(B)). The Act also provides for a periodic review of State programs by EPA to ensure that variances comply with the provisions of the Act. EPA's review with regard to affordability is limited to a determination that all variances granted comply with the State-determined affordability criteria. The State and public will be notified if EPA finds that variances granted are not in compliance with the State's affordability criteria (Section 1415 (e)(8)(A) and (B)). Appendix A includes Section 1415 (e) of SDWA which addresses affordability and variances.

In addition to the variance provisions, affordability is also addressed in SDWA provisions related to the State Revolving Fund (SRF) (see Appendix B) under §1452 (b). States that enter into the capitalization agreement are required to prepare an annual Intended Use Plan (IUP) that includes a prioritized list of projects for assistance.

According to the Act (§1452 (b)(3)(A)):

> An IUP shall provide, to the maximum extent practicable, that priority for the use of funds be given to projects that—
>
> (i) address the most serious risk to human health;
> (ii) are necessary to ensure compliance with the requirements of this title (including requirements for filtration); and
> (iii) assist systems most in need on a per household basis according to State affordability criteria.

The Act further allows States to provide up to 30 percent of their capitalization grant to "disadvantaged communities," which is defined by the Act as "the service area of a public water system that meets affordability criteria established after public review and comment by the State in which the public water system is located."

States may wish to establish different, possibly more rigorous, affordability criteria for variances than they establish for their SRF. This information document has been prepared specifically to assist States in establishing affordability criteria for variances (as directed by section 1415(e)(7)(B) of SDWA as amended). However, the concepts, information, and framework provided herein will also be useful in establishing affordability criteria for SRF purposes.

2. Drinking Water and Affordability

One of the central challenges of modern environmental management is the provision of safe drinking water at an affordable price to citizens. Consumers generally pay far less for water services than for energy and telecommunication services, although available statistics may mask water costs for customers who pay through taxes or rent.

Water prices are primarily a function of water costs. Factors that increase water costs include compliance with drinking water standards, replacing and improving the water delivery infrastructure, and meeting demand growth. Costs associated with meeting demand growth should be recovered through a fair capacity charge plan under which users benefitting from the increased capacity pay for it. Debt costs associated with financing projects over time also put pressure on rates. Another factor that can play a significant role in contemporary rate increases is historic underpricing. For some water systems, the loss of subsidies and the need to begin pricing water more accurately to reflect costs can account for substantial, but necessary, rate increases.

Rising costs and prices for water may force a change in consumer expenditure patterns. The cost of compliance with drinking water standards is only one of several factors contributing to rising water prices. Water prices send customers a crucial signal about the value of quality water service. However, for some communities, higher prices may strain water system and household budgets.

Affordability is a function both of the price of water service and the ability of households (and other water users) to pay for this service. Thus, drinking water can be made more affordable by reducing the cost of service, increasing the ability of users to pay, or both. For systems which qualify, variances may offer a lower cost approach to SDWA compliance.

There are many other possible approaches to lowering the cost of service. Economies of scale offer the most promising means of lowering the unit cost of production, and thus, consumer bills (although not in every circumstance). Economies of scale are particularly relevant for source-of-supply and treatment functions and can be achieved through mergers, acquisitions, interconnection, and wholesale water markets. However, once systems reach a viable size, which varies by geographic location, there is a smaller benefit to an additional increase in system size. Some economies can be achieved through common ownership or management even without the benefit of physical interconnection. Lower cost treatment technologies also provide an important potential means of making SDWA compliance more affordable. The 1996 SDWA Amendments include point-of-use and point-of-entry technologies among possible compliance options. Finally, low-cost loans, grants, and subsidies can help reduce the costs that must be recovered from customers.

Household Willingness-to-Pay vs. Ability-to-Pay

A critical distinction when considering affordability is the difference between *willingness-to-pay* and *ability-to-pay*. Willingness-to-pay reflects consumer preference about purchasing a quantity of goods or services relative to prices. As prices rise, particularly for essential goods and services, consumers may demonstrate a reluctance or unwillingness to pay. A price-responsive consumer, for example, might reduce water usage in response to a rate increase. A large percentage increase in

rates sometimes induces rate shock or a significant reduction in water usage (at least in the short term). Rate shock also might induce some customers to *complain* about price increases to ratemaking authorities (local governing bodies or State public utility commissions), *even if those price increases are cost-justified.* At some point if alternatives are available, customers may not be willing to pay the higher rates of the water utility. Beyond water conservation, some customers may be able to bypass the system through self-supply, such as drilling a private well.

Concerns about how customers will react to price increases can discourage some water systems from recovering actual costs. A widely held view in the water sector is that water in many areas has historically been *underpriced.* It is difficult to assess the extent to which this is actually the case. Artificially low prices would lead to inefficient water use and inaccurate public perceptions about the cost of water. Raising prices, no matter how well justified, can trigger an apparent unwillingness to pay. In the realm of willingness-to-pay, consumers *can* make choices.

However, higher prices do not always result in a reduction in water usage. Since water costs are smaller than other utility costs, customer education about the cost of service may heighten perceptions of the value of water and mitigate the impact of the rate hike. In a similar vein, customers may be influenced by neighboring communities' water rates, particularly small rural systems. Users are willing to pay rates that they perceive as fair and comparable.

Ability-to-pay raises another host of issues. Ability-to-pay focuses not on whether consumers *will* pay for water service, but whether consumers *can* pay for water service. Ability-to-pay is primarily a function of income related to the cost of living, which in turn is primarily a function of employment. Income (weighted by the cost of living) and employment measures often are used in estimating a community's socioeconomic conditions and the related ability of consumers to support utility costs.[1] Fixed costs, such as housing, property taxes, utilities, and other necessities, take a smaller share of household income for households with higher income levels. For low-income households, the higher proportion of income allocated to fixed costs can make paying bills more difficult. The availability of income assistance or bill-payment assistance programs can mitigate this problem.

Finally, rate design by utilities can affect the ability of individual households to pay for basic services. Some rate structures, such as lifeline rates, are specifically designed to keep a basic block of usage affordable. A "progressive" rate, like a progressive tax or an increasing-block rate structure, charges a higher unit price for higher levels of usage. Other rate structures, such as single-tariff pricing, are designed to spread costs over a wider service population so that service to high-cost areas (such as those with a very small customer base) is more affordable.[2] Some publicly-owned water systems recover more of their costs through property taxes, income taxes, and more

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[1] Income must be weighed in the context of the cost of living. A household's ability-to-pay with a $30,000 income in one county may be the same as a household with a $22,000 income in another county.

[2] Single tariff pricing can also have the opposite and unexpected effect, so it should be evaluated carefully. If you combine an urban area with dense population and an efficient water system with a suburban area where customers are widely spread, you may end up with urban customers with a higher percentage of low-income residents subsidizing wealthier suburban residents.

progressive, revenue-related sources than through water charges.

Varying assumptions about rate design can affect the results of an affordability analysis in important ways. In other words, the effect of rising costs on affordability can be exaggerated or mitigated by means of the rate structure. Thus, analysts may want to explore the availability and acceptance of rate design options when considering the household impact of cost and price increases.

As demonstrated in Table 2, high prices (or large rate increases) alone do not necessarily indicate an affordability problem; similarly, low ability-to-pay may not present an affordability problem if water prices are very low. States seeking to measure affordability may want to use several indicators to determine a system's ability-to-pay.

Table 2. Relationship of Water Prices to Household Ability-to-pay.

Household Ability-to-Pay		Water Prices: *Selected factors that can raise water prices* •Compliance costs •Infrastructure improvement costs •Demand growth costs •Debt costs •Correction of historic underpricing	Water Prices: *Selected factors that can lower water prices* •Economies of scale •Affordable technologies •Low-cost loans •Grants •Subsidies
Selected factors that lower ability-to-pay	•Low income levels •Unemployment •Nondiscretionary obligations •No income or payment assistance •Regressive rate structures	High prices and low ability-to-pay	Low prices and low ability-to-pay
Selected factors that raise ability-to-pay	•High income levels •Employment •Discretionary expenditures •Income or payment assistance •Progressive rate structures	High prices and high ability-to-pay	Low prices and high ability-to-pay

Community and Water System Ability-to-Pay

Generally, ability-to-pay is determined at the household level. However, a community's ability-to-pay can be thought of in terms of the aggregation of household ability-to-pay. This issue is relevant because of variations in income distribution from community to community. Communities with isolated pockets of poverty but healthy overall income levels are in a better position to provide payment assistance or to use progressive rate structures to provide affordable water service to those in need.

Affordability is often assessed at the water system level in terms of the capacity of systems (or the communities that operate them) to finance system capital improvements and operations. Water system financial capacity is dependent to a large degree on household ability-to-pay within the service territory. Some communities may qualify for low-cost capital or other assistance programs on the basis of ability-to-pay measures or other indicators of socioeconomic or fiscal distress.

3. Affordability Assessment

In the 1970s, the concept of affordability was introduced by EPA's Office of Water as it sought to make better decisions and incorporate economic considerations into the Construction Grants Program for wastewater treatment facilities. Specifically, EPA wanted municipalities with Publicly-Owned Treatment Works (POTWs) to demonstrate their capability to finance and manage the construction and operation of facilities.

At the same time, the Office of Drinking Water was developing its own concepts of affordability. The 1980 Water Utility Financing Study (WUFS), was prepared in response to a 1977 Congressional requirement that EPA study the cost of complying with new drinking water regulations and investigate alternative methods of meeting compliance costs (including construction grants and loans). The study devoted substantial attention both to system-level affordability and household affordability. However, budget pressures in the 1980s caused the postponement of proposals for construction grants and loans.

Pursuant to the 1986 SDWA Amendments, the Office of Drinking Water continued to develop affordability measures. In particular, affordability criteria were needed to determine what constitutes the Best Available Technologies (BAT) for variances under §1415 of SDWA. In addition to system-level financial variables, analysts also began to consider the role of household affordability in determining system viability or capacity.

State regulatory agencies, including both primacy agencies and public utility commissions, expressed concerns about systems that could not meet standards at prices considered "affordable" to residential customers (see Appendix C). The public utility commission perspective should be placed in the context of rapidly rising energy prices in the 1970s and early 1980s which precipitated the federal Low-Income Home Energy Assistance Program (LIHEAP), utility percentage-of-income payment plans (PIPPs), and least-cost energy planning.

Concerns about funding for federally mandated standards continued to bring attention to the issue of drinking water affordability. In the 1990s, EPA's Office of Policy, Planning, and Evaluation (OPPE) worked to develop a consistent agency-wide affordability policy. In 1995, the Congressional Budget Office reviewed EPA methodologies for estimating SDWA impacts as a case study in the context of the "unfunded mandates" debate. Enactment of the 1996 SDWA Amendments has refocused attention on affordability issues by specifically recognizing the need for States to develop affordability criteria.

United States Environmental Protection Agency Methodologies

EPA has adopted or considered approximately two dozen methodologies for assessing the financial burdens municipalities face under federal environmental laws and regulations. It is important to note that these methodologies focus only upon municipalities. Municipalities and other public entities own only about 20% of Community Water Systems (CWSs) serving populations of 500 persons or fewer. Most very small systems are privately-owned or are an ancillary part of some other business (such as a mobile home park).

Federal mandates requiring consideration of affordability include SDWA, the Clean Water Act (CWA), the Toxic Substances Control Act (TSCA), the Asbestos Hazard Emergency Response Act (AHERA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the Resources Conservation and Recovery Act (RCRA). Affordability methodologies have been used by EPA in conjunction with:

- evaluating compliance;
- assessing financial responsibility;
- establishing penalties and fines;
- setting standards;
- allocating grants and credit assistance; and
- providing guidelines to States and communities.

Appendix D summarizes a report prepared in 1993 by EPA entitled "Affordability of the 1986 Amendments to Community Water Systems," which measured the cost of the Amendments and discussed means to pay for these costs.

Affordability Assessment Methods

Affordability assessment typically involves two different levels of analysis. The first level measures household affordability or ability-to-pay, screening out communities where the household impact of water system costs is relatively low. The most prevalent household cost measure is annual user charges as a percentage of median household income (AUC/MHI).

$$\frac{\textit{Total Annual User Charges (AUC)}}{\textit{Annual Median Household Income (MHI)}} = X \textit{ percent}$$

where X = a household affordability ratio.

The methodology specifies a threshold determined to be affordable, and systems with a ratio less than or equal to the threshold are screened out. Systems with ratios higher than the threshold must be examined further.

Several variations on this formula can be found, such as: (1) inclusion of water *and* wastewater charges in the numerator, (2) use of average (mean) household income in the denominator, and (3) weighting of the measures to capture poverty effects.

The ratio, as shown above, is often used in conjunction with another measure, such as poverty rates or unemployment rates, that takes into account general socioeconomic conditions. Ideally, these companion indicators might be measured relative to State or national benchmarks. Obtaining the necessary data to do these comparisons can be difficult because system service territories do not always correspond to political boundaries (i.e., counties or census blocks).

For the communities exceeding the household ability-to-pay threshold, the second level of analysis involves a more detailed examination of the financial capacity of communities, including debt capacity (for example, debt service as a percentage of revenues), access to capital (for example, bond ratings), and the general socioeconomic condition of the community (indicators of distress).

Office of Policy, Planning, and Evaluation Panel

EPA's OPPE convened an expert panel to consider the issue of affordability. Members of the panel included nationally recognized experts in public-sector finance, economics, and community fiscal decision-making. The panel considered the various factors used in evaluating financial capacity and affordability and provided a critique of the methodologies previously used by EPA.

The panel observed that the two-stage approach (that is, an analysis of household ability-to-pay followed by an analysis of municipal ability-to-finance) may have limitations. Namely, the approach implies that some municipalities for whom an environmental project places a relatively high cost on households may not obtain financial relief because they do not meet the criteria for relief under the second-stage analysis.

The panel also found that the appropriate financial tests or methodology used for assessing affordability will depend on EPA's rationale for providing regulatory relief. The following rationales were proposed:

- *Community's ability-to-finance.* Applies most specifically to capital projects where external financing is required to spread the cost over time. The ability-to-finance can be measured by assessing either a municipality's bond rating above investment grade or its ability to obtain a loan from a bank.

- *Fairness to households in the community.* Considers household ability-to-pay. A reasonable proxy for the ability-to-pay is the AUC/MHI ratio.

- *Fairness to the local government/system.* Aims to identify communities that are severely distressed even in the absence of SDWA mandates. This criterion examines the fiscal distress of each municipality and compares that measure to some threshold level of fiscal distress.

- *Relative size of the financial cost.* Examines the annualized cost of the project in relation to some measure of the scale of local government activities, such as the total public spending by the municipality.

<u>OPPE Panel Conclusions</u>

After evaluating the above rationales, the panel proposed two models for assessing the affordability of environmental compliance costs. The first model is a modified two-stage approach. The first stage is used to screen communities using a very basic measure that is easily available and applicable. Communities that fail to pass the screen are subject to further analysis to assess whether

financial or structural considerations alter the results, and whether financing for improvements is possible, even if it is relatively burdensome. According to this model, analysts must also consider the overall costs of services that the community provides. The community's cost burden will be mitigated if substantial aid is received from other sources.

The basic steps in the OPPE Panel's first model are:

1. Model One: Basic Burden Screen - First determine the incremental cost per household divided by the median household income (or a construct like per capita income times household size). Then evaluate this result to see if the cost is potentially too high by performing a statistical fit to determine whether the cost ratios that fall in the top 10 percent to 5 percent of the tail are high.

2. Model One: Secondary Screen - For the communities that fall on the margin or that display a high burden, a more extended analysis would examine various measures of ability-to-finance the improvement. This analysis is based, in most cases, on the need for capital improvements and access to sources of financing. Some sources of revenue and borrowing may be accessible to one community but not to others. Intergovernmental flows can also greatly alter apparent costs.

The second model proposed by the task force emphasizes rationales for financial relief. It begins with a basic screening test, as in the first approach.

1. Model Two: Basic Burden Screen - First determine if the residents of the jurisdiction would be unfairly burdened (that is, whether the annual cost relative to household income is above a selected threshold which would qualify the community for relief).

2. Model Two: Petition for Relief - If the primary criterion for relief is not met, the municipality could petition for relief under either of two secondary criteria: 1) the municipality is unable to finance the project at a reasonable cost; or 2) the compliance cost is excessively large relative to the level of resources in the municipality. The burden of proof then falls on the municipality or system.

Finally, the task force also provided a series of general recommendations for developing successful affordability approaches as follows:

- Clearly define the economic rationales for granting municipalities relief and discuss the links between the relevant rationales and the specific methodologies used.

- Utilize financial tests that are simple to use, even for non-finance personnel, and tailored to the data available for small systems.

- Base financial relief on: 1) ability-to-finance a capital project; 2) household ability-to-pay; 3) the municipality's relative ability-to-pay; or 4) the size of the financial cost as compared to the resources available to the local government.

- Clearly and openly communicate the rationale for setting the thresholds since this is a political decision involving value judgments.

- Use financial tests that account for differences among local governments and their service responsibilities, access to revenue sources, and institutional relationships with underlying and overlying jurisdictions.

- Use one of two models: 1) a two-part test consisting of a basic household burden screen and an analysis of the municipality's ability-to-finance the environmental project; or 2) an approach that would grant relief to municipalities using household costs as the primary criterion, and the ability-to-finance or the size of the financial cost compared to the resources available as the secondary criteria. In the second model, a municipality that did not meet the primary criterion could petition for relief under the secondary criteria.

The affordability framework developed in this document expands on the alternative approaches to assessing affordability. Appendix E provides a summary of affordability analyses. Each analysis makes use of one or more of the affordability indicators and identifies the thresholds used to judge affordability. States must carefully evaluate whether the thresholds suggested in Appendix E, which are predominantly used to allocate grant or loan funds or to conduct academic studies, should be the same ones used in granting variances. Stricter standards may be warranted.

4. An Affordability Framework

As noted, a wide variety of indicators have been used in affordability assessment. These indicators, and the broader issues they represent, can be organized within an affordability assessment framework. This framework recognizes the flow of resources that affect water systems and the different resources available to different types of water systems. The framework presented here expressly recognizes the institutional and ownership diversity of small water systems. Unlike the affordability assessment reviewed in Chapter 3, this framework is not specifically directed towards assessing municipal affordability. The framework can be used not only to understand affordability issues but also to explore options for addressing affordability concerns.

Indicators organized according to the proposed framework can be used to:

- Evaluate the affordability of water service to households;
- Evaluate a water system's general financial capacity;
- Evaluate a water system's access to private capital;
- Evaluate a water system's access to public capital;
- Evaluate a fiscal condition of relevant local governments; and
- Evaluate a community's socioeconomic conditions.

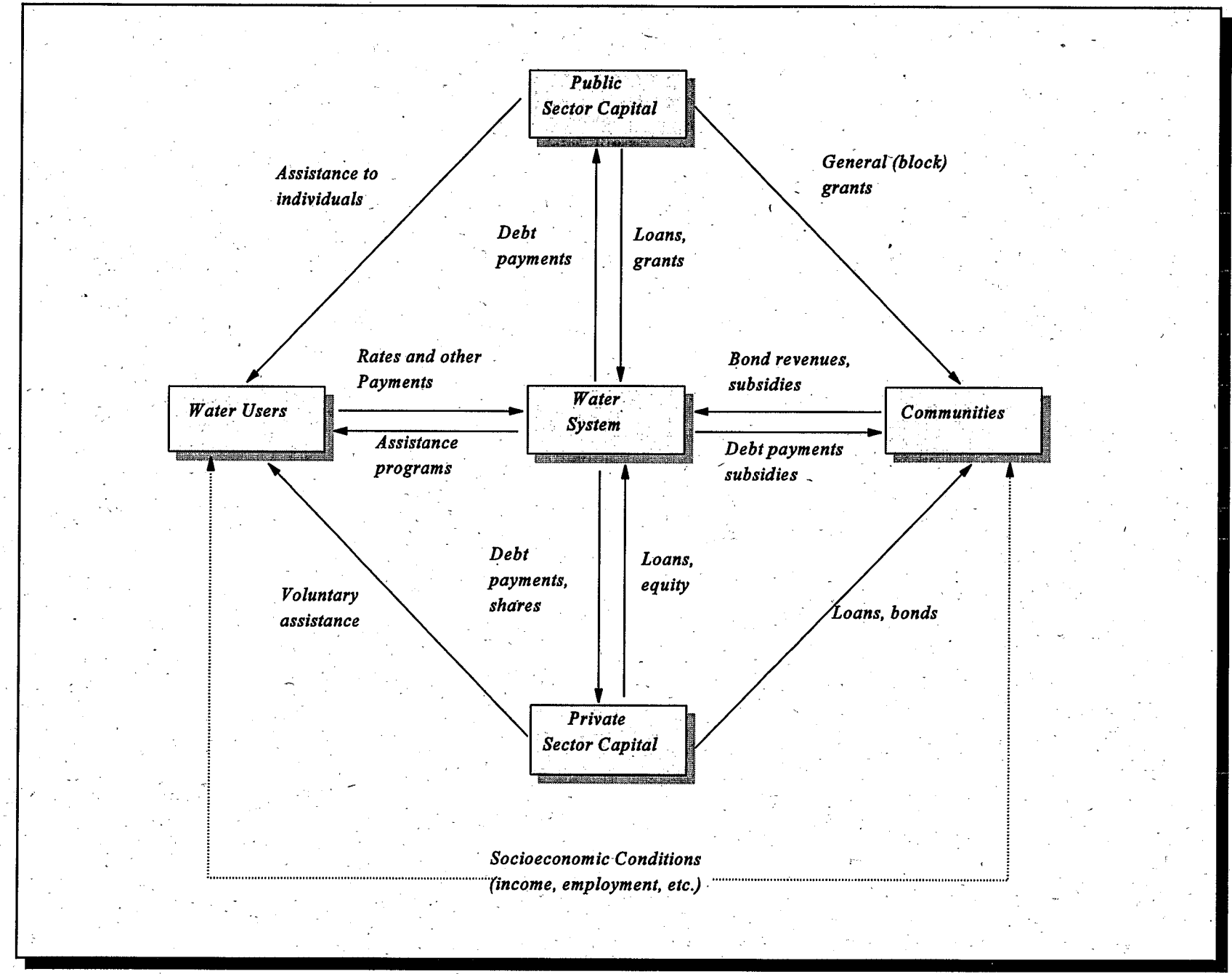

Figure 2. Generalized Resource Flows to and From Water Systems.

Resource-Flow Models

The generalized flow of resources to, from, and around water systems is depicted above in Figure 2. This framework can be used to understand the sources of revenue available to different types of systems. The key elements of the model are:

- *Water systems.* Includes CWSs and non-community water systems (NCWSs) of different sizes and ownership.

- *Water users.* Includes residential and non-residential water customers who support water systems through rates and other charges but also, in the case of non-community private systems, through the cost of goods and services.

- *Communities.* Identifies the lowest level of local government within which the water system provides service (for example, cities, counties, districts). Although some communities own and operate systems, the distinction between communities and systems is important.

- *Private sector capital.* Includes bank loans, equity (stock), and other sources of private capital or financial support that can be provided to the water system. Private-sector sources of capital may not improve affordability if they add to debt costs.

- *Public sector capital.* Includes grants, loans, subsidies, and other sources of public capital or financial support that can be provided to the water system. When it reduces total costs, public-sector capital can improve affordability.

- *Socioeconomic conditions.* Income, employment, participation in welfare or other assistance programs, and other socioeconomic indicators measure the general ability of households in the water system's service territory to pay for water service.

Figures 3a and 3b show the primary and secondary resources available to publicly- and privately-owned CWSs, respectively. Publicly-owned CWSs have access to revenue sources that are generally not available to privately-owned systems. Publicly-owned systems may be supported by water users, as well as through community resources and public capital. Municipal governments can assist their own systems with direct subsidies or financing. However, local communities generally do not provide assistance to privately-owned systems. Publicly-owned systems also generally have had greater access to public capital than privately-owned water systems; conversely, privately-owned systems have had greater access to private capital. Small communities often lack the resources or expertise needed to obtain private credit, and even when they do have such capability, it is difficult for them to compete with larger communities.

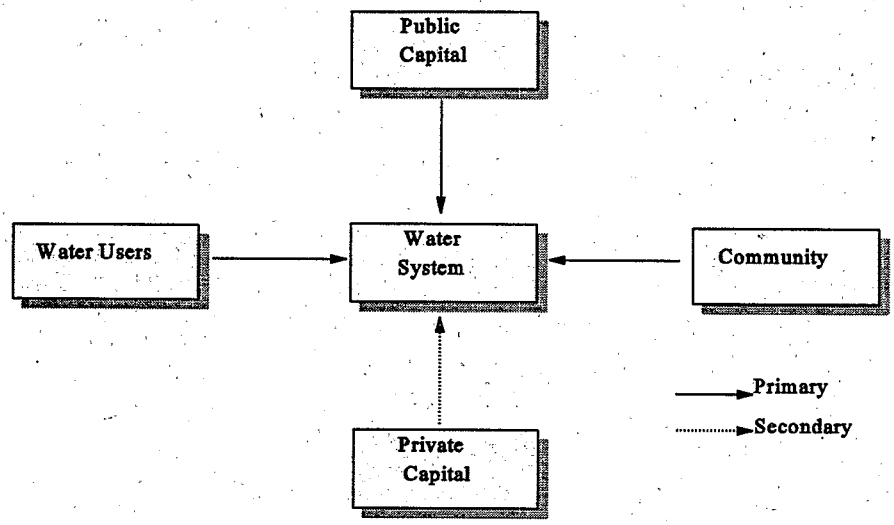

Figure 3a
Potential resources for *publicly-owned CWSs*

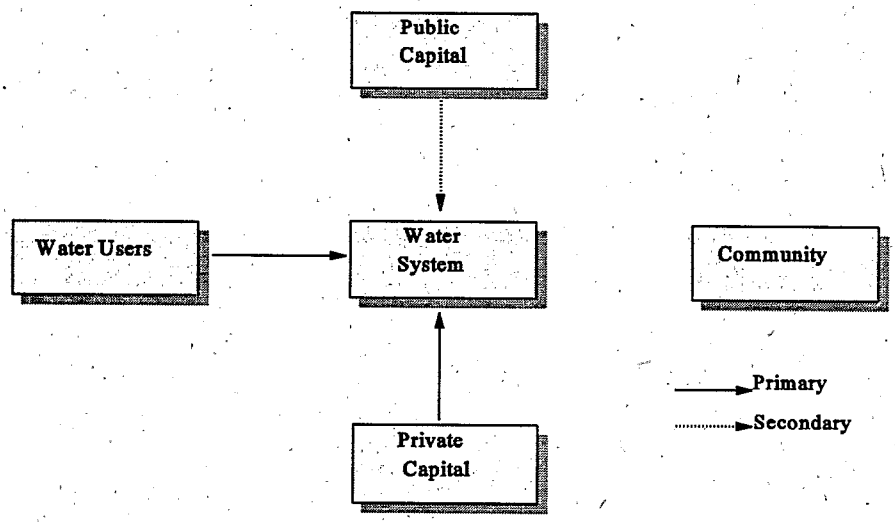

Figure 3b
Potential resources for *privately-owned CWSs*

Figures 3a and 3b. Potential Resources for Publicly- and Privately-Owned Community Water Systems.

Figures 4a and 4b show the primary and secondary resources available to public (or nonprofit) and private NCWSs, respectively. In general, resource flows to NCWSs are more limited than those to CWSs. This is especially true of public or non-profit, non-community systems. For these systems, water costs cannot be supported through charges for goods and services. However, they may have some access to private capital, public capital, and local community resources.

Private NCWSs can be supported by water users, but not usually through water charges. Water costs (like other utility costs) are passed along to users through prices for goods and services. Depending on their corporate organizational structure, private NC systems may have general access to private capital through their parent organizations, but probably have limited access to public capital and no access to community resources.

A key difference between CWSs and NCWSs is that CWSs generally charge customers for water service. Thus, for CWSs, household affordability is a central focus. For NCWSs, attention shifts to the financial capacity of the system and the organization responsible for its operations.

General Framework

Table 3 provides a general framework for an affordability analysis that builds on this understanding of resource flows. Household affordability is perhaps the most basic and essential element of the framework, along with the assumption that it is desirable to support the true cost of water through user charges. However, none of the indicators should be used alone to measure affordability. The framework also suggests a variety of additional indicators for analyzing affordability.

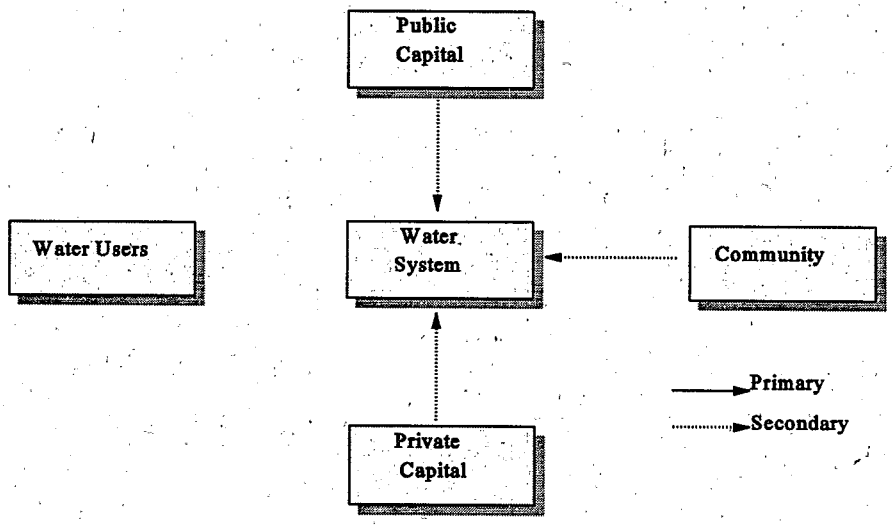

Figure 4a
Potential resources for *public or non-profit NCWSs*

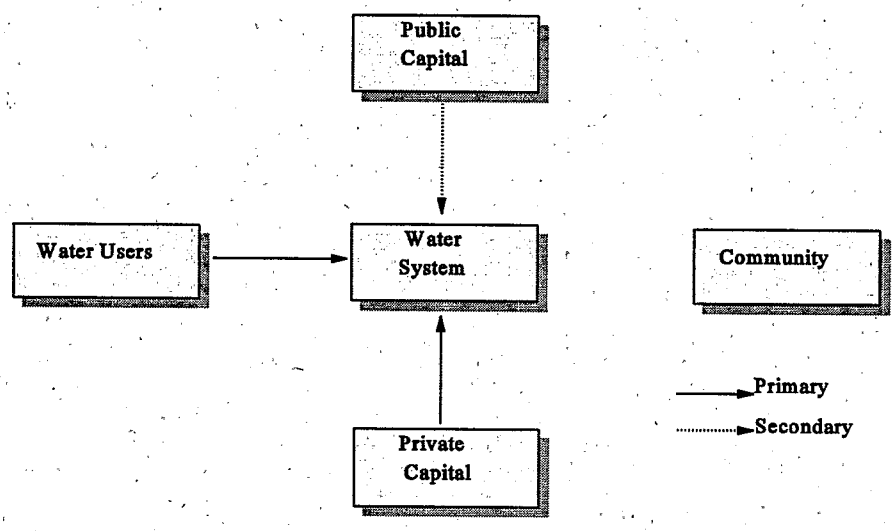

Figure 4b
Potential resources for *private NCWSs*

Figures 4a and 4b. Potential Resources for Public or Non-profit and Private Non-community Water Systemss.

Household Affordability

Household affordability (or rate impact) indicators focus on the capacity of water users (particularly residential users) to support the full cost of water service (including debt repayment) through user charges. Household affordability can be used to assess rate impacts and to screen systems for further analysis. The level of analysis is households or other water users, sometimes measured in terms of connections to the water system. Selected indicators of water users' ability-to-pay are:

- Ratio of user charges to income;
- Ratio of user charges to income relative to income levels; and
- Percentage rate increase (rate shock).

The percentage rate increase is frequently used in affordability assessment as a potential measure of rate shock. However, the impact of the change can be different; a high percentage increase used to correct past underpricing is more affordable in an affluent community than in a poor community. An important issue to consider at this level of analysis is how well readily available median household income information (such as census data) corresponds to actual conditions in the facility service area. Two principal factors could constitute differences. First, the boundaries of the census data may not match the boundaries of water systems. Even if the boundaries do match, incomes may have significantly changed since the last census. If the census data are not believed to offer an accurate picture of income in the service area, then an income survey could be conducted to gather more accurate data. Also, as noted earlier, income must be considered in the context of the local cost of living.

Table 3. Framework for Affordability Analysis

Category	Focus	Level of Analysis	Selected Indicators
Household affordability	Rate impact on the capacity of water users (particularly residential users) to support the full cost of water service (including debt repayment) through user charges.	Households	• Ratio of user charges to income • Ratio of user charges to income relative to income levels • Percentage rate increase (rate shock)
Financial capacity	The financial structure of the water system including internal sources of capital, key financial ratios, and business planning capability.	Water system	• Ratio of revenues to expenditures • Ratio of net income to revenues • Ratio of assets to liabilities • Debt-service coverage • Composite indicators of financial health • Market test for goods and services (noncommunity systems)
Access to private capital	Ability of the water system to arrange financing (such as a bank loan) through private sector equity and debt markets.	System (or parent entity) and private capital markets	• Credit and bond ratings • Debt and debt capacity • Market test
Eligibility for public capital	Ability of the water system to secure financing (grants or loans) from local (community) or nonlocal (SRF and other programs) public sources.	System (or parent entity) and public capital markets	• Credit and bond ratings • Priority rankings • Eligibility test
Fiscal conditions	Fiscal stress on the community in terms of the condition of local government finances and competing demands for capital and operating expenditures.	Relevant local government	• Debt as a percentage of market property value • Tax revenues as a percentage of market property values • Property tax collection or delinquency rate • Local expenditures per resident • Opportunity costs associated with water system expenditures
Socio-economic conditions	General socioeconomic conditions related to household affordability, priority for public funding, and fiscal distress.	Service territory	• Median household income • Percent below the poverty level • Percent unemployment • Composite indicators of distressed communities

Financial Capacity

The financial capacity of a water system depends upon the financial structure of the water system including internal sources of capital, key financial ratios, and business planning capability. In other words, the level of analysis shifts to the water system. Indicators of financial capacity are used for both general capacity assessment and business planning. Business planning can help identify *and* correct financial capacity needs.

The literature on water system financial capacity is extensive. Numerous indicators and composite indicators are available for analysis and screening purposes. Selected indicators of financial capacity are:

- Ratio of revenues to expenditures;
- Ratio of net income to revenues;
- Ratio of assets to liabilities;
- Debt-service coverage; and
- Composite indicators of financial health.

In the case of private systems (including private non-community systems) owned by a parent company, depending on the corporate organizational structure, the analysis of financial capacity may extend to the parent entity.

Access To Private Capital

Access to private capital refers to the ability of the water system (or its parent entity) to arrange financing (such as a bank loan) through private markets. Whether or not a water system can raise financial capital through private markets provides a market test of the water system's financial capacity. Private markets are not likely to provide resources to systems that are financially unhealthy. The level of analysis shifts to private debt and equity markets, where water systems must compete for private capital. Selected indicators of access to private capital are:

- Credit and bond ratings;
- Debt and debt capacity; and
- Market test.

Some analysts have advocated a basic market test when evaluating a water system's access to private capital. The proof is in the process itself — those who can access capital, will access capital. Systems that "pass" the market test are those that successfully obtain private financing for needed improvements.

Eligibility For Public Capital

Evaluating eligibility for public capital parallels evaluating access to private capital. In this case, eligibility refers to the ability of the water system (or its parent entity) to secure financing from local or nonlocal public sources. Financing may be in the form of grants or loans from the SRF or from other State and federal sources. Relevant indicators of eligibility for public capital are:

- Credit and bond ratings;
- Eligibility test; and
- Priority rankings.

Credit and bond ratings are used to evaluate access to public capital as well as private capital. In the case of municipal systems, ratings of municipal governments may be used. The eligibility test is similar to the market tests — systems that "pass" the eligibility test are those that successfully obtain public capital (grants or loans). Some public agencies rank systems in terms of their priority for public funding through grants or loans. Funding priorities tend to focus on systems with pressing public health concerns or those located in distressed communities.

Fiscal Conditions of Local Government

Some indicators of affordability consider the fiscal condition of the relevant local government. Fiscal stress on communities can be assessed in terms of competing demands for capital and operating expenditures, particularly in the face of limited governmental resources. This form of fiscal stress is particularly relevant when considering if resources from the community can be used to support water system costs. Some indicators of local fiscal conditions are:

- Debt as a percentage of market property value;
- Tax revenues as a percentage of market property values;
- Property tax collection or delinquency rate;
- Local expenditures per resident; and
- Opportunity costs associated with water system expenditures.

Opportunity costs may be relevant for some communities. Resources spent on water system improvements cannot be devoted to other uses. Evaluating opportunity costs for a given community generally requires a qualitative assessment of competing concerns.

Socioeconomic Conditions

As previously discussed, ability-to-pay is largely a function of income and employment. A community's socioeconomic conditions are closely related to household affordability indicators, the priority rankings used in determining eligibility for public funding, and the fiscal condition of local governments. Income, poverty, and unemployment indicators are often used to measure socioeconomic conditions and to establish State definitions of distressed or disadvantaged communities.

Two-step affordability tests often combine socioeconomic indicators with household affordability indicators. Some of the leading indicators of socioeconomic conditions are:

- Median household income;
- Percentage of population below the poverty level;
- Percentage of population unemployed; and
- Composite indicators of distressed communities.

Accurately measuring income and other socioeconomic indicators can be difficult because data available from the Census and similar sources may not match water system service territories. For this reason, some analysts have used income surveys in conjunction with affordability analyses. These survey data may be needed to evaluate rate impacts (AUC/MHI) as well.

Appendix E provides a summary of affordability analyses. Each analysis makes use of one or more of the affordability indicators and identifies the thresholds used to judge affordability.

Affordability for Non-community Systems

Most indicators developed for assessing affordability were designed and implemented with CWSs in mind. While some indicators may not apply directly to the case of non-community systems, some do. Specifically, household affordability measures that focus on water user charges relative to income are irrelevant, while measures focused on the financial condition of the system and the socioeconomic condition of the community may be useful.

For NCWSs, the nature of ownership has an important bearing on affordability. In the case of systems run for profit, a market test may be particularly appropriate. If the cost of compliance can be incorporated into the cost of business (like other expenses) and the entity can price its product competitively and stay in business, then the compliance technique might be considered affordable. For some systems, private capital for improvements may be available from a parent corporate entity if the effect on costs and prices is so extreme as to threaten the existence of the business.

Systems managed by and for public purposes cannot pass costs along through prices of goods and services, but instead must rely on public sources of funding. Measures of the fiscal stress for the relevant public entity and access to public capital are applicable to publicly-owned systems. The difficulty in applying affordability measures to these systems is due to the intrinsic relationship between the fiscal health of the water system and the fiscal health of the larger entity.

For both privately and publicly-owned NCWSs, measures of general socioeconomic distress may also prove useful for assessing affordability. Although indirect, these indicators provide a general assessment of the financial condition of the water service population, and its ability-to-pay for water system compliance.

5. Examples of the Use of Affordability Criteria

Pursuant to the 1996 SDWA, States can develop and use affordability criteria when determining whether or not to grant variances. Affordability criteria can also be used in conjunction with State funding, planning, and other decisions.

Section 1415 (e), an excerpt from SDWA as amended in 1996, refers to affordability and variances and is included as Appendix A. The statutory language provides the authority for States to issue variances to water systems. The statute outlines the variance granting process, including the role of the State and the water system. Criteria for receiving a variance, compliance schedules, the duration of variances, factors that make systems ineligible for variances, and the role played by the EPA Administrator are also discussed in Appendix A.

Appendix B contains the portion of SDWA which addresses the relationship between affordability and SRF. Section 1452 (b) focuses on the IUPs of systems, including what the plans should contain. The criteria used to judge the appropriate use of SRF funds by a system are also defined in Appendix B.

The policy statement on affordable drinking water of the National Association of Regulatory Utility Commissioners (NARUC) is attached as Appendix C. NARUC believes that it is essential for EPA to "affirm a commitment to affordable water rates." To this end, NARUC suggests EPA develop a policy that establishes universal water service as a national policy goal, considers four economic factors in the granting of variances or exemptions, and provides State regulatory commission agencies with an advisory role to EPA and primacy agencies.

Appendix D summarizes a 1993 EPA report entitled "Affordability of the 1986 Amendments to Community Water Systems." In the report, EPA measured the affordability to households and the affordability to systems of implementing the 1986 SDWA Amendments.

An overview of selected studies on affordability measures and thresholds is presented in Appendix E. For each study, the appendix lists the concept being studied (i.e. household affordability or socioeconomic conditions), the indicator(s) used, and the chosen threshold levels.

The affordability policies for New York, Pennsylvania, and Idaho are summarized in Appendix F. The summary of New York includes a description of the State's affordability criteria, how New York projects annual drinking water service charges, information the State uses to determine hardship, and the criteria New York uses to determine eligibility for financial assistance. For Pennsylvania, the Pennsylvania Infrastructure Investment Authority (PENNVEST) conducts a program using a computer model named PACNIF (FINCAP, or financial capacity, backwards) as the basis for determining affordability. The affordability assessment tools used by Idaho, including water system revenues, a water system rate affordability index, and information on water system budgets are also detailed.

Appendix A. 1996 Amendments to SDWA on Affordability and Variances

1415 (e) Small System Variances.—

(1) In general—A state exercising primary enforcement responsibility for public water systems under section 1413 (or the Administrator in non-primacy states) may grant a variance under this subsection for compliance with a requirement specifying a maximum contaminant level or treatment technique contained in a national primary drinking water regulation to —

(A) public water systems serving 3,300 or fewer persons; and

(B) with the approval of the Administrator pursuant to paragraph (9), public water systems serving more than 3,300 persons but fewer than 10,000 persons, if the variance meets each requirement of this subsection.

(2) Availability of Variances.—A public water system may receive a variance pursuant to paragraph (1), if—

(A) the Administrator has identified a variance technology under section 1412(b)(15) that is applicable to the size and source water quality conditions of the public water system;

(B) the public water system installs, operates, and maintains, in accordance with guidance or regulation issued by the Administrator, such treatment technology, treatment technique, or other means; and

(C) the state in which the system is located determines that the conditions of paragraph (3) are met.

(3) Conditions for Granting Variances.—A variance under this subsection shall be available only to a system—

(A) that cannot afford to comply in accordance with **affordability criteria** established by the Administrator (or the state in the case of a state that has primary enforcement responsibility under section 1413), with a national primary drinking water regulation, including compliance through—

(i) treatment;
(ii) alternative source of water supply; or
(iii) restructuring or consolidation (unless the Administrator (or the state in the case of a state that has primary enforcement responsibility under section 1413) makes a written determination that restructuring or consolidation is not practicable); and

(B) for which the Administrator (or the state in the case of a state that has primary enforcement responsibility under section 1413) determines that the terms of the variance ensure adequate protection of human health, considering the quality of the source water for the system and the removal efficiencies and expected useful life of the treatment technology required by the variance.

(4) Compliance schedules.—A variance granted under this subsection shall require compliance with the conditions of the variance not later than 3 years after the date on which the variance is granted, except that the Administrator (or the state in the case of a state that has primary enforcement responsibility under section 1413) may allow up to 2 additional years to comply with a variance technology, secure an alternative source of water, restructure or consolidate if the Administrator (or the state) determines that additional time is necessary for capital improvements, or to allow for financial assistance provided pursuant to section 1452 or any other federal or state program.

(5) Duration of variances.—The Administrator (or the state in the case of a state that has primary enforcement responsibility under section 1413) shall review each variance granted under this subsection not less often than every 5 years after the compliance date established in the variance to determine whether the system remains eligible for the variance and is conforming to each condition of the variance.

(6) Ineligibility for variances.—A variance shall not be available under this subsection for—

(A) any maximum contaminant level or treatment technique for a contaminant with respect to which a national primary drinking water regulation was promulgated prior to January 1, 1986; or

(B) a national primary drinking water regulation for a microbial contaminant (including a bacterium, virus, or other organism) or an indicator or treatment technique for a microbial contaminant.

(7) Regulations and guidance.—

(A) In general.—Not later than 2 years after the date of enactment of this subsection and in consultation with the states, the Administrator shall promulgate regulations for variances to be granted under this subsection. The regulations shall, at a minimum, specify—

(i) procedures to be used by the Administrator or a state to grant or deny variances, including requirements for notifying the Administrator and consumers of the public water system that a variance is proposed to be granted (including information regarding the contaminant and variance) and requirements for a public hearing on the variance before the variance is granted;

(ii) requirements for the installation and proper operation of variance technology that is identified (pursuant to section 1412(b)(15)) for small systems and the financial and technical capability to operate the treatment system, including operator training and certification;

(iii) eligibility criteria for a variance for each national primary drinking water regulation, including requirements for the quality of the source water (pursuant to section 1412(b)(15)(A)); and

(iv) information requirements for variance applications.

(B) **Affordability criteria**.—Not later than 18 months after the date of enactment of the SDWA Amendments of 1996, the Administrator, in consultation with the states and the Rural Utilities Service of the Department of Agriculture, shall publish information to assist the states in developing affordability criteria. **The affordability criteria** shall be reviewed by the states not less often than every 5 years to determine if changes are needed to the criteria.

(8) Review by the administrator.—

(A) In general.—The Administrator shall periodically review the program of each state that has primary enforcement responsibility for public water systems under section 1413 with respect to variances to determine whether the variances granted by the state comply with the requirements of this subsection. With respect to affordability, the determination of the Administrator shall be limited to whether the variances granted by the state comply with the **affordability criteria** developed by the state.

(B) Notice and publication.—If the Administrator determines that variances granted by a state are not in compliance with **affordability criteria** developed by the state and the requirements of this subsection, the Administrator shall notify the state in writing of the deficiencies and make public the determination.

(9) Approval of variances.—A state proposing to grant a variance under this subsection to a public water system serving more than 3,300 and fewer than 10,000 persons shall submit the variance to the Administrator for review and approval prior to the issuance of the variance. The Administrator shall approve the variance if it meets each of the requirements of this subsection. The Administrator shall approve or disapprove the variance within 90 days. If the Administrator disapproves a variance under this paragraph, the Administrator shall notify the state in writing of the reasons for disapproval and the variance may be resubmitted with modifications to address the objections stated by the Administrator.

(10) Objections to variances.—

(A) By the Administrator.—The Administrator may review and object to any variance proposed to be granted by a state, if the objection is communicated to the state not

later than 90 days after the state proposes to grant the variance. If the Administrator objects to the granting of a variance, the Administrator shall notify the state in writing of each basis for the objection and propose a modification to the variance to resolve the concerns of the Administrator. The state shall make the recommended modification or respond in writing to each objection. If the state issues the variance without resolving the concerns of the Administrator, the Administrator may overturn the state decision to grant the variance if the Administrator determines that the state decision does not comply with this subsection.

(B) Petition by consumers.—Not later than 30 days after a state exercising primary enforcement responsibility for public water systems under section 1413 proposes to grant a variance for a public water system, any person served by the system may petition the Administrator to object to the granting of a variance. The Administrator shall respond to the petition and determine whether to object to the variance under subparagraph (A) not later than 60 days after the receipt of the petition.

(C) Timing.—No variance shall be granted by a state until the later of the following:

(i) 90 days after the state proposes to grant a variance.
(ii) If the Administrator objects to the variance, the date on which the state makes the recommended modifications or responds in writing to each objection.

Source: SDWA as amended in 1996. Emphasis added.

Appendix B. 1996 Amendments to SDWA on Affordability and the State Revolving Fund

Sec. 1452. (b) Intended Use Plans.—

(1) In general.—After providing for public review and comment, each state that has entered into a capitalization agreement pursuant to this section shall annually prepare a plan that identifies the intended uses of the amounts available to the state loan fund of the state.

(2) Contents.—An intended use plan shall include—

(A) a list of the projects to be assisted in the first fiscal year that begins after the date of the plan, including a description of the project, the expected terms of financial assistance, and the size of the community served;

(B) the criteria and methods established for the distribution of funds; and

(C) a description of the financial status of the state loan fund and the short-term and long-term goals of the state loan fund.

(3) Use of funds.—

(A) In general.—An intended use plan shall provide, to the maximum extent practicable, that priority for the use of funds be given to projects that—

(i) address the most serious risk to human health;
(ii) are necessary to ensure compliance with the requirements of this title (including requirements for filtration); and
(iii) assist systems most in need on a per household basis according to state **affordability criteria.**

(B) List of projects.—Each state shall, after notice and opportunity for public comment, publish and periodically update a list of projects in the state that are eligible for assistance under this section, including the priority assigned to each project and, to the extent known, the expected funding schedule for each project.

(C) Fund Management.—Each state loan fund under this section shall be established, maintained, and credited with repayments and interest. The fund corpus shall be available in perpetuity for providing financial assistance under this section. To the extent amounts in the fund are not required for current obligation or expenditure, such amounts shall be invested in interest bearing obligations.

(D) Assistance for Disadvantaged Communities.—

(i) Loan subsidy.—Notwithstanding any other provision of this section, in any case in which the state makes a loan pursuant to subsection (a)(2) to a disadvantaged community or to a community that the state expects to become a disadvantaged community as the result of a proposed project, the state may provide additional subsidization (including forgiveness of principal).

(ii) Total amount of subsidies.—For each fiscal year, the total amount of loan subsidies made by a state pursuant to paragraph (1) may not exceed 30 percent of the amount of the capitalization grant received by the state for the year.

(iii) Definition of disadvantaged community.—In this subsection, the term "disadvantaged community" means the service area of a public water system that meets **affordability criteria** established after public review and comment by the state in which the public water system is located. The Administrator may publish information to assist states in establishing affordability criteria.

Source: SDWA as amended in 1996. Emphasis added

Appendix C. Policy Statement of the National Association of Regulatory Utility Commissioners on Affordable Drinking Water

The National Association of Regulatory Utility Commissioners (NARUC) believes that while specific affordable dollar amounts of increases in residential water bills cannot be determined, it is essential that the Environmental Protection Agency affirm a commitment to affordable water rates. We suggest that this commitment be expressed in a three-point policy:

1. Universal water service, defined as high quality drinking water at affordable rates for every American, should be a national policy goal.

Universal telephone service has long been a national goal. Previously in water utility service, it had not been necessary to assert a policy of universal service. With the increased recognition of environmental dangers to high quality water supplies and the passage of SDWA, a policy of universal water service is essential.

2. In addition to health factors, four economic factors should be taken into account in considering whether to grant variances or exemption under SDWA. These are community size, the impact on water rates, the price of substitutes for centrally-distributed drinking water, and the financial capability of the water system. If a proposed capital improvement to meet SDWA standards is judged unaffordable by the primacy agency for any of the four factors, a variance or exemption should be considered.

(a) Community Size: A proposed capital improvement may be considered unaffordable, taking into account the size of the community and, thus, the customer base across which costs of the improvement can be spread.

(b) Impact on Water Rates: Rate increases to pay for SDWA improvements may be considered unaffordable if either the immediate increase in rates or the increase in rates phased in over time would result in rates that are (1) substantially higher than existing water rates; or (2) substantially higher relative to rates for other utility services; or (3) substantially higher relative to the average rates paid by residential customers to other water utilities in the state.

(c) Price of Substitutes: Rate increases to pay for SDWA improvements may be considered unaffordable if rates to provide potable water through the central water system would be greater than the price of alternative means of providing high quality drinking water.

(d) Financial Capability: For commission-regulated water utilities, improvements to meet SDWA requirements may be considered unaffordable if the utility has demonstrated its inability to obtain funds to pay for them. Such inability can be shown by the rejection, in writing, of a bonafide application for a loan to pay for the improvements, accompanied by evidence of the willingness of the utility, the primacy agency, and the state regulatory commission to work together to develop a fair and reasonable cost recovery program.

3. State regulatory commissions have an advisory role in SDWA implementation by the EPA and the primacy agencies as SDWA applies to commission-regulated water utilities.

EPA should consider providing guidelines to primacy agencies calling for consultation with the state regulatory commission when dealing with utilities jurisdictional to the commissions. Such consultation should be called for in making decisions on the technology required to meet SDWA standards and the appropriateness of granting a variance or exemption. EPA guidelines to the primacy agencies should be modeled on the definition of roles laid out in the Memorandum Of Understanding between the California Department of Health Services and the California Public Utilities Commission.

The NARUC supports the common objectives stated in the Memorandum of Understanding and suggests that the state regulatory commissions take action through written agreements with the primacy agencies to concur with the objectives and to assume responsibility for:

(a) Determination of the type of rate relief, if any, needed to finance system improvement projects for projects required by SDWA.

(b) Promptly informing the primacy agency of public meetings with customers and/or evidentiary hearings where water quality problems will be discussed so that the primacy agency may prepare and participate.

(c) Providing analyses of the financial impacts, if any, of system improvement projects on both water utilities and customers' rates.

(d) Encourage public education and awareness of SDWA.

Source: National Association of Regulatory Utility Commissioners, Press Release (November 21, 1988).

Appendix D. Affordability of the 1986 Safe Drinking Water Act Amendments

In 1993, the EPA published a report entitled "Affordability of the 1986 Amendments to Community Water Systems." A threshold of two percent was used to measure affordability for three different ratios: 1) household costs to median household income; 2) aggregate household costs to aggregate household income (best case); and 3) household cost as a percentage of median household income for households earning less than 150 percent of the federal poverty level (worst case). In a relatively detailed analysis, the report presents several key findings regarding household affordability and water system affordability:

Affordability to Households

- Pre-SDWA drinking water costs are burdensome to about 7.5 percent of households nationwide—all of which have annual income of less than $10,000.
- Nearly 11 percent of households nationwide may find post-SDWA drinking water costs to be burdensome, particularly households with less than $10,000 annual income.
- Nationally, average annual household drinking water costs have risen 25 percent, from $182 to $227, as a result of the 1986 SDWA Amendments, based on this analysis.

Affordability to Systems

- The study estimates that prior to the 1986 Amendments, less than one percent of CWSs faced affordability problems.
- Virtually all systems serving populations of 10,000 or more can afford SDWA-required costs. Depending on how system affordability is measured, between four and 41 percent of all CWSs may now face post-SDWA affordability problems, primarily systems serving 10,000 persons or fewer.
- If post-SDWA costs were allocated progressively, according to a household's ability to pay, post-SDWA water costs would be burdensome to just over four percent of CWSs.
- Small system diseconomies are responsible for much of the affordability problem at both the household and system levels.

Appendix E. Affordability Measures and Thresholds: Selected Studies

Study	Concept	Indicator (s)	Threshold
Water Utility Financing Study (1980)	Household affordability	Annual user charge (AUC) / Median Household income (MHI)	Questionable: 1.5 to 2.5%; Unaffordable: >2.5%
	Household affordability	Percentage rate increase	100 to 200%; >200%
Multiple Sector Study (1988)	Household affordability	Annual user charge (AUC) / Median household income (MHI)	>1.12%
Rural Development Administration (Grant Eligibility)	Financial capacity Household affordability	Debt service portion of annual user charge (AUC) -and- Statewide nonmetropolitan median household income (MHI)	>0.5% and MHI is below the poverty line or below 80% of the statewide nonmetropolitan MHI -or- >1.0% and MHI is between 80% and 100% of the statewide nonmetropolitan MHI
Department of Housing and Urban Development	Household affordability	Water and sewer bills / Household income	1.3 to 1.4%
National Consumer Law Center "The Poor and the Elderly - Drowning in the High Cost of Water" (circa 1991)	Household affordability	Water and sewer bills / Household income	>2.00%
National Regulatory Research Institute (1992)	Financial capacity: profitability	Net income + depreciation / Annual operating revenues	Indicators compared to normal distribution for the investor-owned water industry
	Financial capacity: liquidity	Current assets / Current liabilities	
	Financial capacity: leverage	Current stock equity / Total assets	
	Financial capacity: profit trend	Retained earnings / Common stock equity	

Study	Concept	Indicator (s)	Threshold
National Regulatory Research Institute (1992) (cont.)	Financial capacity: growth and efficiency	Annual operating revenues Total assets	
	Financial capacity: efficiency and profitability	Annual operating revenues Annual operating expenses	
	Financial capacity: profitability	Net income Annual operating expenses	
	Financial capacity: composite	Composite score	Composite scores compared to normal distribution for the industry
EPA Economic Guidance for Water Quality Standards (WQS) Workbook (draft)	Household affordability (primary test for screening)	Average annual cost for household as a percentage of MHI	<0.8% not expected to create hardship =0.8 to 1.5% mid-range >1.5% may be unreasonable burden
	Access to capital (secondary test)	Bond rating	> BBB or Baa ⇨ Strong = BBB or Baa ⇨ Mid-range < BBB or Baa ⇨ Weak
		Overall net debt as a percentage of full market value of taxable property	< 2% ⇨ Strong = 2 to 5% ⇨ Mid-range > 5% ⇨ Weak
	Socioeconomic conditions	Unemployment rate	< State average ⇨ Strong = State average ⇨ Mid-range > State average ⇨ Weak
		Median household income (MHI)	> State average ⇨ Strong = State average ⇨ Mid-range < State average ⇨ Weak

Study	Concept	Indicator (s)	Threshold
EPA Economic Guidance for Water Quality Standards (WQS) Workbook (draft) (cont.)	Fiscal conditions	Property tax as percentage of full market value of taxable property	< 2% ⇨ Strong = 2 to 4% ⇨ Mid-range > 4% ⇨ Weak
		Property tax collection rate	> 98% ⇨ Strong = 94 to 98% ⇨ Mid-range < 94% ⇨ Weak
		Composite score	> 2.5 ⇨ Strong = 1.5 to 2.5 ⇨ Mid-range < 1.5 ⇨ Weak
EPA Municipality's Ability-to-Pay (MABEL) (1990)	Household affordability (ability to issue revenue debt)	Long-run household impact: Post-compliance average user charges (AUC) per household as a percentage of MHI	> 1.0% ⇨ must provide additional security
		Short-run household impact: Increase in average user charge	> 25% ⇨ system probably cannot issue debt
	Composite analysis (short-run and long-run)		If community fails both short-run and long-run analyses, it will be difficult to raise revenue debt
	Financial capacity, access to capital	Existing revenue debt plus new revenue debt	> revenue debt limit ⇨ system probably cannot issue debt
		Revenues less expenditures	negative ⇨ system probably cannot issue debt

Study	Concept	Indicator (s)	Threshold
EPA Municipality's Ability-to-Pay (MABEL) (1990) (cont.)	Financial capacity, access to capital (ability to issue general obligation bonds)	Debt service of municipality / Total revenues of municipality	< 0.18
		Debt service of municipality / Market value of taxable property	< 0.006
		Existing plus new debt	> debt limit ⇨ probably cannot issue GO debt
	Financial capacity : debt capacity	Additional revenue from taxes before reaching statutory limit	If less than O&M plus new debt service ⇨ probably cannot issue GO debt
Combined Sewer Overflow Financial Capability Assessment Guidebook (1993)	Financial capacity, access to capital	Bond ratings	Moody's B ⇨ Weak Baa ⇨ Mid-range Aaa ⇨ Strong Standard and Poor's BBB ⇨ Weak A ⇨ Mid-range AA ⇨ Strong
	Fiscal conditions: debt	Overall net debt / Full market property value	> 5% ⇨ Weak 2 to 5% ⇨ Mid-range < 2% ⇨ Strong
	Fiscal conditions: property tax collection	Property tax revenues / Full market property value	> 4% ⇨ Weak 2% to 4% ⇨ Mid-range < 2% ⇨ Strong

Study	Concept	Indicator (s)	Threshold
Combined Sewer Overflow Financial Capability Assessment Guidebook (1993) (cont.)	Fiscal conditions: property tax collection (cont.)	Property taxes collected Property taxes levied	< 94% ⇨ Weak 94 to 98% ⇨ Mid-range > 98% ⇨ Strong
	Socioeconomic conditions	Unemployment rate	25% above state average ⇨ Weak State average ⇨ Mid-range 25% below state average ⇨ Strong
		Median household income	25% below state average ⇨ Weak State average ⇨ Mid-range 25% above state average ⇨ Strong
EPA Affordability of the 1986 SDWA Amendments (1993)	Household affordability	Pre and post-SDWA costs as percentage of median household income	> 2.0% not affordable
		Pre and post-SDWA costs as percentage of median household income for impoverished households (worst case)	> 2.0% not affordable
		Aggregate pre- and post-SDWA costs as percentage of aggregate household income (best case)	> 2.0% not affordable
The Road to Financing (EPA, 1992)	Financial capacity	Overall net debt per capital	Below $750 ⇨ Strong $750 to 1,200 ⇨ Mid-range $1,200 ⇨ Weaker
		Overall net debt as a percentage of property value	Below 2% ⇨ Strong 2% to 5%⇨ Mid-range Above 5% ⇨ Weaker

Study	Concept	Indicator (s)	Threshold
The Road to Financing (EPA, 1992) (cont.)	Financial capacity (cont.)	Operating ratio (revenues to expenditures	Above 120% ⇨ Strong 100 %to 120% ⇨ Mid-range Below 100% ⇨ Weaker
		Debt service coverage	Above 140% ⇨ Strong 120 to 140% ⇨ Mid-range Below 120% ⇨ Weaker
		Utility operating surplus as a percent of total expenses	Above 5% ⇨ Strong 0 to 5% ⇨ Mid-range Below 0% ⇨ Weaker
	Fiscal conditions	Property tax collection rate	Above 98% ⇨ Strong 94 to 98% ⇨ Mid-range Below 94% ⇨ Weaker
	Socioeconomic conditions	Annual population change	Above 2% ⇨ Strong -1 to 2 % ⇨ Mid-range Below -1% ⇨ Weaker
		Unemployment	Below state average ⇨ Strong State average ⇨ Mid-range Above state average ⇨ Weaker
		Median household income ($1989)	Above $40,000 ⇨ Strong $17,000 to 40,000 ⇨ Mid-range Below $17,000 ⇨ Weaker

Study	Concept	Indicator (s)	Threshold
The Road to Financing (EPA, 1992) (cont.)	Household affordability	Utility operating cost as a percent of median household income	Below 1% ⇨ Strong 1 to 2% ⇨ Mid-range Above 2% ⇨ Weaker
		Percentage change in user fees	Below 5% ⇨ Strong 5 to 10% ⇨ Mid-range Above 10% ⇨ Weaker
Rural Utilities Service Water and Waste Disposal Loans and Grants	Household affordability	Debt service portion of the average annual equivalent dwelling unit cost -and- Median household income	• 0.5% when median household income of service area is equal to or below 80% of statewide nonmetropolitan median household income -and- • 1% when median household income of service area exceeds 0.5% requirement but is not more than 100% the statewide nonmetropolitan median household income
Rural Utilities Service Very Low Income Housing Repair Loans and Grants	Household affordability	Household income	May not exceed the very low-income limit specified in RUS. Limits range from $8,450 to $22,050 per household, depending on an area's median income.
Rural Housing Service (RHS), Department of Agriculture	Household affordability	Number of households in poverty	Funds are allocated to States based upon rural population and number of households in poverty. The statistical factor for eligibility is towns or incorporated areas under 50,000 population.

Study	Concept	Indicator (s)	Threshold
Enterprise Zones: Community Planning and Development, Department of Housing and Urban Development		Poverty rate -or- Pervasive poverty -or- Unemployment	Demonstrates a poverty rate which is not less than: (1) 20 percent in each census tract; (2) 25 percent in 90 percent of the population census tracts within the nominated area; and 3) 35 percent for at least 50 percent of the population census tracts within the nominated area Pervasive poverty shall be demonstrated by the nominating entities by providing evidence that: (1) Poverty is widespread throughout the nominated area; or (2) Poverty has become entrenched or intractable over time (through comparison of 1980 and 1990 census data or other relevant evidence) Data indicating that the weighted average rate of unemployment for the nominated area is not less than the national average rate of unemployment; or (2) Evidence of specially severe economic conditions, such as military base or plant closings or other conditions which have brought about significant job dislocation

Study	Concept	Indicator (s)	Threshold
Enterprise Zones: Federal Agency: Office of Community Development, Department of Agriculture		Poverty rate -or- General distress	A poverty rate that is not less than: (a) 20 percent in each census tract or census block numbering area (BNA); (b) 25 percent in 90 percent of the population census tracts and BNAs within the nominated area; and (c) 35 percent for at least 50 percent of the population census tracts and BNAs within the nominated area General distress shall be evidenced by describing adverse conditions within the nominated area other than those of pervasive poverty and unemployment. Below average or decline in per capita income, earnings per worker, per capita property tax base, average years of school completed; out-migration and population decline from 1980-1990

References

Saunders, Margot. 1992. "Water and Sewer Rates—The Emerging Crisis for the Poor." In *Proceedings of the Biennial Regulatory Information Conference.* Columbus, OH: The National Regulatory Research Institute.

U.S. Environmental Protection Agency. October 1991. *ABEL User's Manual.* Washington, DC: Office of Enforcement, U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. September 30, 1993. *Affordability of the 1986 SDWA Amendments to Community Water Systems.* Prepared by ICF, Inc. Washington, DC: U.S. EPA, Drinking Water Standards Division.

U.S. Environmental Protection Agency. September 1993. *Combined Sewer Overflow Financial Capability Assessment Guidebook.* Washington, DC: Office of Drinking Water, U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. September 1993. *Development and Analysis of Community Financial Profiles.* Washington, DC: Drinking Water Standards Division, Office of Ground Water and Drinking Water, U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. November 1993. Economic Guidance for Water Quality Standards: Workbook. Washington, DC: Economics and Statistical Analysis Branch, Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. September 30, 1994. *Evaluating Municipal Environmental Burdens.* Prepared by The Cadmus Group, Inc. Washington, DC: U.S. EPA, Office of Policy, Planning, and Evaluation.

U.S. Environmental Protection Agency. March 1993. *Guidance for Calculating Municipal and Not-for-Profit Organizations' Ability to Pay Civil Penalties Using Current Fund Balances.* Washington, DC: Toxics Enforcement Policy Branch, Office of Compliance Monitoring, U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. June 1990. *Municipality's Ability to Pay (MABEL): Volume 1 - User's Manual.* Washington, DC: Office of Policy, Planning, and Evaluation, U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. October 1996. *Proceedings of the Blue ribbon Panel on Safe Drinking Water Act Costing.* Washington, DC: Office of Drinking Water, U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. October 1991. *The Road to Financing: Assessing and Improving Your Community's Credit.* Washington, DC: Office of Water, U.S. Environmental Protection Agency. EPA 832-B-92-004.

Appendix F. Selected State Policies Using Affordability Criteria

New York State
Affordability Criteria for the
Drinking Water State Revolving Fund (DWSRF)

I. Summary

The purpose of the affordability criteria is to determine which public water systems are eligible for financial assistance beyond the ordinary benefit available through the Drinking Water State Revolving Loan Fund (DWSRF). The additional benefits will assist economically disadvantaged water systems in the construction of eligible drinking water projects. As defined by federal statute, a disadvantaged community is one in which the service area of a public water system meets affordability criteria established after public review and comment by the state in which the public water system is located.

In New York State, drinking water projects will be reviewed to determine eligibility and scored based on an established priority ranking system. Communities whose water projects are ranked high enough and whose annual projected service charges for drinking water are above the DWSRF's target service charge (TSC) may be eligible for additional financial assistance to bring the projected service charge closer to the TSC.

II. Affordability (Hardship) Criteria

Hardship will be based on the following percentages of the community's Median Household Income (MHI)*:

Median Household Income (MHI)	**Target Service Charge (TSC)**
$0 to $24,725	1% MHI
$24, 725 to $39,557	$247 + (MHI - $24,725) x .0235
$39,558 and above	1.5% MHI

Attached is a table showing sample target service charges at various Median Household Income Levels.

MEDIAN HOUSEHOLD INCOME (MHI)	TARGET SERVICE CHARGE(S)
10,000	100
15,000	150
20,000	200
25,000	253
30,000	371
35,000	488
40,000	600
45,000	675
50,000	750
55,000	825
60,000	900

III. Projected Annual Drinking Water Service Charge

The projected annual service charge must be calculated on an Equivalent Dwelling Unit (EDU) basis. Use of cost per EDU will standardize the way the projected service charge is calculated and provide comparable results and consistency in the financial hardship review. The EDU system relates all system usage proportionately to that equivalent to a typical single family residence. EDU's should be allocated to commercial, industrial, and institutional users based upon the water usage from flow data, number of employees, fixture units, or other factors that equate usage to that of an equivalent number of residential users.

**Most recent U.S. Census Data will be used. Acceptable income surveys for the service area may also be considered.*

IV. Information Required for Hardship Determination

A. Existing population of the project service area.

B. Number of EDU's to be served, and the basis on which they were calculated.

C. Existing annual debt service for the system.

D. Existing annual operation and maintenance (O&M) costs.

E. Estimated project costs.

F. Estimated O&M costs based upon completion of this project.

G. Any other sources of funding anticipated for this project, including the amount, type of funding (loan or grant), and if a loan, its interest rate, term, and annual debt payment.

V. Criteria for Hardship Financial Assistance

A. Maximum project size will be $10,000,000. Projects may not be segmented in order to qualify for hardship assistance.

B. Hardship financial assistance is only available for new drinking water projects. Refinancing of existing long-term debt is not eligible for hardship assistance; however, debt issued after July 1, 1993 is eligible for refinancing through the regular subsidized DWSRF loan program.

C. The applicant for DWSRF hardship loan must demonstrate that it can repay its debt obligation.

D. Projects which are determined eligible for hardship assistance will receive a written confirmation of eligibility.

E. Confirmation of funding availability will be valid for two consecutive annual Intended Use Plan periods, provided that the projected service charge does not change significantly.

F. Confirmation of funding availability may be withdrawn if: the applicant fails to demonstrate satisfactory progress towards project implementation, the information on which the determination was made changes prior to loan closing, or the applicant fails to demonstrate that it can repay the loan.

PENNVEST Affordability Determinations

PENNVEST's primary affordability determination is done through a computer model named PACNIF (which is FINCAP, or financial capability, backwards). Generally, PACNIF operates by comparing the projected user rates for a project with a target rate it generates. The target, or "affordable" rate, is based on a percentage of Adjusted Median Household Income (AMHI). Median Household Income from the most recent census is adjusted for inflation through the use of CPI. The percentage that the AMHI is multiplied by is on a sliding scale of 1 percent to 2 percent, based on the socioeconomic condition of the community. The theory is that a stronger community can afford to pay a larger percentage of its AMHI for drinking water rates than a weaker community.

Where a community sits on the sliding scale is based primarily on its AMHI, but is also influenced by its Early Warning System (EWS) score as calculated by the Department of Community and Economic Development. The EWS consists of eighteen variables, including demographic information, financial condition of the municipality, and burden on the rate payer. The system was legislatively mandated by another program, and developed by the state through a stakeholders group. It represents a strong indication of the overall social and economic health of a given municipality.

For systems whose service area does not match municipal boundaries, PENNVEST weighs the AMHI and EWS for each municipality served based on the number of customers in that municipality.

The PACNIF model starts by comparing the target rate to the projected rate assuming the maximum interest and fees PENNVEST can charge. If the projected user rate is higher than the target, the interest rate is lowered until either the target rate is reached, or the interest rate reaches 1 percent, which is the lowest PENNVEST can charge under its enabling legislation. If the projected rate is still significantly above the target rate, PENNVEST considers a grant. Conversely, if the projected rate is significantly under the target rate, PENNVEST will consider requiring the applicant to fund the project from conventional sources, either in whole or in part.

1. Water System Revenues From User Charges Meet or Exceed Expenses

Total User Charge Revenues - Total Water System Expenses ≥ 0

Yes (Go to Question #3)
No (Go to Question #2)

2. If Total Revenues from user charges less the total water system expenses is less than zero (0), are other funds contributed to water system operations to offset system expenses?

Yes, If yes, what is(are) the source(s) of these additional other revenue funds?

What is the total amount of these additional revenues in the current year water system budget?

No (Go to Question #3)

NOTE: In some cases water systems may supplement user charges with other revenues. This practice is usually discouraged because the full costs of operations should be met by revenues. However, where user fees are supplemented, the DEQ should obtain information regarding the specific situation and the dependability of the supplemental resources.

3. Water System Rate Affordability Index (current)

For residential customers only, please indicate the following using most current information:

- Average Residential Water System User Charge (in dollars and cents)
- Frequency of Water System Billing (e.g., 12, 6, or 4 times per year)
- Average Median Household Income (AMHI)
  (indicate county or local AMHI in dollars)
  i.e., U/m = $\leq$ 1.5% (AMHI/m)

where, U/m = Avg. Residential User Charge per Month
(AMHI/m) Avg. median Household Income per Month

NOTE: The State of Washington Drinking Water Program uses an affordability range of 1.25 to 1.75%. The disadvantaged community threshold is 2.0% of 80% of the statewide non-metropolitan average median household income. In any case, a figure above 2.0% should be investigated further, especially if the residents are paying additional user charges for wastewater, solid waste and other utility services.

4. Water System Rate Affordability Index (future)

For residential customers only, please indicate the following after calculating the expected Average Residential Water system User Charge inclusive of any new debt expenses related to capital improvements in the next five years:

- Average Residential Water System User Charge (in dollars and cents)
- Frequency of Water System Billing (e.g., 12, 6, or 4 times per year)
- Average Median Household Income (AMHI)
  (indicate county or local AMHI in dollars)

i.e., $U/m = \leq 1.5\%$ (AMHI/m)

where, U/m = Avg. Residential User Charge per Month
(AMHI/m) Avg. median Household Income per Month

NOTE: This measure considers the affordability of user charges when incorporating additional capital improvements. Will additional debt be matched by increased rates? Will the rates be affordable?

5. Does the water system include a cash budget within its annual budget for cash flow and emergency purposes?

Yes If yes, is the operating cash on hand greater than or equal to one and one-half (1.5) times the average monthly operations and maintenance plus general and administration expenses?

i.e., Operating Cash (annual) $\geq 1/8$ (O & M + G & A)

where, O = operations expenses
M = maintenance expenses
G = general expenses
A = administrative expenses

No (Go to Question #6)

NOTE: A water system budget that incorporates a cash budget equivalent to one and one-half the monthly O&M and General & Administrative expenses is conscious of the need to be prepared for emergencies, payment delinquencies, and other short-term cash flow problems.

6. Water System Rates Review

Does the water system management review the user fee, user charge, or rate system at least once every two years?

Yes (Go to Question #7)

No If no, what was the date of the most recent water system rates (user fees, charges) review?

What was the date of the previous water system rates (user fees, charges) review?

NOTE: It is good practice for a water system to review its rates on an annual basis. The longer the interval between water system rate reviews, the less likely the system will be to adjust to significant changes in expenses. The higher the interval, the less likely the system will be able to raise user charges to meet expenses related to new or amended drinking water rules.

7. What resources and guidance does the water system use for setting water user rates, fees or charges?

(Please List:) (then Go to NEXT SECTION)

Sources: "Financial Viability Manual for New and Expanding Small Water Systems." Bill Jarocki and Tim Wilkinson, Environmental Finance Center, Boise State University based on a report by the Washington State Department of Health

"The Small System Guide to Viability." Community Resource Group, Inc., Southern RCAP

Appendix G. Additional References for Information Resources on Affordability

1994 Catalog of Domestic Federal Assistance. Available on the net at www.tgci.com/cfda/tocfda/htm.

American Water Works Association. 1986. "Water Rates and Related Charges." American Water Works Association, Denver, CO. AWWA Manual M26. 44 p.

Author ?. 1995. "Water and Wastewater Cost and Rate-Setting Trends." Water Engineering & Management. MAY 01 1995 v 142 n 540 (The findings of a 1994 survey on utility rates.)

Beecher, J.A. 1994. "Water Affordability and Alternatives to Service Disconnection." Journal of the American Water Works Association, OCT 01 1994 v 86 n 1061.

Beecher, J.A. 1996. "Avoided Cost: An Essential Concept For Integrated Resource Planning." Water Resources Update, Summer 1996 n 10428.

Beecher, J.A. 1997. "Water Utility Privatization and Regulation: Lessons from the Global Experiment." Water International, MAR 01 1997 v 22 n 154.

Beecher, J.A. and P.C. Mann. 1997. "Real Water Rates on the Rise." Public Utilities Fortnightly (Arlington, VA.) : 1 JUL 15 1997 v 135 n 1442.

Beecher, J.A. 1995. "Integrated resource planning fundamentals." Journal of the American Water Works Association, JUN 01 1995 v 87 n 634.

Bogodon, A.S. and A. Can. 1997. "Indicators of Local Housing Affordability: Comparative and Spatial Approaches." Real Estate Economics, Spring 1997 v 25 n 143.

Bourassa, S.C. 1996. "Measuring the Affordability of Home-Ownership." Urban Studies, DEC 01 1996 v 33 n 101 867.

Department of Housing and Urban Development. 1995. "Small Cities Community Development Block Grant Program for Fiscal Year 1996; Section 108 Loan Guarantee Program for Small Communities in New York State." Federal Register / Vol. 60, No. 249 / Thursday, December 28, 1995.

Dreese, G.R. and J. Beecher. 1993. "Developing Models for Assessing the Financial Health of Small and Medium-Sized Water Utilities." Journal of the American Water Works Association JUN 01 1993 v 85 n 654.

General Accounting Office. [RCED-94-40] Drinking Water: Stronger Efforts Essential for Small Communities to Comply with Standards. Available on the net from www.gao.gov. in text, PDF format.

General Accounting Office. 1984. 1984.07 "Housing Allowances: An Assessment of Program Participation and Effects." General Accounting Office, Washington D.C. 20548. PEMD 86-3.

General Accounting Office. [RCED-95-61W] "Housing and Community Development Products, 1992-94." Available on the net from www.gao.gov. in text, PDF format.

General Accounting Office. [RCED-95-82] Housing Finance: Improving the Federal Home Loan Bank System's Affordable Housing Program. Available on the net from www.gao.gov. in text, PDF format.

General Accounting Office. [RCED-97-109] "Rural Development: Availability of Capital for Agriculture, Business, and Infrastructure." Available on the net from www.gao.gov. in text, PDF format.

General Accounting Office. [RCED-97-82] "Rural Development: Financial Condition of the Rural Utilities Service's Loan Portfolio." Available on the net from www.gao.gov. in text, PDF format.

General Accounting Office. [RCED-95-258] "Rural Development: USDA's Approach to Funding Water and Sewer Projects." Available on the net from www.gao.gov. in text, PDF format.

General Accounting Office. [RCED-97-82] "Appendix I: Objectives, Type of Assistance, and Eligibility Criteria of Water and Wastewater Programs for Rural Areas." In "Rural Development: Patchwork of Federal Water and Sewer Programs is Difficult to Use: Briefing Report to the Chairman." Washington, D.C. : The Office.

Hancock, K.E. 1993. "Can Pay? Won't Pay? or Economic Principles of 'Affordability'." Urban Studies. FEB 01 1993 v 30 n 1 127.

Hulchanski, J.D. 1995. "The Concept of Housing Affordability: Six Contemporary Uses of the Housing Expenditure-to-Income Ratio." Housing Studies, OCT 01 1995 v 10 n 4471.

Hunt, Florine E. 1966. "Public Utilities: Information Sources; an Annotated Guide to Literature and Bodies Concerned with Rates, Economics, Accounting, Regulation, History, and Statistics of Electric, Gas, Telephone, and Water Companies." Gale Research Co., Detroit. 200 p.

Magat, Wesley A., Alan J. Krupnick, Winston Harrington. 1986. "Rules in the Making : a Statistical Analysis of Regulatory Agency Behavior." Resources for the Future, Washington, D.C. 182 p.

Mann, P.C. and J.A. Beecher. 1996. "Incremental and average cost methods in rate design." Journal of the American Water Works Association, JUN 01 1996 v 88 n 634.

Mann, Patrick C. and Janice A. Beecher. 1990. Monograph. "Deregulation and Regulatory Alternative for Water Utilities." Columbus, Ohio: The National Regulatory Research Institute, Ohio State University.

Mann, Patrick C. and Janice A. Beecher. 1991. Monograph. "Cost Allocation and Rate Design for Water Utilities." Denver, CO: The American Water Works Association Research Foundation.

Mann, Patrick C., Janice A. Beecher and James R. Landers. 1992. Monograph. "Integrated Resource Planning for Water Utilities." Columbus, Ohio: The National Regulatory Research Institute.

Mann, Patrick C. 1993. Monograph. "Water-Utility Regulation: Rates and Cost Recovery." Los Angeles, California: The Reason Foundation.

Mann, Patrick C. and Janice A. Beecher. 1993. Monograph. "Meeting Water Utility Revenue Requirements: Alternative Financial and Ratemaking Mechanisms." Columbus, Ohio: The National Regulatory Research Institute.

Meeks, C.B and A.L. Sweaney. 1994. "Assessing Housing Affordability in Rural Georgia." Southern Rural Sociology. 1994 v 10 n 191.

Meeks, C.B. 1992. "Balancing Regulation and Affordability of Housing." Journal of Family and Economic Issues. Winter 1992 v 13 n 4373.

Morganstern, R.D. (Ed.). 1997. Economic Analyses at EPA: Assessing Regulatory Impact. Resources for the Future, Washington, DC. 480 p.

Native American Housing Assistance and Self-Determination Act of 1996. 104th CONGRESS, 2d Session. Text can be found on the HUD web site.

Noll, P.F., W. O'Dell, and J. Sullivan. 1997. "Florida's Affordable Housing Needs Assessment Methodology". Journal of the American Planning Association, Fall 1997 v 63 n 4495.

Notani, S. 1997. "Perceptions of Affordability: Their Role in Predicting Purchase Intent and Purchase." Journal of Economic Psychology, SEP 01 1997 v 18 n 5525.

Singhvi, S. 1996. "Using an affordability analysis to budget capital expenditures." Healthcare Financial Management JUN 01 1996 v 50 n 668.

U.S. Dept. of Housing and Urban Development (HUD). Community Planning and Development Program Guide. The U.S. Department of Housing and Urban Development, San Francisco Office, San Francisco, CA.

van Rynveld, M.B. 1995. "Costs and Affordability of Water Supply and Sanitation Provision in the Urban Areas of South Africa." Water South Africa. JAN 01 1995 v 21 n 11.