NRRI 91-17

VIABILITY POLICIES AND ASSESSMENT METHODS FOR SMALL WATER UTILITIES

Janice A. Beecher, Ph.D.
Senior Research Specialist
The National Regulatory Research Institute

G. Richard Dreese, Ph.D.
Institute Associate and Professor of Economics
Ohio Dominican College

James R. Landers
Graduate Research Associate
The National Regulatory Research Institute

THE NATIONAL REGULATORY RESEARCH INSTITUTE
The Ohio State University
1080 Carmack Road
Columbus, Ohio 43210
(614) 292-9404

June 1992

This report was prepared by The National Regulatory Research Institute (NRRI) with funding provided by participating member commissions of the National Association of Regulatory Utility Commissioners (NARUC). The views and opinions of the authors do not necessarily state or reflect the views, opinions, or policies of the NRRI, the NARUC, or NARUC member commissions. Any reference in this report to specific methods or models does not constitute an endorsement by the NRRI or the NARUC.

EXECUTIVE SUMMARY

The proliferation of nonviable small water systems may not be the most prominent issue on the regulatory agenda at large, but it probably is the most pressing issue with respect to the regulation of water utilities. Public policies in this area can be distinguished in terms of whether they target proliferation (the birth of systems) or viability (the survival of systems), although many policies actually address both problems at once.

Based on the empirical evidence, proliferation (that is, *growth* in the number of systems) may not be as pervasive a problem today as might be assumed. The decline in the investor-owned water utility population can partly be attributed to economic factors, but the role of state policy in contributing to this trend may be equally relevant. Still, controlling the emergence of water systems is perhaps the most essential of all viability policies; without nonproliferation policies the task of improving viability is made much harder.

In developing a framework for this analysis, key dimensions of water utility viability were identified. Three are performance dimensions (technical, financial, and managerial) and three are institutional dimensions (regulatory, structural, and comprehensive). This framework is used in the discussion of the industry's performance, the review of viability policies for emerging and existing water systems, and the presentation of viability assessment methods.

The key to assuring the viability of water systems is the judicious use of state regulatory authority so that only viable systems emerge in the first place. This authority rests in the hands of state drinking water regulators and, in the case of many small systems, state public utility commissions. Each has a certification process, a permitting process, or both whereby new systems emerge. The need to tighten up the certification and permitting processes and curtail the emergence of new nonviable water systems has been well recognized by the states. Many have taken significant steps in this area and have begun to see positive results in slowing the proliferation of new water systems.

Past proliferation and financial distress caused by a variety of factors have resulted in the existence and persistence of thousands of small water systems whose viability is precarious. For failing water systems, institutional solutions are virtually imperative. While the primary issue for emerging water systems is a regulatory one (namely certification), for existing systems issues of structure are especially important, reflecting a strong interest in improving the industry's efficiency and, hence, viability.

In light of the growing interest in viability policies for both emerging and existing water systems, the need for performance assessment techniques also has grown. Water utilities, their regulators, and others concerned about viability can apply a variety of rudimentary assessment techniques to evaluate or "screen" water utilities. Utilities themselves may use these techniques to appraise their own condition or that of another utility with which they might want to do business. Regulators may use the same techniques to evaluate certificate applications, survey the health of existing utilities, or to trigger intervention. Public policy analysts may use them to measure the effectiveness of water utility viability policies.

Effective viability policies require assessment methods that can be used by regulators and others for screening utilities and triggering intervention as needed. Because financial performance is so vital to water system viability, a need exists for methods specifically designed to assess the financial health of existing water systems and the expected health of emerging water systems. Some basic assessment methods are introduced as well as a financial distress classification model.

This research endeavor has shown that performance assessment methods can play a role in developing viability policies for water utilities. Despite limitations, performance assessment is critical even before a water system is operational. Certification of water systems should be rigorous, thorough, and restrictive when necessary. Barriers to market entry are necessary whenever a local economy cannot support the full cost of water service from a new water system. Existing systems, too, should be screened along various performance criteria. As a diagnostic tool, performance assessment can assist regulators in identifying cases where intervention is justified. Another application for existing systems is the use of performance assessment in evaluating prospective structural changes, such as mergers, acquisitions, and satellite management.

Signs of change for the water industry, especially its small systems component, can be seen. In many ways, this study has attempted to hit a moving target, as some significant water system viability policies have been adopted as recently as early 1992. The states clearly have found ways to address the serious problems of small water systems. Continued experimentation in this area is needed along with monitoring to assess the effectiveness of various policy alternatives in meeting the goals of performance, efficiency, and viability.

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FOREWORD

The viability of emerging and existing small water utilities is an area of ongoing concern to state public utility commissions as well as state drinking water program administrators. This report addresses public policies targeting the viability issue.

Douglas N. Jones
Director
Columbus, Ohio
June 15, 1992

ACKNOWLEDGEMENTS

The authors extend their appreciation to Douglas N. Jones, Raymond W. Lawton, and John D. Borrows of the NRRI, Sarah P. Voll of the New Hampshire Public Utilities Commission, and reviewers of the American Water Works Association Research Foundation for comments and suggestions. The authors also acknowledge David Wagman for expert editing, Wendy Windle for computer graphics, and Linda Schmidt for word processing and production assistance.

CHAPTER 1

PROLIFERATION AND VIABILITY OF SMALL WATER SYSTEMS

The proliferation of nonviable small water systems may not be the most prominent issue on the regulatory agenda at large, but it probably is the most pressing issue with respect to the regulation of water utilities. This is an issue not only for public utility regulators whose chief concern is economic regulation, but a significant one for drinking water administrators whose focus is on public health, as well as water planners whose focus is on resource management and protection. Public policies in this area can be distinguished in terms of whether they target proliferation (the birth of systems) or viability (the survival of systems), although many policies actually address both problems at once.

This study is the most recent of several by NRRI addressing small water systems and their regulation by state public utility commissions.[1] Based on this research, as illustrated in table 1-1, both the problems of small water systems and appropriate solutions are entwined with the phases of the regulatory process. More attention than ever is being paid to small water system viability in light of the Safe Drinking Water Act (SDWA) as amended in 1986. The economic and regulatory impact of the SDWA has even raised the possibility of a small system crisis:

> It is a fact that problems frequently do not get solved in our society until they reach crisis proportions. The small water system situation is a dilemma, but it is not yet a crisis. It will become a crisis once state drinking water programs accept primary enforcement responsibility for the waves of comprehensive regulations currently under development by the USEPA. . . . Once the states begin implementation of the provisions of the new law, the enforcement pressures on small systems will increase steadily and inexorably.[2]

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[1] A listing of NRRI reports on water utilities and their regulation appears at the end of the bibliography of this report.

[2] G. Wade Miller, John E. Cromwell III, and Frederick A. Marrocco, "The Role of the States in Solving the Small System Dilemma," *Journal of the American Water Works Association* (August 1988): 37.

TABLE 1-1
PROBLEMS AND SOLUTIONS IN SMALL WATER SYSTEM REGULATION

Stage	Problems	Solutions
I.	**Demand for Creation of Small Water Utilities**	
	· Reliance on small water supply · Distance from large water supply systems · Adjuncts of land development	· Certificates of convenience and necessity · Regionalization · Land-use controls
II.	**Establishment of Small Water Utilities**	
	· Little capital · Weak management experience and structure	· Cooperative ownership · Capital subsidies · Education and training · Setting initial rates
III.	**Utility Operations**	
	· Low revenues · Poor recordkeeping · Inadequate service quality · Deteriorating plant · Low capital reserves	· Consolidation · Centralized assistance · In-service education and training · Annual reports · Receivership
IV.	**Application for Rate Relief**	
	· Unfamiliar procedures · Disproportionately expensive to utility · Poor quality submission to commission	· Case consolidation · Routinized timing · Deregulation · Safe harbors · Automatic adjustments
V.	**Processing Application for Rate Relief**	
	· Expensive for company · Time consuming for commission	· Stipulated proceedings · Short forms · Complaint-triggered rate case · Staff-assisted rate case

Source: Adapted from Raymond W. Lawton and Vivian Witkind Davis, *Commission Regulation of Small Water Utilities: Some Issues and Solutions* (Columbus, OH: The National Regulatory Research Institute, 1983), 4 and 67.

Federal regulators have recognized this effect and have devoted considerable attention to the problems of small water systems in the past few years. Studies by the U.S. Environmental Protection Agency (EPA) provide evidence of the strong interest in these issues at the federal level: *Establishing Programs to Resolve Small Drinking Water System Viability: A Summary of the Federal/State Workshop* (February 1991); *Improving the Viability of Existing Small Drinking Water Systems* (June 1990); and *Ensuring the Viability of New, Small Drinking Water Systems: A Study of State Programs* (April 1989).

The EPA also conducts workshops, publishes occasional bulletins and newsletters focused on viability, and has developed a program for mobilizing resources aimed at SDWA compliance. The three principal components of mobilization are strengthening the institutional framework for water supply at the state and utility levels, improving water systems' technical and managerial capabilities, and building public support for safe drinking water.[3]

Because most forms of water management and regulation are implemented at the state level, the states have long been sensitized to the problems of small water systems. The importance of the states relative to both the federal and local governments is well recognized.[4] With the mounting constraints on viability, state regulators may find the regulation of small water systems even more troublesome than in the recent past.[5] In response, several states have conducted their own studies and investigations of small water systems and their regulation. As revealed in a recent analysis of jurisdictional water utilities by staff of the Public Utilities Commission of Ohio, commissions are well aware not only of the precarious condition of small systems but the reasons for it as well:

> [O]ften times the smaller companies fail to ask the Commission for sufficient rate increases or do not ask at all because of the time and complexity, either real or perceived, involved in a rate case filing; the small plants may be older, less efficient, and insufficiently maintained;

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[3] "EPA Program to 'Mobilize' Compliance Efforts," *Mainstream* (A publication of the American Water Works Association), 34 no. 8 (August 1990), 9.

[4] Daniel A. Okun, "State Initiatives for Regionalization," *American Water Works Association Journal* 73 (May 1981): 243-45.

[5] G. Richard Dreese, "The Bleak Future of Small Investor-Owned Water Companies and Their Customers: Ohio as a Case Study," *Ohio Cities and Villages* 36 no. 1 (February 1988): 15.

> management may not be skilled in properly running a water and sewer utility; and the smaller customer base means economies of scale are not at the same level as the larger companies. Also, it cannot be overlooked that the accuracy of the bookkeeping of smaller companies is often in question due to poor recordkeeping, uncertain cost allocation between personal and business expenses, and improper accounting procedures.[6]

Changes in the way regulatory commissions deal with the problems of small water systems are rapidly unfolding. Some of the states with fairly aggressive viability policies already in place include California, Connecticut, Georgia, Maryland, Missouri, New Jersey, Nevada, Pennsylvania, and Washington. Other states with considerable activity include Arizona, Kentucky, Massachusetts, New Hampshire, Utah, and Vermont.

Still, there is much work to be done in developing effective viability and nonproliferation policies. A Pennsylvania utility regulator provided the following blueprint for state commission action:[7]

- The *first* thing regulators must do is recognize that regulation of water companies will require more of our time in the future if adequate solutions to the troubled water company problem are to be found.
- *Secondly,* regulators must adopt the principle that a water utility to be successful must have competent management and adequate financing.
- *Thirdly,* regulators must identify companies that need help.
- *Fourthly,* assuming a takeover by a healthier private company, regulators must resolve to provide adequate incentives to such companies.
- *Fifthly,* if the situation is truly intolerable, with no possibility of improvement in sight, regulators must consider encouraging a voluntary sale, or forcing a sale, to a larger private company or to a municipality.
- *Sixthly,* longer-term solutions must be considered.

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6 Public Utilities Commission of Ohio, *1990 Annual Report Review of Water and Sewer Companies* (Columbus, OH: Public Utilities Commission of Ohio, 1992).

7 Excerpts from James H. Cawley, "The Takeover of Troubled Water Companies," *Proceedings of the Fourth Biennial Regulatory Information Conference* Columbus, OH: The National Regulatory Research Institute, 1984), 359-69.

- *Lastly,* regulators must recognize that only an entity with strong water management skills and technical expertise, great financial flexibility, and the ability to employ economies of scale can solve the troubled water company problem.

For water utility regulators, the emergence of new water systems and the precarious viability of so many existing small water systems continue to be the principal areas of concern. As noted above, defining the problem in terms of proliferation versus viability is the first order of business.

Proliferation Defined

This study began as one aimed at the "nonproliferation of nonviable water systems," meaning a key focus of the study would be on methods for thwarting the emergence of new nonviable systems, or methods of "birth control." In keeping with this metaphor, nonviable water systems are sometimes referred to as "orphans."[8] These themes remain central to this report. However, the empirical evidence suggests that the proliferation of water systems may not be as pervasive a problem today as it once may have been. In the past two or three years, some states appear to have brought the proliferation problem under more control.

The historical development of the water utility industry in the United States, like other public utilities, reflects substantial growth. As table 1-2 reveals, more than 3,000 systems existed before the end of the nineteenth century. Initially, the vast majority of systems were privately owned, although the proportion of publicly owned systems grew steadily and eventually claimed the majority. Today, the number of community water systems in the United States is about 60,000.[9]

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8 James R. McQueen, "Takeover of Small Failing Water Systems," *Proceedings of the Annual Conference of the American Water Works Association, 1991* (Denver, CO: American Water Works Association, 1991), 341-45.

9 According to the EPA, there exist another 140,000 noncommunity water systems, which are further subdivided into transient and nontransient systems. These systems are not analyzed in this report because they generally are not considered public utilities.

TABLE 1-2
HISTORICAL DEVELOPMENT OF WATER SYSTEMS IN THE UNITED STATES

Year	Publicly Owned	Privately Owned	Total	Percent of Total Public	Percent of Total Private
1800	1	15	16	6.3%	93.7%
1810	5	21	26	19.2	80.8
1820	5	25	30	16.6	83.4
1830	9	35	44	20.5	79.5
1840	23	41	64	35.9	64.1
1850	33	50	83	39.7	60.3
1860	57	79	136	41.9	58.1
1870	116	127	243	47.7	52.3
1880	293	305	598	49.0	51.0
1890	806	1,072	1,878	42.9	57.1
1896	1,690	1,489	3,179*	53.2	46.8

Source: M. N. Baker (1989) as reported in Charles F. Phillips, Jr., *The Regulation of Public Utilities* (Arlington, VA: Public Utilities Reports, Inc., 1988), 759.

* There also existed seventeen additional water systems of which twelve were of joint ownership and five were of unknown ownership.

Table 1-3 presents U.S. EPA data on the number of community water systems in existence as of the beginning of 1992 according to system size. The anomaly here is that roughly 13 percent of the water systems serve 89 percent of the population, while more than 87 percent of the water systems serve only 11 percent of the population. The structure of the water supply industry is one supporting a vast number of small systems, many serving populations fewer than 500.

Smallness, of course, is a relative issue. The EPA generally classifies systems serving a population under 3,300 (about 1,000 service connections) as small, although other subcategories also are used. The states use different definitions of smallness, sometimes based on service connections, sometimes based on population served, and sometimes based on utility revenues.[10] Regulatory standards and policies sometimes vary according to system size. Federal drinking water regulations do not apply to

10 Janice A. Beecher and Ann P. Laubach, *1989 Survey on State Commission Regulation of Water and Sewer Systems* (Columbus, OH: The National Regulatory Research Institute, 1989).

TABLE 1-3
WATER SYSTEMS AND POPULATION SERVED, 1992

System Size by Population Served*	Number of Community Water Systems	Percent of Total Systems	Population Served (000)	Percent of Population Served
Smaller Systems				
25-100	18,388	31.2	1,038	.4
101-500	18,465	31.4	4,602	2.0
501-1,000	6,331	10.8	4,660	2.0
1,001-2,500	6,588	11.2	10,739	4.6
2,501-3,300	1,518	2.6	4,390	1.9
Total < 3,300	51,290	87.1	25,429	10.9
Larger Systems				
Over 3,300	7,570	12.9	207,587	89.1
All Systems	58,860	100.0	233,017	100.0

Source: U.S. Environmental Protection Agency, *Federal Reporting Data System FRDS-II* (computer printout dated 2/25/92). Percentages for size categories were calculated by the authors. Totals are affected by rounding.

* Population served (not connections).

systems serving fewer than twenty-five customers. Washington state, however, includes systems serving as few as two connections under the jurisdiction of its Department of Social and Health Service, which is responsible for drinking water regulation. Its sister agency, the Utilities and Transportation Commission exempts from economic regulation systems having less than $300 in annual operating revenues per customer or fewer than 100 customers.[11] The lines of jurisdiction, in other words, are drawn differently from state to state and even from agency to agency within a state.

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[11] Many commissions selectively exempt systems on the basis of size, which can limit their perspective on the small systems problem. Iowa, for example, does not regulate systems serving fewer than 2,000 customers, leaving only one under the commission's authority.

Further detail on the structure of the industry is found in table 1-4, which compares systems by size and according to specific types of ownership. Among small water systems, the most predominant form is local, municipally owned systems (30.5 percent). The next largest category consists of systems affiliated with mobile home parks (19.3 percent). In general, most small water systems are considered privately owned or ancillary systems. These ownership forms frequently place systems under the jurisdiction of the state public utility commissions.

Recent EPA data (1991/1992) on the total number of water systems are compared with data from five years earlier (1986/1987) in table 1-5. On the whole, the number of systems declined slightly (by 761 systems or 1.3 percent) over the five-year period.[12] Most interesting is the finding that within the smallest size category (systems serving 100 or fewer customers), the number of systems declined in a fairly significant way (by 1,290 systems or 6.6 percent). Indeed, this was the only size category to experience a decline over the period. In the other "smaller systems" groupings, the increase in systems was fairly modest. For the "larger systems" (serving 3,300 or more customers), more substantial gains were made.

The relative stability in the aggregate number of U.S. water systems over the 1980s appears to challenge some commonly held assumptions about proliferation. The small decline in the total number of systems and the decline in the number of systems in the smallest category might suggest that proliferation has slowed (along with the economy in general and real estate markets in particular) or even that some measure of consolidation may be underway. The data are imperfect in that keeping track of water systems (especially the very small systems) is extremely difficult.[13] Moreover, the use of aggregate data could mask proliferation trends within particular regions. The numbers, of course, are not so dramatic as to suggest that public policies to address proliferation are misdirected. On the contrary, these policies are essential to real progress in reducing the number of nonviable systems.

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[12] EPA sources indicate that the total number of water systems has hovered around 60,000 for at least a decade.

[13] Underestimation bias in the data would probably affect the early data and the later data similarly. If anything, undercounting of systems would be more likely in the earlier days of the Federal Reporting Data System, which would result in a slightly greater decline in the total number of systems as counted by the EPA.

TABLE 1-4

ESTIMATED COMMUNITY WATER SYSTEMS BY OWNERSHIP, 1992

Type of Ownership	Serving <3,300 pop.(a) Number	Pct.	Serving >3,300 pop.(a) Number	Pct.	Total Systems	Pct.
Public						
Local, municipal government	17,978	30.5%	8,082	13.7%	26,060	44.3%
Federal government	434	.7	158	.3	592	1.0
On Indian land	139	.2	3	.0	142	.2
Subtotal	18,551	31.5	8,243	14.0	26,794	45.5
Private						
Investor-owned						
Financially independent	6,528	11.1	999	1.7	7,528	12.8
Financially dependent (b)	899	1.5	204	.3	1,105	1.9
Homeowners' association (c)	6,651	11.3	259	.4	6,908	11.7
Other	633	1.1	108	.2	741	1.3
Not available	156	.3	44	.1	200	.3
Subtotal	14,865	25.3	1,615	2.7	16,481	28.0
Ancillary						
Mobile home parks	11,379	19.3	0	.0	11,379	19.3
Institutions	600	1.0	0	.0	600	1.0
Schools	502	.9	11	.0	513	.9
Hospitals	102	.2	0	.0	102	.2
Other	2,958	5.0	0	.0	2,958	5.0
Not available	35	.1	0	.0	35	.1
Subtotal	15,573	26.5	11	.0	15,585	26.5
All Systems	48,989	83.2%	9,871	16.8%	58,860	100.0%

Source: Authors' construct using U.S. Environmental Protection Agency, *Federal Reporting Data System FRDS-II* (computer printout dated 2/25/92) and Frederick W. Immerman, *Financial Descriptive Summary: 1986 Survey of Community Water Systems* (Washington, DC: Office of Drinking Water, U.S. Environmental Protection Agency, 1987), table 2-2. System percentages for each category reported in the 1986 survey were applied to the aggregate system total available in early 1992. Some figures are affected by rounding.

(a) Population served (not connections).
(b) Financially dependent on parent company (EPA categorization).
(c) Homeowners' association or subdivision (EPA categorization).

TABLE 1-5

CHANGE IN THE NUMBER OF
COMMUNITY WATER SYSTEMS IN THE UNITED STATES
1986/1987 TO 1991/1992

System Size*	Water Systems 1986/1987		Water Systems 1991/1992		Change	Percent Change
	Number	Percent	Number	Percent		
Smaller Systems						
Under 101	19,678	33.0%	18,388	31.2%	-1,290	-6.6%
101-500	18,330	30.7	18,465	31.4	+135	+.7
501-1,000	6,310	10.6	6,331	10.8	+21	+.3
1,001-3,300	7,940	13.3	8,106	13.8	+166	+2.1
Larger Systems						
3,301-10,000	4,210	7.1	4,231	7.2	+21	+.5
10,001-50,000	2,534	4.3	2,649	4.5	+115	+4.5
50,001-75,001	240	0.4	272	.5	+32	+13.3
75,001-100,000	104	0.2	105	.2	+1	+1.0
Over 100,000	275	.5	313	.5	+38	+13.8
Total	59,621	100.1%	58,860	100.1%	-761	-1.3%

Source: U.S. Environmental Protection Agency, *Federal Reporting Data System FRDS-II* (computer printouts dated 5/23/88 and 2/25/92). Some of the original categories reported were collapsed for comparison purposes. Percentages were calculated by the authors and may not add due to rounding.

* Population served (not connections).

State public utility regulators often use utilities rather than water systems as a unit of analysis.[14] Data on the number of water utilities under the jurisdiction of the commissions (and other survey data on the topic of small system viability) appear in appendix A of this report. Different types of water utilities are regulated by the states to a different extent:[15]

- Investor-owned (45 commissions)
- Municipal (14 commissions)
- Water districts (9 commissions)
- Cooperatives (13 commissions)
- Homeowners' associations (9 commissions)
- Other systems (7 commissions)

The scope of commission jurisdiction varies with the type of utility regulated, but investor-owned (or privately owned) utilities are regulated most comprehensively. States reporting 100 or more jurisdictional investor-owned water utilities (100 utilities or more) for 1990 were: Texas (1,402), Arizona (378), Florida (357), North Carolina (336), New York (317), Pennsylvania (269), California (225), and Louisiana (116). In most of these states, the water system viability issue has been high on the regulatory agenda.

The change in the number of investor-owned water utilities between 1980 and 1990 is reported in appendix A (table A-8) and arrayed in table 1-6.[16] Overall, thirteen states experienced an increase in the number of jurisdictional utilities, thirty experienced a decline, and two (Delaware and Kansas) experienced no change. Not surprisingly, big increases in the number of jurisdictional investor-owned water utilities are apparent for Texas (+957) and Florida (+97), followed by South Carolina (+20), Utah (+15), and Nevada (+10). At the other end are New York (-174), California (-121), Arizona (-97), Pennsylvania (-76), and Connecticut (-45).

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14 Many individual water systems may be subsumed under the ownership of one utility, which may make it hard to assess proliferation in the number of systems.

15 Beecher and Laubach, *1989 Survey on State Commission Regulation.* Commission regulation of water systems is nonexistent in Georgia, Minnesota, Nebraska, North Dakota, South Dakota, and Washington, D.C.

16 These data may not be completely reliable, and should be used with care, but are the best available. As in the federal data, any bias in the data due to undercounting of utilities would likely affect both data points and would not be expected to affect the general results.

TABLE 1-6
STATES ARRANGED BY CHANGE IN THE NUMBER OF
JURISDICTIONAL INVESTOR-OWNED WATER UTILITIES

State	1980	1990	Change	Percent
Texas	445	1,402	+957	+215%
Florida	260	357	+97	+37%
South Carolina	52	72	+20	+39%
Utah	18	33	+15	+83%
Nevada	13	23	+10	+77%
Vermont	71	80	+9	+13%
New Hampshire	31	40	+9	+29%
New Mexico	30	38	+8	+27%
Montana	27	35	+8	+30%
Washington	55	60	+5	+9%
Missouri	75	78	+3	+4%
Hawaii	8	11	+3	+38%
Idaho	22	23	+1	+5%
Delaware	14	14	0	0%
Kansas	7	7	0	0%
Wyoming	17	16	-1	-6%
Rhode Island	8	7	-1	-13%
Virginia	73	70	-3	-4%
Alaska	24	21	-3	-13%
Wisconsin	15	12	-3	-2%
Alabama	17	13	-4	-24%
Tennessee	13	9	-4	-31%
North Carolina	343	336	-7	-2%
Ohio	42	35	-7	-17%
Colorado	12	5	-7	-58%
Arkansas	12	3	-9	-75%
Kentucky	46	36	-10	-22%
West Virginia	70	58	-12	-17%
Massachusetts	51	37	-14	-27%
Iowa	15	1	-14	-93%
Oklahoma	46	30	-16	-35%
Michigan	18	1	-17	-94%
Illinois	73	55	-18	-25%
Oregon	25	6	-19	-76%
Maine	61	38	-23	-38%
New Jersey	88	64	-24	-27%
Louisiana	144	116	-28	-19%
Maryland	60	28	-32	-53%
Mississippi	108	71	-37	-34%
Connecticut	106	61	-45	-42%
Pennsylvania	345	269	-76	-22%
Arizona	475	378	-97	-20%
Indiana	123	23	-100	-81%
California	346	225	-121	-34%
New York	491	317	-174	-35%

Source: Appendix A, table A-8.

Although not statistically tested, the change in the number of investor-owned utilities over the period does not seem to be consistently related to population or other major demographic patterns, meaning that other factors appear to be at work.

The proliferation of systems in Florida is largely explained by economic growth and real estate development. Texas, too, was affected by these factors but by other changes as well. In 1986, jurisdiction over water utilities was transferred from the state's utility commission to the Texas Water Commission. What followed was a concerted effort on the part of Commission staff to locate and register systems that were under the agency's jurisdiction but not accounted for. A few systems that had been grandfathered under the change in state regulation were eventually added to the rolls as well. The Commission also continued to refine its definitions of jurisdictional homeowners' associations and cooperatives. Both Texas and Florida continue to experience pressure in terms of the large numbers of pending certification cases. In 1989, Texas had 152 cases pending and Florida had 75; the total for all states was 627.[17]

Nevertheless, proliferation (that is, *growth* in the number of systems) may not be as pervasive a problem today as might be assumed. The decline in the investor-owned water utility population can partly be attributed to economic factors, but the role of state policy in contributing to this trend may be equally relevant. Many states, such as Arizona, California, Connecticut, Florida, Illinois and South Carolina, have implemented fairly aggressive policies for slowing or reversing the proliferation trend, especially since the mid-1980s. Other states could follow Texas's lead in trying to locate more jurisdictional utilities.[18] However, many of these renegade utilities are very small and in several states they already may be exempt from public utility regulation on the basis of size or other criteria.

These findings should in no way undermine the priority of nonproliferation (namely, of nonviable water systems) as a matter of public policy. Many states continue to experience significant growth in the number of jurisdictional utilities. Most systems not under the commission's jurisdiction still must be regulated by state drinking water authorities. Controlling the emergence of water systems is

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17 Janice A. Beecher and Patrick C. Mann, *Deregulation and Regulatory Alternatives for Water Utilities* (Columbus, OH: The National Regulatory Research Institute, February 1990).

18 In New Hampshire, for example, the commission intends to investigate several hundred such systems.

perhaps the most essential of all viability policies; without nonproliferation policies the task of improving viability is made much harder. Indeed, most policies toward small water systems correctly address proliferation and viability simultaneously. While, as a distinction can be made between policies toward emerging systems and policies toward existing systems, as discussed in chapters 3 and 4, both have the common goal of nonproliferation of nonviable small water systems.

Viability Defined

Dictionary definitions treat viability in terms of survival under adverse conditions. Survival is an issue for mortal beings and business entities alike; indeed, the latter's life expectancy is probably shorter. Failure is perceived as especially disastrous when a business provides a service regarded as essential, as in the case of public utilities.

In the study of small water systems, several useful definitions of viability have emerged. According to Wade Miller Associates, Inc., a viable water system is one that is self-sustaining, and that has the commitment, and the financial, managerial, and technical capability to meet performance requirements reliably on a long-term basis.[19]

Somewhat more attention has been paid to defining "nonviability." Robert Heater defines a nonviable water system in terms of four issues: lack of motivation to operate properly, lack of ability to operate properly, lack of money to operate properly, and lack of ability to sell at a reasonable price due to lack of rate base, size, or geographic location.[20] This definition encompasses an emerging perspective that emphasizes how a community's ability to pay for the full cost of water service can determine water system viability.[21]

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[19] Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems In Pennsylvania* (Arlington, Virginia: Wade Miller Associates, Inc., 1991), 5-1.

[20] Robert B. Heater, "The Problems of Small Water Companies as Viewed by the Owner of One," *Proceedings of the Fifth NARUC Biennial Regulatory Information Conference* (Columbus, OH: The National Regulatory Research Institute, 1986), 1412.

[21] A.W. Marks of the U.S. Environmental Protection Agency's Office of Ground Water and Drinking Water is an advocate of this perspective.

Regulators frequently link nonviability to problems of regulatory compliance. The EPA has defined nonviable water systems as those "with technical, financial, or managerial weaknesses that may render them incapable of complying with drinking water regulations."[22] Most state drinking water agencies probably conceive of viability in similar terms. The three components of this definition--technology, finance, and management--make up what is sometimes known as the "three-legged" stool on which viability rests. Emerging viability policies reflect this emphasis.

Staff members of many state public utility commissions employ definitions of viability (or nonviability), a sample of which appears in table 1-7. Some, like New Hampshire's, echo the three-legged-stool definition. Most, however, reflect the utility commission's interest in the nitty-gritty of ratemaking, defining viability in such terms as unreasonable rates (California), inadequate cash flow (Michigan), and the public interest in general (Wisconsin). What is noteworthy about these definitions is the diversity among the commissions in defining water system viability, revealed not only by the eleven commissions represented here but by the other commissions that did not report a working definition for their jurisdiction. Viability to a degree is an "I-know-it-when-I-see-it" phenomenon. While most regulatory commissions put forth neither a definition of viability nor systematic evidence about the condition of their small water systems, anecdotal testimony abounds. Small water systems are reputed to have been abandoned, given away, traded away, and even lost in poker games (not just in Texas). Most seasoned commission staff members can provide a good anecdote or two along these lines.

Finally, emerging definitions of viability go beyond the traditional considerations. Many are focused on larger institutional factors that may influence water system viability, especially in terms of regulatory and structural alternatives. In these terms, solutions to the viability problem may rest outside of the water utilities themselves. While proliferation may be a problem limited to certain geographic areas, viability is not. Moreover, without vigilant public policies, the potential for further proliferation of nonviable water systems still lingers. Policy solutions, therefore, are best structured with an emphasis on viability for both emerging systems and those already in existence.

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22 U.S. Environmental Protection Agency, *Ensuring the Viability of New, Small Drinking Water Systems: A Study of State Programs* (Washington, DC: U.S. Environmental Protection Agency, 1989), i.

TABLE 1-7
SOME COMMISSION STAFF DEFINITIONS OF VIABILITY/NONVIABILITY

California	One that cannot exist without charging unreasonable rates.
Connecticut	A system that is unable or unwilling to provide adequate service to its customers.
Illinois	An independently owned and operated system, generally serving 500 customers or less that is unable to hire sufficient management and operator expertise to operate as a utility.
Kansas	A system that is unable to provide efficient and sufficient service.
Massachusetts	The person(s) who will own and operate the system must demonstrate to the Department of Public Utilities that they have the technical, managerial, and financial resources to operate and maintain the system in a reliable manner and provide continuous adequate service to consumers.
Michigan	A system that cannot operate under its current cash flow.
New Hampshire	One whose management does not have sufficient managerial, financial, and technical expertise.
New Mexico	A water system that does not meet the requirements of commission rules; a water system incapable of sustaining itself.
Tennessee	Where rates to provide service would be prohibitive to customers.
Utah	Ideally, a water company owns sufficient water rights, has adequate sources of water, and owns its physical water plant. It is able to recover its operating costs in its rates as well as earning a return on its investment. It has cash reserves sufficient to cover extraordinary repairs or expense and can truly be considered viable.
Wisconsin	Generally defined as a system that would not be in the public interest to construct.

Source: *1991 NRRI Survey on Commission Regulation of Water Systems.* Other states may have working definitions or related rules or statutes not reported here.

A Policy Framework

A need exists for a framework to organize the various policies to improve the viability of small water systems. As the earlier discussion suggests, specific dimensions of viability are identifiable. Three dimensions involve characteristics specifically and directly related to water system performance, all of which can be used to diagnose viability problems:

- **Technical** issues concern the operational aspects of the water delivery infrastructure and technical compliance with drinking water regulations.
- **Financial** issues concern the financial resources needed for supporting a viable water system.
- **Managerial** issues concern the competence of utility management in planning for, establishing, and operating a viable water system that meets all appropriate regulatory standards.

Performance in general is defined in terms of internal characteristics of public utilities (such as management competence) but can be shaped by external forces as well (such as a community's ability to pay or a regulatory approval of rates). The technical, financial, and managerial elements of performance are critical, as seen throughout the literature on water system viability.

The performance dimensions provide a useful diagnostic tool, but they do not encompass some of broader institutional forces that affect water system viability and the overall viability of the water supply industry. Institutional arrangements are determined by public policies as well as market forces. They shape how utility services are provided, which in turn affects how individual utilities perform. The institutional issues affecting water system viability also can be subdivided into three distinct dimensions:

- **Regulatory** issues concern the requirements, constraints, and performance incentives imposed on the water supply industry, especially in certifying new water systems and providing oversight for existing systems.
- **Structural** issues concern relationships among water systems aimed at improving efficiency, especially consolidation measures that exploit economies of scale and scope.

- **Comprehensive** issues concern substantial institutional changes of a regulatory and structural nature that affect the long-term viability of the water supply industry, especially integrated resource planning.[23]

Some public policies (such as loans and grants to water systems) are intended to influence utility performance directly. While these solutions may treat the symptoms of distress, it is uncertain whether they will improve long-term survival rates. For this reason, there is a growing interest in policies affecting the institutional character of water supply, including the way it is structured and regulated, because they may offer more effective and permanent solutions.

Institutional policy alternatives are somewhat cumulative. Regulatory policies begin with the immediate goal of improving performance, structural policies turn to the intermediate goal of efficiency, and comprehensive policies turn to the ultimate goal of viability. Institutional issues arise both for emerging and existing water systems. For example, there is a strong emphasis on regulatory solutions (such as strengthening the certification process) for emerging systems. Structural solutions (such as consolidation of the water supply industry) can be developed for both emerging and existing systems. The most comprehensive solutions address the viability of both emerging and existing systems. That is, they seek to control the proliferation as well as improve overall viability.

For each of the six viability dimensions, specific policy questions arise, as summarized in table 1-8. As a self-assessment tool, these questions can help identify problem areas as well as point to potential solutions.

The distinction between the performance and institutional dimensions is relevant to the organization of the remainder of this report. The performance dimensions are used for describing the condition of small water systems (chapter 2) and the institutional dimensions are used to organize the discussion of viability policies (chapters 3 and 4). Assessment methods emphasize the performance dimensions, although not exclusively (chapter 5 and 6). In considering future directions, institutional alternatives are of critical importance (chapter 7).

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23 For a similar emphasis on the importance of comprehensive policy and planning, see Wade Miller Associates, Inc., *State Initiatives.*

TABLE 1-8
DIMENSIONS OF WATER SYSTEM VIABILITY AND SOME KEY QUESTIONS

PERFORMANCE DIMENSIONS	
Technical	· Can the system provide safe, adequate, and reliable water service? · Does the system comply with drinking water regulations? · Does the system operate with engineering efficiency? · Is the system technologically current? · Is the system run by a certified operator?
Financial	· Does the system have or can it acquire the capital need to provide water service that meets regulatory standards? · Do the existing or proposed rates accurately, adequately, and equitably reflect the full cost of water service? · Are the system's customers willing and able to pay the rates necessary for the provisions of water service?
Managerial	· Does the system benefit from management expertise? · Is management competent to comply with environmental, public health, and economic regulations? · Does the system have a business plan to assure viability? · Does management avail itself of outside resources and assistance? · Is management responsive to customer needs?
INSTITUTIONAL DIMENSIONS	
Regulatory	· Is the certification process for emerging water systems adequate for assuring viability? · Is regulatory oversight of existing water systems adequate for assuring their viability? · Are regulators implementing appropriate tools for improving the viability of the water industry?
Structural	· Is the water supply industry structured to exploit economies of scale and scope and operate efficiently? · Are there barriers to industry restructuring? · Are there barriers to coordination and sharing of facilities?
Comprehensive	· Are governmental roles in water resource management coordinated? · Is integrated resource planning a guiding paradigm? · Does the regulatory system promote structural solutions, such as consolidation and other means of achieving economies of scale, economies of scope, and optimal performance?

Source: Authors' construct.

CHAPTER 2

DIMENSIONS OF WATER SYSTEM PERFORMANCE

This chapter assesses the present condition of small water systems in terms of the performance dimensions introduce in chapter 1--financial, managerial, and technical. The flipside of viability, of course, is failure. Although few water systems actually file for bankruptcy, the bankruptcy literature provides fertile ground for understanding the principal dimensions of water system failure. This is not to suggest that all water systems or even all small water systems are destined to fail. Rather, this study serves to point out the signs of failure to be used by the industry and regulators in the interest of diagnosis and prevention.

A Bankruptcy Perspective

A *Wall Street Journal* article citing Dun & Bradstreet data reported a record 87,266 business bankruptcies in the United States during 1991.[1] This figure is up 45 percent from the 60,000 bankruptcies reported in 1990, the worst since the recession of the early 1980s.[2]

The obvious trend in business failure has been upward with no region or industrial sector spared. It is no surprise that bankruptcies increase during recessions, leading analysts to cite "economic factors" as the major cause of business failures, but there are exceptions. Bankruptcies among banks and savings and loans may be less related to economic downturns since such failures predated the 1990-91 recession. Deep cyclical and secular declines in energy and real estate markets caused many financial institutions to fail in the late 1980s. The 1990-91 recession merely exacerbated these trends.

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1 *The Wall Street Journal* (February 21, 1992): 83.

2 Dun & Bradstreet defines failure to include firms that ceased operations following assignment or bankruptcy; ceased operations with losses to creditors after such actions as foreclosure or attachment; voluntarily withdrew leaving unpaid debts; were involved in court actions such as receivership, reorganization or arrangement; or voluntarily compromised with creditors (Dun & Bradstreet, *Business Failure Record*, 1989); Suein Hwang, "Business Failures Rose 20% in '90 Amid Recession," *The Wall Street Journal* (March 31, 1991): 2A.

The most recent trends in failure by industry are shown in table 2-1. The large increase in 1990 was from a relatively low number in 1989 and occurred across all industries including transportation and public utilities. In table 2-2 the causes of failure are presented. Economic factors, especially insufficient profits, are the major cause in every year. Lack of business experience also has been consistently among the top few causes. However, lack of experience shows the greatest percentage increase in 1989, and economic factors declined dramatically in 1989.

The business failure trends show that in every industry a major cause of failure was beyond the control of individual firms, since failure was due to economic factors such as industry weakness or insufficient profits. But a major cause of failure is lack of business knowledge or experience, a key issue of concern in the certification of new water systems.

The common assumption is that the failure rate is relatively high among small businesses and among new businesses. Table 2-3 shows that small firms do have a high failure rate. But the failure rate among relatively large firms ($100,000 or more in liabilities) is high as well (as table 2-3 shows), although liabilities of up to $1 million arguably are not really large. Table 2-4 shows that 50 percent of failures in 1989 affected firms under five years old. But 25 percent were between six and ten years old and 25 percent were "old" firms (over ten years old).

The data illustrate an important reality: both new firms and small firms are at risk of failure. This is consistent with the concern among regulators about the viability of emerging small water systems as well as with existing systems. Fortunately, there are some offsetting data about new and small firms that suggest many can and do survive. However, one key to survival and success is the presence of economic growth. This variable is critical to the success of new firms generally and a regulatory requirement in some cases, such as for firms entering the banking industry.[3]

A major study on this topic was sponsored by the Small Business Administration (SBA).[4] The data indicate that 40 percent of all new and small

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3 Economic growth is an essential requirement in the chartering of *all* new banks by the United States Office of the Comptroller of the Currency (OCC) and the state banking commissions, and for insurance approval by the Federal Deposit Insurance Corporation (FDIC).

4 Bruce Phillips and B. A. Kirchhoff, "Formation, Growth and Survival: Small Firm Dynamics in the U.S. Economy," *Small Business Economics* 1 (1989): 65-74.

TABLE 2-1

BUSINESS FAILURES BY INDUSTRY, 1987-1990

Industry	1987	1988	1989	1990
Agriculture, Forestry, Fishing	3,766	2,029	1,540	1,727
Mining	627	500	351	381
Construction	6,735	7,140	7,120	8,072
Manufacturing	4,273	4,264	3,933	4,709
Wholesale trade	4,336	4,510	3,638	4,376
Retail trade	na	11,862	11,120	12,826
Finance, Insurance, Real Estate	na	2,884	2,932	3,881
Services	23,802	17,930	13,679	17,673
Transportation & Public Utilities	2,236	2,234	2,115	2,610
Nonclassified	546	3,744	3,884	4,177
Total	61,111	57,097	50,361	60,432

Source: Dun & Bradstreet, *Business Failure Record* (various years) and *News Release,* March 12, 1991.

na = not available.

TABLE 2-2

CAUSES OF BUSINESS FAILURES, 1987-1989

Cause of Failure	1987	1988	1989
Economic Factors	71.7%	57.2%	41.3%
Industry weakness	14.8	10.5	18.4
Insufficient profit	75.2	22.1	18.3
Poor growth prospect	9.0	19.6	.4
Finance	na	26.2	32.8
Heavy operating expense	na	11.7	13.5
Insufficient capital	na	5.8	10.5
Experience	20.3	12.0	20.1
Business ignorance	75.0	5.2	10.5
No managerial experience	12.6	2.6	1.5
Neglect	1.6	1.7	2.4
Fraud and Disaster	.7	1.7	1.8
Strategy Conflict	na	.9	1.1

Source: Dun & Bradstreet, *Business Failure Record* (various years).

TABLE 2-3

LIABILITY SIZE OF FAILED FIRMS, 1989

Firm Liability Size	Failed Firms	Percent
Over $1 million	2,807	5.6%
$100,000 to $1 million	14,272	28.3
$25,000 to $100,000	10,471	20.8
$5,000 to $25,000	3,708	7.4
Under $5,000	19,130	38.0

Source: Dun & Bradstreet, *Business Failure Record,* 1989.

TABLE 2-4

AGE OF FAILED COMPANIES, 1989

Age of Firm	Percent
1 year	9.0%
2 years	11.2
3 years	11.2
4-5 years	18.4
6-10 years	24.3
Over 10 years	25.9

Source: Dun & Bradstreet, *Business Failure Record,* 1989.

firms survived after six years. Those that experienced even modest economic growth (as measured by new employees hired) survived at a 63 to 74 percent rate after six years. It is clear that these high survival rates persisted across all industries, as shown in the table. Essentially, even a little economic growth produces high survival rates among new small companies.

Bankruptcy and Water Utilities

What do the above data have to do with water utilities? A review of failure trends is important for understanding the general pressures facing water companies although water utilities are unique in many ways. Macroeconomic conditions do not necessarily affect water companies to a significant degree because they are monopolies providing a product with a generally inelastic demand.[5] Thus water companies are somewhat insulated from recessions or sudden economic shocks like OPEC oil restrictions. Two major exceptions to this assertion, however, are the effect of real estate markets on new water systems and the dependence of existing systems on large customers.

Many small water systems are established on the basis on speculation about real estate development and growth. Growth is essential to the success of most new firms (as also discussed in chapter 6). Yet per capita water demand is highly stable, meaning that the only real growth in system demand comes from adding new customers through housing sales. Lack of expected growth (namely less-than-full development of a subdivision) is probably the most prevalent cause of distress for young water systems.[6] Also, all water systems are vulnerable to the effects of the economy if they are dependent on one or a few industrial customers who are not recession proof. If these large water customers are forced to close up shop, the utility may have trouble covering its fixed costs.

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[5] For products with inelastic demand curves, consumers are less responsive to changes in price. For water, indoor use is considered very inelastic and more so than outdoor use.

[6] Staff members in New York point out that there is no mechanism in place to ensure financial viability in the case of a real estate development that does not meet expectations in terms of housing sales and therefore cannot support the cost of operating the water system.

Although somewhat insulated from economic cycles, water systems can experience many of the other manifestations of distress listed earlier in table 2-2. These problems include insufficient profits, management inexperience, heavy operating expenses, and insufficient investor capital. Many small water utilities encounter these difficulties even when the economy in which they operate is healthy. For distressed firms, more than one problem is usually at work. Management inexperience combined with lack of growth, for example, means two strikes against a system from the start.

While it is not easy to know with certainty how many jurisdictional water companies are financially distressed, it is clear from available data that many small water utilities are technically bankrupt and have been for years. Legal or accounting bankruptcy occurs when a firm has negative net worth, meaning that its liabilities exceed its assets. Insolvency means that a firm cannot pay its current bills in a timely fashion, that is, the firm has missed payments on accounts payable, defaulted on bank loans, or on scheduled interest or note payments, and so on. Basically its current liabilities exceed its current assets.

Inadequate capital (equity or debt) is frequently assumed to be a critical problem for new small firms, but the Dun & Bradstreet data do not show this as a consistent source of failure though it was very important in 1989. In banking studies capital adequacy was a major cause of bank closures but the measure used in the studies frequently referred to retained earnings rather than original capital by owners or creditors. Capital infusions are an important ingredient in the restructuring of distressed banks today in the same way that capital infusions are essential even in a Chapter 11 bankruptcy reorganization plan. New capital frequently is required in the solution to a water utility's capital shortage as well.

How many jurisdictional water companies are technically bankrupt? Few utilities are in bankruptcy in the legal sense that they have filed with Federal District Bankruptcy Court for protection during reorganization (Chapter 11 filing) or for liquidation (Chapter 7 filing). In its published data Dun & Bradstreet includes public utility bankruptcies in its Transportation and Public Utilities category, but is not specific about which of these involved water utilities.

The only available data specifically about water utility bankruptcy and/or default rates (nonpayment of notes, loans, interest) among jurisdictional water companies is presented in table 2-5. It was collected in a telephone survey of commissions by Kenneth Hall of National Guaranty Management, Inc. in 1990. The

TABLE 2-5

DEFAULTS AND BANKRUPTCY OF WATER UTILITIES BY STATE, 1990

State	Number of Defaults	Number of Bankruptcies
Arizona	1	Many*
Florida	5-6	1 (by parent company)
Louisiana	2	3-4
Maine	1	1
Massachusetts	0	2
Mississippi	1	1
New Jersey	0	1
North Carolina	0	3-4*
Pennsylvania	0	2
South Carolina	0	3
Texas	0	10 per year over last 5 years*
Utah	1	1
Virginia	0	1 (by parent company)
Total	12	31

Source: 1990 survey of state commission staff by National Guaranty Management, Inc. (used with permission).

* Personal bankruptcies of company owners or developers, not necessarily the water company they own.

total number of defaults shown is twelve, six of which occurred in Florida. While there are thirty-one bankruptcies indicated, sixteen involved developers rather than the owned water utility. These are scattered throughout the states and are cumulative over many years. For example, the two bankruptcies in Massachusetts were reported to have occurred in 1906 and 1936. The data also are known to be somewhat incomplete. For example, other sources indicate there were four water utility bankruptcies in Ohio between 1987 and 1990. The difficulty in collecting this type of data is certainly understandable given the limits on institutional memories.

Even though sketchy, the bankruptcy data on investor-owned water utilities were consistent with expectations. A large number of legal bankruptcies was not expected and was not found. A key reason for limited bankruptcies appears to be that commissions try to intervene before distressed utilities are forced to renege on their obligation to serve. In a few rare cases, however, utilities may have turned to bankruptcy for rate relief. One rationale by the parent company for the four Ohio bankruptcies, for example, was that the procedure allowed the water systems to achieve rate increases through Bankruptcy Court larger what than they expected to achieve from the Ohio Public Utilities Commission.[7]

Unfortunately, although actual filings for bankruptcy are few the number of distressed small water companies apparently is many. For example, in the NRRI 1986 report on mergers among jurisdictional water companies, many of the sample companies used in the study (while identified by the commissions surveyed as successful) were in fact bankrupt; that is, they had negative net worth and liabilities greater than assets in 1985 and in several previous years.[8]

Throughout this report we refer to distressed water companies even though the term is relative with no legal meaning like bankruptcy or insolvency. The bankruptcy prediction models that we review and simulate later would simply try to identify their distress early enough to intervene. They are thus in the realm of "early warning" models like those used by federal banking agencies to identify

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[7] The four Ohio bankruptcies were subsidiaries of American Utilities, Inc. of New Jersey. Ironically, Ohio statutes later were revised in an attempt to bring these firms back under Ohio jurisdiction along with many other not-for-profit water companies.

[8] Patrick C. Mann, G. Richard Dreese and Miriam A. Tucker, *Commission Regulation of Small Water Utilities: Mergers and Acquisitions* (Columbus, OH: The National Regulatory Research Institute, October 1986).

distressed banks and saving and loans early enough to prevent their closure. For water utilities early intervention also is essential to survival.

Three Dimensions of Water System Performance

Characteristics of potentially nonviable water systems, all too familiar to many water utility regulators, are reported in table 2-6. To many regulators, the profile of a distressed small system is easy to sum up:

> Most troubled small water systems fall into one of the following categories: (1) they are obtained as a 100% donation by a developer to the owner/operator of a company attempting to operate as a valid operating company; (2) they are owned and operated by the developer; (3) they are a 'shell' corporation set up by a developer that he finances until all lots are sold, after which it is allowed to fold; they usually do not have enough customers to stand alone and generate enough money to operate effectively as a separate company (i.e. less than 1,000 customers). They were usually installed with everything at a bare minimum and they almost never have a real rate base.[9]

The substantial literature on the characteristics of small water utilities is cited throughout this report. As discussed in chapter 1, water system performance can be defined in technical, financial, and managerial terms. Using these dimensions as a guide, some of the key performance indicators used in assessing the water industry as a whole, and small systems in particular, are discussed below.

Technical Performance

The technical health of a water utility reflects its physical condition as well as its capacity to meet increasingly stringent drinking water regulations. Because technical health requires resources, it is especially dependent on the financial and managerial health of the firm.

The physical deterioration of small systems is often of paramount concern to regulators, ratepayers, and others. Upgrading a deteriorated system is costly and frustrating. Larger and more viable water systems may be more reluctant to take

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[9] Robert B. Heater, "The Problems of Small Water Companies as Viewed by the Owner of One," *Proceedings of the Fifth NARUC Biennial Regulatory Information Conference* (Columbus, OH: The National Regulatory Research Institute, 1986), 1411.

TABLE 2-6

CHARACTERISTICS OF POTENTIALLY NONVIABLE SMALL WATER SYSTEMS

Number of customers	· Typically between 50 and 500 customers.
Annual revenues	· From less than $5,000 up to $100,000.
Return on equity	· Considerably less than 15% return on equity; actual net income loss.
Fixed capital investment	· From less than $50,000 up to $500,000.
Physical plant deficiencies	· Rudimentary chemical treatment facility. · Inadequate wells and/or unreliable springs. · Pumps, electrical equipment and controls, distribution mains, and storage facilities are usually outmoded and/or inadequate; metering is minimal, if not nonexistent. · Systems barely meets or is deficient in meeting water quality standards; system-wide water pressure is minimal.
System ownership/ origin	· Systems installed by contractor, builder, or developer for the purpose of selling homes. · Systems in vacation or second-home developments. · Systems in nongrowth communities that have lost principal industries, and have few or no commercial customers. · Location with the residue of a former water system that directly served a particular industry and incidentally served local residential and commercial customers.
Management skills	· Lacking in the financial, engineering, legal, accounting, and operational skills necessary to adequately run the water system.
Other characteristics	· Poor service quality. · Inadequate existing rates; existing rate structure is devoid of conservation and seasonal use designs; rate filings are poor in quality. · Borrowing is almost nonexistent; when capital can be raised it is only at premium rates.

Source: Adapted from James H. Cawley, "The Takeover of Troubled Water Companies," *Proceedings of the Fourth NARUC Biennial Regulatory Information Conference* (Columbus, OH: The National Regulatory Research Institute, 1984), 359-69.

over such systems, particularly without special incentives, because they require so much attention and resource investment. Customers, too, may not welcome the service interruptions necessary to upgrade the water system.

According to a regional manager of one company, some small systems suffer from a host of physical problems and limitations:[10]

- Plastic mains and services are deteriorated due to type of material and age. In most cases, they are unrepairable.
- Mains are located on private property, in some cases, five to ten feet off the house foundation.
- Main and service break repairs require excavating on private property disrupting lawns, shrubbery, and so on. Restoration is seldom acceptable to the property owner.
- Very few valves exist to isolate the mains and services during main and service breaks increasing the number of customers involved in service outages.
- Curb valves do not exist requiring main shutdown for service line work and prohibiting nonpayment shutoffs.
- In most cases, locations of plastic mains and services are unknown and untraceable.
- Lack of blowoffs to flush the system causes problems with sediment in mains and services.
- Mains are along rear property lines with fences, storage building and shrubberies placed on top.
- Low pressure and flows due to leaking small diameter mains and services cause customer complaints. In some cases, customers refuse to pay their water bill.
- Small diameter steel mains are deteriorated and tuberculated restricting water flow.
- Many mains and services are shallow and freeze in cold weather.
- Some services, leaking of course, crossed septic fields.

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[10] James R. McQueen, "Takeover of Small Failing Water Systems," *Proceedings of the Annual Conference of the American Water Works Association, 1991* (Denver, CO: American Water Works Association, 1991), 342-43.

Because of their physical condition, many small systems are more likely to have problems complying with drinking water standards. The U.S. Environmental Protection Agency, which administers the Safe Drinking Water Act (SDWA) through state primacy agencies, is phasing in a three-tiered system.[11] The first tier defines a "significant noncomplier" as one with violations posing the greatest risk to health. In the second tier are intermediate violators involving a short-term violation or one involving a low-level contamination that does not pose an immediate threat to public health. The third tier consists of all remaining violators. It is generally assumed that many of the significant noncompliers will be small water systems.

According to EPA data for 1991, the number of SDWA violations nationally (63,370) exceeded the number of water systems (58,860).[12] The number of systems in violation was 16,940, or 29 percent of the industry. Within the EPA's ten geographic regions, between 21 and 52 percent of water systems were in violation. Total violations for three regions exceeded 12,000; for one region, the number of systems in violation exceeded 3,600. However, it is important to note that the majority of the violations (about 85 percent) involve monitoring and reporting requirements. The remaining violations involve situations where maximum contamination levels (MCLs) have been exceeded. Unfortunately, a monitoring violation can mask MCL violations, which is why monitoring is so vital to implementation of the SDWA. Compliance with monitoring and reporting requirements is suggestive not only about technical capability but managerial capability as well, as discussed below.

Table 2-7 presents EPA compliance data (for MCLs and monitoring) according to the size of water systems, using the EPA's categories. Fully 81.4 percent of all *violations* are reported for systems serving 1,000 or fewer populations; 92.2 percent are for systems serving 3,300 or fewer populations. Nearly 90 percent of all *systems in violation* serve populations of 3,300 or less. As would be expected, the number of systems in violation as a percentage of systems within each size category

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11 "EPA Revises Definition of SNC," *Mainstream* (A publication of the American Water Works Association) 34 no. 8 (August 1990), 9.

12 U.S. Environmental Protection Agency, *Federal Reporting Data System FRDS-II* (computer printouts dated 2/25/92 and 3/3/92). Percentages were calculated by the authors. The EPA did not include 569 violations (66 systems in violation) because of insufficient data. These data are highly volatile and must be used with caution.

TABLE 2-7

EPA COMPLIANCE CHARACTERISTICS BY SYSTEM SIZE, 1991

System Size(a)	Water Systems Number	Water Systems Pct.	Total Violations Number	Total Violations Pct.	Systems in Violation Number	Systems in Violation Pct.	Systems in Violation as a % of Systems
Under 101	18,388	31.2%	22,909	36.2%	6,233	36.8%	33.9%
101-500	18,465	31.4	21,103	33.3	5,498	32.5	29.8
501-1,000	6,331	10.8	7,523	11.9	1,505	8.9	23.8
1,001-2,500	6,588	11.2	5,681	9.0	1,622	9.6	24.6
2,501-3,300	1,518	2.6	1,112	1.8	359	2.1	23.6
3,301-5,000	1,963	3.3	1,293	2.0	453	2.7	23.1
5,001-10,000	2,268	3.9	1,340	2.1	497	2.9	21.9
10,001-50,000	2,649	4.5	1,696	2.7	657	3.9	24.8
50,001-75,000	272	.5	103	.2	50	.3	18.4
75,001-100,000	105	.2	34	.1	18	.1	17.1
Over 100,000	313	.5	576	.9	48	.3	15.3
Total(b)	58,860	100.0%	63,370	100.2%	16,940	100.1%	28.8%

Source: U.S. Environmental Protection Agency, *Federal Reporting Data System FRDS-II* (computer printouts dated 2/25/92 and 3/3/92). Percentages were calculated by the authors. The EPA did not include 569 violations (66 systems in violation) because of insufficient data.

(a) Population served (not connections).
(b) Percentages may not add to 100 due to rounding.

is inversely related to system size. For the very smallest systems, more than a third are in violation; for the very largest, only 15 percent. However, in the middle are groupings of systems that still vary significantly in size but with rather comparable proportions of systems in violation. Only for systems serving populations greater than 50,000 do the systems in violation drop below 20 percent.

Compliance data by system size for water quality monitoring under the total coliform rule is reported in table 2-8. The majority of monitoring violations are associated with this rule. Again, while there are more violations for the smaller systems this is partially explainable because of the greater number of small systems. However, proportionally more small systems have difficulty complying with monitoring requirements. Major violations in routine reporting are especially significant for small water systems. However, repeat monitoring violations (major and minor) are substantially less than routine violations, even for small water systems.

Using the cutoff of 3,300 in population served, used often by the EPA to define small community water systems, compliance data for a dozen selected states and the United States as a whole (including territories) are presented in table 2-9. For the U.S. as a whole, 30 percent of the smaller systems are in violation compared with 23 percent of the larger systems. This pattern holds true for ten of the twelve states analyzed. For Connecticut, New Jersey and Texas, however, proportionally more larger systems were in violation than smaller systems. The number of violations (which again are predominantly monitoring violations) are highest in Pennsylvania, North Carolina, Florida, and Washington. Accounting for thirty-six percent of all violations, it is no wonder that these states are especially concerned about the effect of the SDWA on their jurisdictional water utilities.

These data seem to suggest a technical performance crisis in the water utility industry. However, it may be too early to pass judgment on the performance impact of the SDWA using EPA compliance data. Both regulators and regulatees are adjusting to the demands of this legislation. In fact, the long-term effect of the SDWA on the industry may be positive in terms of improving technical assistance efforts (such as "circuit rider" programs) and stimulating technological innovations (such as affordable and possibly portable treatment technologies for small water systems). Another positive effect of the SDWA in the long term may be the implementation of structural changes in the industry, such as satellite management and mergers. Still, it is obvious that financial and managerial resources of the

TABLE 2-8

COMPLIANCE WITH EPA MONITORING REQUIREMENTS
UNDER THE TOTAL COLIFORM RULE BY SYSTEM SIZE, 1991

Systems Size*	Routine Minor		Routine Major		Repeat Minor		Repeat Major	
	Viol.	Systems	Viol.	Systems	Viol.	Systems	Viol.	Systems
Under 101	812	546	3,568	1,934	201	186	372	315
101-500	800	598	2,282	1,439	201	183	300	245
501-1,000	267	213	477	346	53	46	85	73
1,001-2,500	567	433	296	244	89	81	67	64
2,501-3,300	144	94	40	33	17	17	10	10
3,301-5,000	163	117	54	49	27	23	12	12
5,001-10,000	196	127	38	35	32	28	24	24
10,001-50,000	220	128	31	26	28	28	23	22
50,001-75,000	15	9	3	3	5	5	6	3
75,001-100,000	4	4	0	0	1	1	3	3
Over 100,000	12	8	0	0	3	3	3	3
Total	3,200	2,277	6,789	4,109	657	601	905	774

Source: U.S. Environmental Protection Agency, *Federal Reporting Data System FRDS-II* (computer printout dated 3/3/92). The EPA did not include 569 violations (66 systems in violation) because of insufficient data.

* Population served (not connections).

TABLE 2-9

EPA VIOLATIONS BY SYSTEM SIZE FOR SELECTED STATES, 1991

State	Systems serving < 3,300 pop.		Systems serving > 3,300 pop.		Total Systems	
	Number	Percent	Number	Percent	Number	Percent
Arizona						
Number of systems	778	90%	83	10%	861	100%
Violations	202	91	40	9	442	100
Systems in violation	244	94	16	6	260	100
% systems in violation	--	31	--	19	--	30
California						
Number of systems	3,047	83%	621	17%	3,668	100%
Violations	2,090	94	126	6	2,216	100
Systems in violation	573	89	70	11	643	100
% systems in violation	--	19	--	11	--	18
Connecticut						
Number of systems	573	91%	59	9%	632	100%
Violations	140	91	14	9	154	100
Systems in violation	89	90	10	10	99	100
% systems in violation	--	16	--	17	--	16
Florida						
Number of systems	1,880	84%	367	16%	2,247	100%
Violations	3,785	89	448	11	4,233	100
Systems in violation	1,006	87	153	13	1,159	100
% systems in violation	--	54	--	42	--	52
Illinois						
Number of systems	1,510	79%	400	21%	1,910	100%
Violations	897	87	136	13	1,033	100
Systems in violation	400	82	90	18	490	100
% systems in violation	--	26	--	23	--	26
Maryland						
Number of systems	453	89%	55	11%	508	100%
Violations	205	94	12	6	217	100
Systems in violation	84	90	9	10	93	100
% systems in violation	--	19	--	16	--	18
New Jersey						
Number of systems	401	63%	238	37%	639	100%
Violations	307	65	163	35	470	100
Systems in violation	98	51	94	49	192	100
% systems in violation	--	24	--	39	--	30

TABLE 2-9 (continued)

State	Systems serving < 3,300 pop. Number	Systems serving < 3,300 pop. Percent	Systems serving > 3,300 pop. Number	Systems serving > 3,300 pop. Percent	Total Systems Number	Total Systems Percent
North Carolina						
Number of systems	2,753	93%	207	7%	2,960	100%
Violations	4,539	98	77	2	4,616	100
Systems in violation	815	97	21	3	836	100
% systems in violation	--	30	--	10	--	28
Ohio						
Number of systems	1,279	81%	296	19%	1,575	100%
Violations	702	83	146	17	848	100
Systems in violation	316	86	52	14	368	100
% systems in violation	--	25	--	18	--	23
Pennsylvania						
Number of systems	2,039	86%	324	14%	2,363	100%
Violations	10,311	92	873	8	11,184	100
Systems in violation	859	90	92	10	951	100
% systems in violation	--	42	--	28	--	40
Texas						
Number of systems	4,018	86%	651	14%	4,669	100%
Violations	1,193	85	206	15	1,399	100
Systems in violation	672	82	148	18	820	100
% systems in violation	--	17	--	23	--	18
Washington						
Number of systems	2,320	94%	160	6%	2,480	100%
Violations	2,826	95	151	5	2,977	100
Systems in violation	1,208	94	71	6	1,279	100
% systems in violation	--	52	--	44	--	52
United States						
Number of systems	51,290	87%	7,570	13%	58,860	100%
Violations	58,328	92	5,042	8%	63,370	100
Systems in violation	15,217	90	1,723	10	16,940	100
% systems in violation	--	30	--	23	--	29

Source: U.S. Environmental Protection Agency, *Federal Reporting Data System FRDS-II* (computer printouts dated 2/25/92 and 3/3/92). Percentages were calculated by the authors.

water industry, especially its small system members, will be challenged to new limits as utilities seek to improve their technical capability.

Financial Performance

Viability frequently is defined in financial terms, as the earlier discussion of bankruptcy would suggest. This is certainly understandable given the financial strain on the water supply industry, attributable not only to the Safe Drinking Water Act but also the need to upgrade the nation's water supply infrastructure. Some will assert that the water industry's financial condition is uniquely poor. As one water utility executive lamented, "Much of the regulated water utility industry is 'troubled' if we consider it in light of its earnings in relation to the earnings of other utilities or of alternative non-regulated investments."[13] Representatives of the industry frequently have asserted that authorized and realized returns on equity for water are lower than returns for the other regulated sectors (electric, gas, and telephone).[14] Evidence on this issue is mixed.[15] However, there is considerable evidence that within the water industry, small systems are more financially troubled than large systems. Like technical capability, in other words, size plays a critical role in determining financial viability.

Using EPA survey data for 1986, mean financial statistics for the water industry per 1,000 gallons of water produced are provided in table 2-10. Economies of scale clearly are apparent. Gross assets per 1,000 gallons produced (defined as gross plant and equipment divided by average daily production) are many times greater for small systems than for larger systems. The same holds for operating expenses. Revenues per 1,000 gallons produced are higher for smaller companies than larger companies, although the differences are not quite so dramatic. The result is that the difference between average revenues and average expenses for the smallest water utilities (serving populations under 500) is negative. Utility revenues are further eroded by debt service and taxes, both of which affect private systems to a greater degree than municipal systems. Making matters worse is the

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13 William D. Holmes, "The Take Over of Troubled Water Companies," 371-76.

14 Ibid.

15 Fassil T. Fenikile, *Staff Report on Issues Related to Small Water Utilities* (San Francisco, CA: Public Utilities Commission, 1991).

TABLE 2-10

MEAN FINANCIAL STATISTICS BY WATER SYSTEM SIZE

System Size(a)	Gross Assets(b) $/gal./day	Operating Revenues(c) $/1,000 gal.	Operating Expenses(d) $/1,000 gal.	Operating Margin(e) Amount	Percent
25-100	$ 24.9	$198.2	$278.0	$ -79.8	40%
101-500	16.5	242.6	259.3	-16.7	7
501-1,000	8.4	184.1	163.5	+20.6	11
1,001-3,300	7.2	204.1	163.9	+40.2	20
3,301-10,000	4.6	149.5	140.7	+8.8	6
10,001-25,000	4.1	180.2	138.6	+41.6	23
25,001-50,000	2.4	113.8	82.6	+31.2	27
50,001-75,000	2.2	103.1	83.1	+20.0	19
75,001-100,000	3.2	108.7	107.7	+1.0	1
100,001-500,000	2.2	114.5	79.5	+35.0	31
500,001-1,000,000	2.0	112.7	68.1	+44.6	40
Over 1,000,000	1.8	82.0	50.9	+31.1	38
Total	$ 10.6	$196.2	$188.0	$ +8.2	4%

Source: Frederick W. Immerman, *Final Descriptive Summary: 1986 Survey of Community Water Systems* (Washington, DC: Office of Drinking Water, U.S. Environmental Protection Agency, 1987), 6. Includes data for privately-owned and publicly-owned systems.

(a) Population served (not connections).
(b) Defined as gross plant and equipment divided by average daily production.
(c) Defined as operating and maintenance expense, depreciation expense and other operating cost, per 1,000 gallons of water produced annually.
(d) Defined as revenues from all water sales per 1,000 gallons of water delivered annually.
(e) Calculated by authors. The amount is the difference between average revenues and average expenses; the percent is this difference divided by average revenues.

fact that some municipal systems enjoy revenues from sources other than water sales. Most private systems must somehow be sustained without cross-subsidization from another revenue source. State regulation, with its emphasis on cost-based ratemaking, helps ensure this as well.

These findings can be confirmed another way using the annual *Financial Summary for Investor Owned Water Utilities* published by the National Association of Water Companies (NAWC), which classifies water companies into seven size groups.[16] The smallest group in the NAWC database, class D companies (consisting of nine utilities with revenues under $50,000), reported average operating losses in 1990 of about $15,000. (In previous years even the larger class C companies reported losses.) Unfortunately, most of the 4,500 investor-owned water utilities as well as the 2,000 water districts, cooperatives, and homeowners' associations under commission jurisdiction fall in the class D category in terms of annual revenues. Many are presumed to be losing money and showing negative net worth, or accumulated losses, year after year.

In the 1991 NRRI survey, several state commissions reported that they had jurisdictional water systems with a negative net worth, negative net income, or both as reported in appendix A (table A-2). States with particularly severe situations are reported in table 2-11 in descending order according to systems with negative net income in two of the last three years. Topping the list are Florida, Texas, and Arizona, all of which have a substantial number of jurisdictional water utilities. Clearly, the problem of negative net income is pervasive. In many respects, however, systems with a negative worth are even more problematic because this measure is cumulative over time. Commission staff also were asked about the number of water utilities that ceased operations in 1990 for financial reasons (reported in table A-7 of appendix A). Leading this list, which totaled 48, was North Carolina (twenty systems), followed by South Carolina and Texas (six systems each), Pennsylvania (five systems), and Connecticut (three systems). These data, of course, do not reflect the financial distress of nonjurisdictional systems and systems that somehow escape state regulation.

Finally, for regulated utilities, another financial viability issue is the precarious existence of utilities with a negative rate base. This situation results

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16 National Association of Water Companies, *1990 Financial Summary for Investor-Owned Water Utilities* (Washington, DC: National Association of Water Companies, 1991).

TABLE 2-11

ESTIMATED NUMBER OF SYSTEMS IN POOR FINANCIAL HEALTH FOR SELECTED STATES, 1991

State	Approximate Number of Small Systems with: Negative Net Income (a)	Negative Net Worth (b)
Florida	462	39
Texas	291	na
Arizona	226	91
Wisconsin	103	52
Montana	100	na
Kentucky	95	2
Pennsylvania	91	55
Indiana	90	90
Utah	60	15
Louisiana	58	58
Vermont	50	0
Mississippi	45	25
New Jersey	25	28
California	25	0
Illinois	22	9
Washington	21	9
South Carolina	na	23

Source: *1991 NRRI Survey on Commission Regulation of Water Systems* (see appendix A). Only water systems under the jurisdiction of the state public utility commissions are included. States with more than 20 systems in either category are included, with the ranking based on negative net income.

(a) Approximate number of small systems (under 3,300 population or 1,000 connections) having a negative net income (losses) in two of the last three years.

(b) Approximate number of small systems (under 3,300 population or 1,000 connections) having a negative net worth at the time of the survey.

from the relatively high proportion of contributed plant for many small water systems, which generally is excluded from the rate base in most jurisdictions. These systems do not benefit from depreciation as a source of revenues. Negative rate base can be "a critical issue for small water utilities."[17] It also sends a signal about financial viability.

Given these findings and observations, it is no wonder that financial viability of small water systems is a key concern to economic regulators, along with concerns about technical and managerial capability.

Managerial Performance

Earlier, economic growth was shown to be an essential requirement for the success of new small firms. A review of the banking literature also pointed out the critical importance of management in the success or failure of banks.[18] The Dun & Bradstreet failure data also indicate that management inexperience continues to be a major cause of business failure. As in the technical and financial areas, size is a factor in management too. For small firms, management competence and continuity are essential. A large firm can have an incompetent employee or two without jeopardizing the viability of the entire firm. When the one and only employee of a small firm is incompetent, the firm itself is in serious trouble.

The managerial structure of small systems often consists of an owner-operator. In many cases, real estate developers establish and initially operate small systems but often want to get out of the water business (which they never intended to enter in the first place) and move on to the next development within a few years. Other small system operators are landlords, as in the case of mobile home parks, providing water as an ancillary service to housing. If customer satisfaction is one measure of management capability, small systems seem to have more than their share of problems, as revealed in a study sponsored by the National

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[17] Stephen B. Alcott, "Negative Rate Base in Water Co. and What to Do About It," a paper presented at the 1989 Annual Meeting of the Society of Depreciation Professionals in New Orleans, Louisiana (December 7, 1989).

[18] Office of the Comptroller of the Currency, *Bank Failure,* Washington, DC: June 1988.

Association of Water Companies.[19] According to the study, customer of small water utilities:

- Gave their utilities lower scores on overall customer satisfaction compared with mid-sized and large firms.
- Gave their utilities lower scores on water quality than mid-sized and large companies.
- Were less pleased than average with their billing statements, finding them difficult to understand, inaccurate, and so on.
- Were least likely to feel that the cost of their water service was reasonable.

A paramount concern to drinking water regulators is the need for certified operators to help systems comply with increasingly complex treatment requirements. Based on EPA survey data, as reported in table 2-12, water systems employ both professional operators (who have formal training) and nonprofessional operators (who do not). Not surprisingly, the percentage of professional operators increases with system size. More professional operators work full time in almost every size category than their nonprofessional counterparts. Professional operators also are more likely to be certified, a trait that holds for all size categories. Finally, professional operators devote more hours each week to working at the system; the number of hours increases with system size. Professional, certified operators are likely to make a key difference in compliance with the Safe Drinking Water Act. As noted above, failure to meet monitoring and reporting requirements probably signals managerial as well as technical problems.

Utilities under the jurisdiction of state public utility commissions must comply with the requirements of economic regulation. Many small system managers are especially frustrated by the ratemaking process. In a few cases, systems have managed to avoid economic regulation even though they fall under a commission's jurisdiction. The Texas Water Commission, for example, has had to devote considerable attention to finding these renegade water systems. Utility managers are frustrated not only by the "red tape" of the regulatory process but also its

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[19] Walker Research: Customer Satisfaction Measurements, *Water Service Customer Satisfaction: A Management Report* (Washington, DC: National Association of Water Companies, 1988).

TABLE 2-12

WATER TREATMENT PLANT OPERATOR CHARACTERISTICS BY SIZE

System Size(a)	Percent Total Operators Prof.	Percent Total Operators Non.(b)	Percent Fulltime Prof.	Percent Fulltime Non.(b)	Percent Certified(c) Prof.	Percent Certified(c) Non.(b)	Hours worked per week Prof.	Hours worked per week Non.(b)
25-100	31%	69%	40%	4%	84%	11%	2	2
101-500	49	53	37	14	87	12	8	6
501-1,000	30	70	49	7	94	6	15	8
1,000-3,300	59	41	77	54	95	21	20	12
3,301-10,000	60	40	84	75	87	22	30	18
10,001-25,000	40	60	92	42	96	19	29	21
25,001-50,000	80	20	96	83	93	31	34	12
50,001-75,000	81	19	96	95	91	10	37	15
75,001-100,000	81	19	100	86	97	45	37	8
100,001-500,000	78	22	98	96	80	26	35	14
500,001-1,000,000	78	22	99	99	92	16	41	23
Over 1,000,000	65	35	99	100	84	32	34	17
Total	49%	51%	70%	30%	91%	14%	13	8

Source: Frederick W. Immerman, *Final Descriptive Summary: 1986 Survey of Community Water Systems* (Washington, DC: Office of Drinking Water, U.S. Environmental Protection Agency, 1987), 28. Includes data for privately-owned and publicly-owned systems.

(a) Population served (not connections).
(b) Prof. = professional operators who have formal training in water treatment plant operations. Non = nonprofessional operators who have no formal training.
(c) Operator certified by the state.

cost. Numerous anecdotes recount the situation where a substantial portion of the requested revenue requirement is needed simply to meet rate case expenses, such as accounting assistance and legal counsel.

Investor-owned utilities and others under the jurisdiction of the state public utility commissions generally are required to submit periodic reports for use in monitoring the health of individual utilities and the industry as a whole. Late or inadequate reports can trigger concern, as recently noted by members of the Ohio commission staff in their water and sewer newsletter:

> The majority of companies filed their reports on time in an accurate and complete manner. Unfortunately, there were several companies that did not return their annual reports by [the deadline]. . . . Missing a deadline as important as this, especially when it is missed in more than one year (as was the case with a couple of the companies), is an indication that there could be serious troubles in the management of the utility. In addition to stiff penalties which can be levied on delinquent filers, the PUCO has the authority to investigate the causes of the tardiness. It is hoped that, in the future, all companies will respond in a timely manner so that the inconvenience of this procedure can be avoided.[20]

This and other evidence might suggest that regulators today may be less tolerant of managerial incompetence. A 1988 order by the Connecticut Department of Utility Control found that the manager of one company had "shown an almost reckless attitude in his management of the Company. . . [failing] to provide the manpower and finances necessary to maintain services" and lacking an understanding of his obligation to serve.[21] In this case, among other directives by the DPUC, officers of the company were personally fined $750.

The relationships among the technical, financial, and managerial dimensions of viability are circular, which is why so many small water systems seemed trapped in a never-ending pattern of failure. Technical problems drain financial resources and frustrate managers. Financial crises make technical and managerial improvements impossible. Managerial weaknesses aggravate technical difficulties and present a

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20 *Water and Sewer Newsletter* (A publication of the Public Utilities Commission of Ohio) 4 no. 2 (November 1991): 12.

21 "Water Service and Supply," *NRRI Quarterly Bulletin* 9 no. 3 (July 1988): 355.

barrier to raising financial resources. Breaking this cycle should be the goal of any public policy intending to remedy "the small water systems problem."

CHAPTER 3

VIABILITY POLICIES FOR EMERGING WATER SYSTEMS

The key to assuring the viability of water systems is the judicious use of state regulatory authority so that only viable systems emerge in the first place. This authority rests in the hands of state drinking water regulators and, in the case of many small systems, state public utility commissions. Each has a certification process, a permitting process, or both whereby new systems emerge. The need to tighten up the certification and permitting processes and curtail the emergence of new nonviable water systems has been well recognized by the states. As mentioned already, many have taken significant steps in this area and have begun to see positive results in slowing the proliferation of new water systems. Any state now without a proliferation policy has several apparently successful working models from which to choose. Viability policies toward emerging water systems can be subdivided into the institutional dimensions identified in chapter 1 (regulatory, structural, and comprehensive).

Regulatory Policies

A strong consensus exists on the critical nature of certification in shaping the viability of the water supply industry. The certification process is the state's most important tool in screening systems before they actually begin operations. In the lexicon of economic regulators, certification can present a barrier to market entry. Ideally, regulatory approvals are garnished before significant investments are made, but this is not always the case. Sometimes the certification process is used to grant a monopoly franchise to systems already in existence. The methods for improving the viability of existing water systems are more difficult and costly to implement. Thus the importance of the certification process for assuring the viability of emerging water systems cannot be overstated.

Federal water regulators have emphasized the importance of the state certification or permitting processes in determining the technical, financial, and managerial viability of proposed systems as well as the assessment of structural alternatives to their creation:

> Establishing State viability programs to assess a small system's performance before construction are one step toward instituting a more functional, problem prevention approach to drinking water management. Several States already have effective viability measures. For example, the permitting process can be used to ensure the financial, managerial and technical qualifications of water system owners and operators by requiring comprehensive reviews of the systems. This process also can be used to determine whether proposed systems can be interconnected with existing systems or could be run better through satellite management.[1]

It would be misleading, of course, to say that nonproliferation can be accomplished without objection. State authorities may encounter some resistance to the curtailment of new water systems.[2] Property owners might object if they believe that limits on the creation of new water systems would restrict land development, thereby depriving them of the maximum use of their property. Others might view tighter state controls as an obstacle to the provision of safe drinking water to isolated rural communities. For some systems, there even might be an attempt to evade the state regulatory structure by using alternative ownership arrangements that would exempt them or by other means. So far, these potential forms of opposition have not proved to be significant. Thus in the design of nonproliferation policies, potential opposition should be recognized but not necessarily viewed as an insurmountable obstacle.

Despite federal interest in nonproliferation, it is a policy dependent almost entirely on implementation at the state and local levels. In most cases, water systems do not emerge without the approval of more than one regulatory agency. The multiplicity of regulatory approvals required at the state and local levels can thwart nonproliferation efforts. In Pennsylvania, for example, five regulatory mechanisms are at work:[3]

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[1] U.S. Environmental Protection Agency, *Developing Solutions: On the Road to Unraveling the Small Systems Dilemma* (Bulletin no. 1, July 1990), 1.

[2] U.S. Environmental Protection Agency, *Ensuring the Viability of New, Small Drinking Water Systems: A Study of State Programs* (Washington, DC: U.S. Environmental Protection Agency, 1989), vi.

[3] Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991), 4-12.

- Local government authority under the Municipalities Planning Code.
- Department of Environmental Resources (DER) wastewater permit authority under the Pennsylvania Sewage Facilities Act.
- DER public water supply permit authority under the Pennsylvania Safe Drinking Water Act.
- DER water allocation permit authority under the Water Rights Act and the Interstate Compacts on the Delaware River Basin and the Susquehanna River Basin.
- Public Utility Commission certification and rate approval authority under the Pennsylvania Public Utilities Code.

The coexistence of these many processes can present a significant barrier to public policy toward water systems, a problem that can be addressed by an integrated planning approach.[4] In terms of the nonproliferation problem, this is especially important in coordinating local land use and state water resource policies. The two principal state agencies involved in certification, however, are the state drinking water authorities (often a department of health or environmental protection) and the state public utility commissions.

State Drinking Water Authorities

All community water systems, defined by the U.S. Environmental Protection Agency as those serving twenty-five or more customers, must acquire construction and operating permits from state drinking water quality regulators to help ensure their compliance with applicable federal and state standards. In Pennsylvania, the conventional construction permit process involves both the Department of Environment Resources and the Public Utility Commission and proceeds in the following steps:[5]

- Preliminary subdivision approval (with final subdivision approval contingent on DER and PUC approvals).

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[4] Janice A. Beecher and Patrick C. Mann, *Integrated Resource Planning for Water Utilities* (Columbus, OH: The National Regulatory Research Institute, 1991).

[5] Wade Miller, *State Initiatives*, 8-2.

- Predesign conference with DER Engineer.
- Submittal of DER permit application.
- DER review of application and decision.
- PUC certification decision.

Although the chief concern of drinking water regulators is public heath and technical compliance with federal and state drinking water standards, many of these agencies have become aware of the importance of financial and managerial resources in water system viability. In Massachusetts, the Department of Environmental Protection has established rules that reflect the "three-legged-stool" approach to water system viability:

> No person shall construct, substantially modify, or operate a public water system without the prior written approval of the Department. The Department will not grant such approval unless. . . The person(s) who will own and operate the system demonstrates to the Department's satisfaction it has the technical, managerial and financial resources to operate and maintain the system in a reliable manner and provide continuous adequate service to consumers.[6]

Similarly, recent legislation in Montana gives the Department of Health and Environmental Sciences (DHES) authority to review the financial viability of new or expanding water systems in an effort to curb proliferation of new nonviable systems.[7] For drinking water regulators, this type of authority goes beyond the traditional regulatory roles.

Results of a survey of state drinking water agency administrators in the mid-1980s on procedures used to control small water system proliferation appears in table 3-1. Most had no such procedures in place at the time of the survey. While only nine state agencies reported they could prohibit construction, twenty-five reported they could discourage it. Similarly, few of these state agencies appeared to have authority to attach certain financial requirements (such as the creation of

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6 *310 CMR* (Massachusetts), Section 22.04.

7 Ibid., 3.

TABLE 3-1

PROCEDURES USED BY
STATE DRINKING WATER AGENCY ADMINISTRATORS
TO CONTROL SMALL WATER SYSTEM PROLIFERATION

	Yes	No	Percent Yes
None	11	30	22%
Are there specific enabling or restraining laws, regulations and/or policies?	9	32	22
In review of new systems, when extensions from another system are economically feasible,			
· Can you prohibit construction?	9	32	22
· If yes, do you?	7	2	78
· If no, do you discourage construction?	25	7	78
When extensions are not economically feasible, do you require:			
· Operation under contract with a viable entity?	6	30	17
· An operation and maintenance (O&M) plan?	10	26	28
· An escrow fund?	1	35	3
· A sinking fund?	1	35	3
· O&M funds until self-sustaining?	2	34	6
Do you require that small systems review and evaluate regionalization, consolidation, contract service or other alternative prior to a permit?	15	22	41
Do you require local planning of water systems?	11	26	30
Do you make non-proliferation a condition for grants and loans?	6	31	16

Source: Survey of State Drinking Water Administrators in 1984/1985 as reported in Robert G. McCall, *Institutional Alternatives for Small Water Systems* (Denver, CO: American Water Works Association, 1986), appendix B2. For each question, the data reflect 36 to 41 states reporting.

an escrow or sinking fund) to the creation of a new system. More activity was registered in the area of planning, with eleven agencies reporting they require local planning of water systems. Finally, fifteen state drinking water administrators reported that they required small systems to review and evaluate regionalization, consolidation, contract service, or other alternatives prior to getting a permit.

The authority of the state drinking water agencies to control the emergence of water systems is shared with their sister agencies, the state public utility commissions, although commission jurisdiction does not exist in every state or extend to as many types of water systems. Today, evidence from several states would suggest that the role of both agencies in implementing nonproliferation policies may be expanding.

State Public Utility Commissions

The blame for the proliferation of nonviable small water systems (usually privately owned) has often been laid at the door of the state public utility commissions: "The state PUC regulatory process has been too lenient in allowing the creation of many small water systems that were not financially viable when initiated."[8] In the past, commissions may not have presented an effective barrier to market entry for some utilities.

With a few exceptions, systems falling under the jurisdiction of the state public utility commissions must acquire a certificate of convenience and necessity, or its variant, for the purpose of entering a market, expanding service, or building new facilities.[9] These certificates are fundamental to the economic regulation of public utilities because of their monopolistic character and the state's responsibility

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8 G. Wade Miller, John E. Cromwell III, and Frederick A. Marrocco, "The Role of the States in Solving the Small System Dilemma," *Journal of the American Water Works Association* (August 1988): 33.

9 Only the commissions in Iowa, Oklahoma, and Oregon reported that they had no certification authority. On jurisdictional issues, see also Janice A. Beecher and Ann P. Laubach, *1989 Survey on State Commission Regulation of Water and Sewer Systems* (Columbus, OH: The National Regulatory Research Institute, 1989).

for assuring that they operate in the public interest.[10] Often in conjunction with certification, the commissions make determinations about viability in terms of a utility's capacity to meet its "obligation to serve." Most of the state commissions regulating investor-owned water utilities issue certificates of need and also have the authority to modify or revoke them. Some commissions are increasingly inclined to place restrictions or limitations on the certificates they do grant, such as requiring new systems to post a performance bond. This strategy requires a commission to use other oversight and enforcement tools, such as rate cases or financial audits, to review the condition of the firm at some future date.

The 1991 NRRI survey found that most of the state commissions with water system certification authority consider viability in the process, as reported in table 3-2.[11] Most also coordinate certification with drinking water regulators, who in some cases may have more authority in this area. Eighteen states have strengthened certification to help ensure viability; in others this process was underway at the time of this study. Only eight commissions reported denying certificates on the basis of the viability issue. More can be expected to follow as the curtailment of new systems through the certification process becomes a more prevalent public policy.

Commission staff members in twenty-seven states reported that they regarded their certification programs as adequate for ensuring the viability of small water systems. Staff in twelve states found their policies less than adequate in some respect. A few felt it was too early to evaluate their certification process because changes recently had been implemented. One of the key issues raised by commission staff is the need to conduct the certification process during an advance planning phase that takes place *prior* to the investment of capital. In some cases, construction is completed before commission approval is secured; state laws and regulations designed mainly to enfranchise utilities may not be sufficient for preventing this situation. In other cases, existing systems that rightly require certificates are "discovered." Once investments are made and expectations about

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[10] On the rationale for regulation, see Raymond W. Lawton and Vivian Witkind Davis, *Commission Regulation of Small Water Utilities: Some Issues and Solutions* (Columbus, OH: The National Regulatory Research Institute, 1983), 89.

[11] Only three of the forty-five commissions that regulate investor-owned water utilities reported that they had no certification authority. For some states, this authority is shared between the commissions and drinking water agencies.

TABLE 3-2

STATE CONSIDERATION OF WATER SYSTEM VIABILITY

Commissions that consider viability in the certification process	Commissions that coordinate certification with state drinking water authority	Commissions that have strengthened certification to help ensure viability	Commissions that have denied certificates on the basis of the viability issue
Alabama	Alabama	Arizona	Arizona
Arizona	Arizona	California	California
Arkansas	California	Connecticut	Connecticut
California	Connecticut	Delaware	Florida
Colorado	Delaware	Florida	New Jersey
Connecticut	Florida	Idaho	Virginia
Delaware	Hawaii	Maryland	West Virginia
Florida	Idaho	Nevada	Wyoming
Hawaii	Illinois	New Hampshire	
Idaho	Iowa	North Carolina	
Illinois	Kentucky	Rhode Island	
Kansas	Louisiana	South Carolina	
Kentucky	Kentucky	Tennessee	
Maine	Maryland	Texas	
Maryland	Michigan	Utah	
Michigan	Mississippi	Vermont	
Mississippi	Missouri	Virginia	
Missouri	New Hampshire	Wyoming	
New Hampshire	New Jersey		
New Jersey	New Mexico		
New Mexico	New York		
New York	North Carolina		
North Carolina	Ohio		
Ohio	Pennsylvania		
Pennsylvania	South Carolina		
Rhode Island	Tennessee		
South Carolina	Texas		
Tennessee	Utah		
Texas	Vermont		
Utah	Virginia		
Vermont	West Virginia		
Virginia	Wisconsin		
West Virginia	Wyoming		
Wisconsin			
Wyoming			

Source: *1991 NRRI Survey on Commission Regulation of Water Systems.*

water service are raised, political and economic pressures can make it difficult for commissions to deny a certificate of necessity.

Commission Certification Policies

Commission certification policies can be distinguished according to four different types of regulatory authority: statutes, rules, resolutions and other statements of policy, and company-specific commission orders. Selected examples are provided here to illustrate the fairly substantial array of commission policies available for controlling the emergence of nonviable water systems. States most effective in their nonproliferation policies generally have reinforcing policies based on different levels of regulatory authority.

Statutory authority can be an essential part of a state's nonproliferation policy, even if it only serves as a disincentive for creating new systems. Texas statutes, revised in 1991 to include consideration of the utility's debt-equity ratio in the certification process, reflect the growing commitment on the part of state legislatures in giving regulators they tools needed to make the certification process more effective:

> Certificates of convenience and necessity shall be granted on a nondiscriminatory basis after consideration by the commission of the adequacy of service currently provided to the requested area, the need for additional service in the requested area, the effect of the granting of a certificate on the recipient of the certificate and on any retail public utility of the same kind already serving the proximate area, the ability of the applicant to provide adequate service, the feasibility of obtaining service from an adjacent retail public utility, the financial stability of the applicant, including, if applicable, the adequacy of the applicant's debt-equity ratio, environmental integrity, and the probable improvement of service or lowering of cost to consumers in that area resulting from the granting of the certificate.[12]

In addition to statutory authority, most commissions develop their own rules for implementing the certification process on their own or pursuant to the enactment of a new statute. The rulemaking process presents an opportunity to consider the relationship between certification and viability. For example, the Idaho Public Utilities Commission initiated a Notice of Intended Rulemaking in 1980

12 Texas Statutes, Section 13.246.

to consider its certification policies for Class D water utilities (those with less than $50,000 annual gross water revenues from water operations). The commission adopted an order in the case in 1987. The questions raised, recommendations made, and resultant rules are presented in table 3-3.

Portions of the rules imposed by three state commissions (Connecticut, Florida, and Ohio) are reported in appendix B of this report. Certification rules can serve to screen applicants (discouraging some from applying in the first place) as well as to force them to consider and plan for the substantial responsibilities associated with establishing a water system. The language of the highly detailed Connecticut rule, which applies not only to the Department of Public Utility Control but the Department of Health Services, expressly refers to the "proliferation" problem:

> These Regulations are intended to restrict the proliferation of new small water systems, to promote good public utility practices, to encourage efficiency and economy, to deliver potable water in accordance with applicable health standards, and to establish minimum standards to be hereafter observed in the design, construction and operation of waterworks facilities of new small water systems and on which existing community water systems should base their future plans should they choose to expand. The Certificate of Public Convenience and Necessity assures town governments that community water systems will operate in accordance with the general requirements and applicable minimum standards of. . . . the Regulations of Connecticut State Agencies.[13]

In Ohio only a few new water system certificates have been issued over the past several years despite fairly rapid growth in some areas. The Ohio certification rules are similar to those in several states and require "unobligated paid-in capital" equal to 40 percent of the construction of new facilities and commitments from financial institutions for the remaining funds. Applicants must file with the commission a statement from the Ohio Environmental Protection Agency (OEPA) stating that the OEPA has approved preliminary plans for the proposed system and that it would approve final plans after the commission grants a certificate of convenience and necessity. A pro forma income statement for the first and fifth years of operation must also be filed with the certificate application. The staff of the Ohio Public Utilities Commission carefully reviews pro forma projections and reports its findings to the Commission. The Ohio rules effectively address many

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13 *Rules of the Department of Public Utility Control, Section 16-292m-9* (see appendix B).

TABLE 3-3

IDAHO'S RULEMAKING ON SMALL WATER UTILITY CERTIFICATION

Questions in the Notice of Proposed Rulemaking

1. Should the Commission deny a certificate for an operation that is likely to be unviable or to provide inadequate service?

2. Should the Commission deny a certificate for a potentially viable system if another entity is demonstrably able to serve the proposed area adequately?

3. Should the Commission promote conversion of unviable or marginal water utilities to public ownership or mergers with more viable entities when those opportunities arise and customer services are likely to improve as a result?

4. Assuming that the Commission should grant certificates only to viable water systems, what criteria of viability should it employ? In particular, is a water system viable if it cannot earn its owner a fair rate of return on an investment without combining funds with nonwater operations or without charging rates that are unreasonably high compared to similar utilities?

5. Should the Commission consider encouraging developers to contribute the cost as a part of the cost of the water system in determining whether or not the water system should be viable?

6. Should the Commission require developer applicants to substantiate that they have not recovered any part of the cost of the water system through the sale of the lots?

Recommendations Made to the Commission

1. The Commission should deny certificates for water companies that are likely to be nonviable, to be marginally viable, or to provide inadequate service.

2. The Commission should deny certificates to potentially viable systems if a stronger or more reliable utility is able to serve the area.

3. The Commission should cancel certificates for water companies if the certificates remain unexercised.

4. The Commission should support and promote conversion of nonviable or marginally viable water companies to public ownership or merger with viable utilities.

TABLE 3-3 (continued)

5. The Commission should grant certificates for proposed new water companies only when it is demonstrated (a) that there is a need for a water company and no other water company is willing to serve the area, and (b) that the proposed water company proves its reliability by showing that its proposed revenues from reasonable rates will give it a reasonable opportunity to earn a fair return on its investment without subsidization from other businesses or other sources of income.

6. The Commission should establish a presumption that all capital investment in a developer-created system is contributed capital.

7. The Commission should coordinate with State or Health District water quality regulators by regular review of all investor-owned water systems brought to the attention of State or District Health officials.

Rules and Regulations Adopted by the Commission

1. *Small Water Companies Defined.* Small water companies are water corporations as defined by the Public Utilities Act that (a) have or anticipate not more than $50,000 annual gross revenues from water operations, or (b) provide service to fewer than three hundred customers or proposed initially to provide service

2. *Alternative Service and Consideration.* The Commission may deny certificates for proposed new small water companies when it is demonstrated that there is no need for the service or that another company (whether municipal, cooperative or investor-owned) is wiling and able to provide similar or better service.

3. *Presumption of Contributed Capital.* In issuing certificates for a small water company or in setting rates for a small water company, it will be presumed that the capital investment in plant associated with the system is contributed capital, i.e., that this capital investment will be excluded from rate base.

Source: Idaho Public Utilities Commission, *In the Matter of Rulemaking for Class D Water Companies,* Order No. 21208 dated April 30, 1987.

viability issues, especially the need for advance regulatory approvals and adequate financing. Also, while not especially rigorous, the rules may be a discouragement to new water company applicants.[14]

Some commissions have passed resolutions or other policy statements concerning nonproliferation. Somewhat ahead of its time, California adopted a small water system viability policy in 1978 with Resolution M-4178, which appears in table 3-4.[15] The number of jurisdictional water utilities in the state declined from more than 323 at the inception of the policy to 223 by 1990. According to a Commission staff report, the resolution constituted a "restrictive" policy toward small water utilities and calls for the denial of certificates that are likely to result in a nonviable or marginally viable utility or when another public or private entity is able to serve the proposed area.[16]

Simultaneously with or soon after the certification of a new water system, most commissions review and approve an initial rate structure, which itself is a key determinant of water system viability. In the late 1970s, also ahead of its time, New York implemented an "initial rate policy" dealing directly with the problem of real estate developers who initially charge customers an artificially low rate during development only to shock them later with greatly increased water rates based on full return on fully capitalized plant after developments had been completed.[17] The policy emphasizes that this practice leads customers to believe that at least some of the construction costs of the water system had been recovered in the sale price of the homes. To make matters worse, when the cost of the water plant is placed in the utility's rate base it allows for double recovery. In this case, the commission would be inclined to reduce or eliminate the proposed rate base to keep rates in

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14 The best source of information about how discouraging they are would come from developers. A survey of major developers would be a useful next step in developing nonproliferation policies.

15 Fassil T. Fenikile, *Staff Report on Issues Related to Small Water Utilities* (San Francisco: Public Utilities Commission, 1991), 13.

16 Ibid.

17 Memo of the Water Division to the New York Department of Public Service regarding Case 90-W-0482, Initial Tariff Filing by Warwick Water Corporation (September 7, 1990).

TABLE 3-4
CALIFORNIA COMMISSION'S POLICY STATEMENT ON SMALL SYSTEM VIABILITY

SUBJECT: Resolution for Commission Adoption on Certification Policy for Water Companies and Support or Mergers of Small Water Companies or their Conversion to Public Status.

WHEREAS: The Commission finds that Class D water company operations tend to be inadequate for both owners and customers. The lack of economies of scale often results in a limited return on the owner's investment and poor service to the customer. Now, therefore, be it resolved that the Commission will:

(a) deny certificates for operations which are likely to be unviable or marginally viable or provide inadequate service, whether or not an existing entity can provide service to the subject area;

(b) deny certificates for a potentially viable system if another entity, such as a public utility or public district, is able to serve the proposed area;

(c) cancel unexercised certificates for operations unlikely to be viable systems if developed; likewise cancel certificates for constructed systems serving no customers when the owner requests a transfer and sale of the utility which would not be likely to result in a viable operation;

(d) support and promote the conversion of unviable or marginal water utilities to public ownership or their mergers with more viable entities when opportunities arise and customer service is more likely to improve through such change than without it;

(e) grant certifications for proposed water systems only when (1) need for the utility is demonstrated by applicant showing that no other entity is willing and able to serve the development and concrete present and/or future customer demand exists and (2) viability is demonstrated, ordinarily through the following tests:

- proposed revenues would be generated at a rate level not exceeding that charged for comparable service by other water purveyors in the general area;

- the utility would be self-sufficient, i.e., expenses would be supported without their being allocated between the proposed utility and other businesses;

- the applicant would have a reasonable opportunity to derive a fair return on its investment, comparable to what other water utilities are currently being granted.

Source: Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991), 3-13.

line with what customers were used to paying and preclude the possibility of double recovery. This initial rate policy has the force of law behind it:

> In 1977, Section 89-e(2) of the Public Service Law was amended to require that all waterworks file a tariff containing rates and rules for water service 120 days prior to providing service. This amendment allows staff and the Commission to determine what plant cost will be included in and recovered through rate base, before the customers are served.
>
> Because a water company with no rate base may eventually provide deteriorating water service (a water utility without rate base has no means of earning a profit, and there is no incentive to continue operation as a viable business), the Commission began requiring developers to capitalize a portion of the water plant construction costs, and to charge initial rate which reflected that rate base, so there would be a profit and incentive to operate the system once real estate sales ceased. The currently used minimum capitalization is $1,500 per customer.[18]

Although this particular policy may only be part of the state's overall nonproliferation strategy, the strategy seems to be working. The number of jurisdictional water utilities in New York declined steadily through the 1980s.

Commission policy can be developed not only through statutes and rules but on a case-by-case basis. Some commissions have begun to require new water systems to create an escrow account or post a performance bond as a condition of certification to protect the public should the systems fail within a specified amount of time. This requirement can be an effective screening device because it is likely to deter the development of water systems whose viability is uncertain. When viability is not an issue, the bond itself should not pose a barrier to the creation of a needed water system. The bond is no longer required when self-sufficiency is established and demonstrated to the satisfaction of regulators. A certification order issued by the Arizona Corporation Commission illustrates some of the mechanics involved in issuing a performance bond:

> [The] approval of [the water system's] application for a Certificate of Convenience and Necessity shall be expressly contingent upon [the water system] posting a form of performance bond in the amount of $3,000 (cash deposit, surety bond, or similar alternative, i.e., certificate of deposit) with the Commission to ensure that Applicant shall meet its obligations arising under its Certificate; in the event Applicant chooses to make a cash deposit, said amount shall be deposited with a federally

18 Ibid.

> insured financial institution and bear interest at a commercial acceptable rate until [the water system] achieves viable operations, is sold to another company, or ten years have passed, whichever is sooner, at which time the bond will be returned to [the water system], upon approval of its application for same.[19]

Finally, for the certification process to be effective, regulators must be prepared to reject certificates for systems that cannot meet viability standards. A recent order issued by the Florida Public Service Commission rejecting a certificate recognizes the fact that new water systems face substantial cost pressures under federal drinking water standards and that small size is a distinct disadvantage to their viability:

> We are concerned about [the company's] ability to operate the water system. It is unlikely that a system of this size will be able to operate as a financially sound business, especially when the requirements of the Safe Drinking Water Act are fully implemented. It is anticipated that the cost of providing water service which complies with these requirements will have a greater impact on a small utility [than] on a larger utility which can spread the cost over a larger number of customers.[20]

Outright rejection of a certification of convenience and necessity, which at least eight commissions have done (table 3-2), forces consideration of structural alternatives to the creation of a new water system.

Structural Policies

Structural policies are an intrinsic part of regulatory policies toward emerging water systems because the certification process often places a burden on applicants to show that structural alternatives for providing community water service are unavailable. Structural options can have a substantial and complex effect involving

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[19] Arizona Corporation Commission, *In the Matter of the Application of Golden Corridor Water Company for a Certificate of Convenience and Necessity to Operate a Water Utility in Portions of Pinal County, Arizona* (Docket No. u-2497-87-107, Decision No. 56088, August 17, 1988).

[20] Florida Public Service Commission, *In re: Application of Pointe Utilities, Inc. for Water Certificate in Marion County* (Docket No. 900152-WU, Order No. 22976, May 24, 1990).

the creation or reorganization of existing management or political entities providing water service.[21] They typically present opportunities for improving economies of scale and scope in the provision of a service. Structural options exist for the creation of new systems while restructuring options are available for existing systems. As discussed in the next chapter, structural alternatives for existing systems also include such methods as satellite management and mergers.

Two key structural dimensions are size and ownership. On the issue of size, because of economies of scale (as noted in the Florida Commission order cited above and in chapter 2), there is considerable consensus that larger is better than smaller. For this reason, regulators responsible for certification almost always ask whether, as an alternative to the creation of a new water system, service can be provided by an existing nearby water utility. Many regulators, either from a public health or public utility standpoint, seem to feel so strongly about the size issue that they are essentially indifferent about ownership (except to the extent it may affect whether a utility falls within a commission's jurisdiction). Most regulators seem to have a strong preference for the *extension* of existing water service into new areas as compared with the *creation* of a new and potentially nonviable small water system.

The perennial debate over public versus private ownership will not be replicated here; there is no clear consensus on appropriate ownership structure among regulators or anyone else. In fact, it can be argued that the answer depends heavily on local political and economic circumstances as well as the characteristics of the utility service in question. Traditionally, a key advantage of municipalities has been their access to the capital necessary for improving utility infrastructures. However, the growing pressures on local government finances and the growing interest in developing private sources of capital may blunt the public-ownership advantage.[22] Large private systems, in fact, may play an essential role in the future structure of the water supply industry. Furthermore, some degree of "competition" among public and private water utilities may eventually prove to be beneficial to the industry as a whole.

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21 Adapted from SMC Martin, Inc., *Regionalization Options*, III-1.

22 Even in the wake of the 1986 tax code amendments, both public and private water utilities have some access to tax-exempt bonds, but volume limits are imposed on the states.

The interest in exploring public ownership of water systems is understandable given the predominance of private ownership of the smallest water utilities and the concern that viability may be linked to ownership structure. In particular, small water systems of an ancillary nature (such as those associated with mobile home parks) or the owner-operator variety (serving only a handful of customers) have drawn considerable fire. In many of these investor-owned systems there is only one investor whose only available capital for the firm is personal capital. Within the public ownership form, which can be loosely defined in terms of noninvestor-owned systems, there remain many specific alternatives.[23] On a smaller scale, there are associations or nonprofit water supply corporations (which actually are quasipublic entities), local special districts, and areawide special districts or authorities. On a larger scale, there are water districts, county-owned utilities, and even state-owned utilities. Many proposed regionalization policies depend on having the weight of government behind them, making implementation through public ownership easier.

Ownership, however, does not consistently define whether a system falls under the jurisdiction of the state public utility commissions. As noted in chapter 1, forty-five state commissions regulate investor-owned systems but in addition some have authority over municipal systems (fourteen commissions), water districts (nine commissions), cooperatives (thirteen commissions), and homeowners' associations (nine commissions).[24] In addition, in selected states commission authority extends to regional authorities (Connecticut), conservancy districts (Indiana), water associations (Kentucky), not-for-profit systems (Ohio), and miscellaneous political subdivisions (Texas).[25] In general, commission jurisdiction over publicly owned water systems is more limited than jurisdiction over investor-owned systems.

The many variations in commission oversight across the states should not pose a barrier to the consideration of structural alternatives. However, it is noteworthy that within states, the structure of a proposed water system will determine the nature of commission jurisdiction. It is possible to circumvent the public utility

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[23] SMC Martin, Inc., *Regionalization Options;* and McCall, *Institutional Alternatives.* See appendix E.

[24] Janice A. Beecher and Ann P. Laubach, *1989 Survey on State Commission Regulation of Water and Sewer Systems* (Columbus, OH: The National Regulatory Research Institute, 1989).

[25] Ibid.

regulatory process by establishing a water system that does not fall under state commission jurisdiction. Those in favor of commission oversight will favor structures that make it possible; those opposed will not.

As seen above, many commission rules and state statutes specifically require the consideration of alternative ways to provide water service prior to certification (see table 3-3). Ohio, for example, requires that a new water utility applicant show that "no existing agency, publicly or privately owned or operated, would or could economically and efficiently provide the facilities and services needed by the public in the area which is the subject of the application."[26]

In 1991 Nevada adopted some very significant legislation to assure the continued provision of water service should a new water system fail (see appendix C).[27] Permitting authority belongs to the Division of Health, which in the permitting process requests comments from the owner of the system, the local government within whose jurisdiction the system will operate, the state engineer, and the public service commission. Proposed privately owned water systems will be issued a special permit if they can demonstrate that there are no alternative to their creation (such as the extension of service by nearby systems). As a condition of the permit, system owners must post a five-year performance bond not with the state but with the local governing body (such as the city council or county commission) of the jurisdiction in which they plan to operate because this governing body is to have the ultimate responsibility for water service should the system fail. The draft rules for the legislation spell out the requirements:

> (h) The health division may not issue an operating permit until the local governing body submits written documentation which assures that it will:
>
> 1) assume responsibility for the water system's continued operation and maintenance in accordance with the permit's terms and conditions; and

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26 *Ohio Administrative Code,* Ch. 4901:1-15-03, C (2).

27 *Small System Viability Bulletin* (A publication of the Office of Ground Water and Drinking Water, U.S. Environmental Protection Agency) no. 6 (August 1991): 2.

2) assume the duty of assessing lands to be served by the water system for its proportionate share of the cost of the continued operation and maintenance in the event of a default by the applicant or operator of the water system and a sufficient surety is unavailable.[28]

This approach could be used by the state public utility commissions as well. A certificate of convenience and necessity could be made contingent on the provision of assurances that a local governing body (or possibly a nearby utility) would fulfill the "obligation to serve" should a new system fail. A performance bond could be posted with the entity assuming this responsibility. Certainly local governments would be forced to consider carefully their policies toward development. The use of such contingencies may require new statutory authorities, but the potential benefits are substantial.

Many contemporary state policies reflect the idea that the establishment of a new water system essentially is a last resort. The rules of the Connecticut Department of Public Utility Control make this point:

> If the Department of Public Utility Control and Department of Health Services determined that a main extension is not feasible or no utility is willing to extend such main, and that no existing regulated public service or municipal utility or regional water authority is willing to own, operate and maintain the final constructed water supply facilities as a non-connected, satellite system, and if it is not feasible to install private individual wells, the applicant may continue forward with the application by satisfactorily providing the following additional information. . . .[29]

While public policies can force consideration of structural alternatives, cases where there are no feasible structural alternatives will remain. In such cases, regulators with certification authority need not feel compelled to issue a certificate to a potentially nonviable system. In California, the Commission resolved to "deny certificates for a potentially viable system if another entity, such as a public utility or public district, is able to serve the proposed area" but also resolved to "deny

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28 "Operating Permits for Newly Constructed Privately Owned Public Water Systems," Division of Health, Bureau of Health Services Protection Services, Carcon city, NEvada (Draft dated May 27, 1992), 5.

29 *Rules of the Department of Public Utility Control, Section 16-292m-9* (see appendix B).

certificates for operations which are likely to be unviable or marginally viable or provide inadequate service, whether or not an existing entity can provide service to the subject area" (see table 3-4). In other words, the absence of a structural alternative *does not,* according to the Commission, justify the establishment of a nonviable water system.

No community water service, it seems, is preferable to service by a nonviable entity. This is a difficult but probably necessary exercise of commission regulatory authority. In California and elsewhere, it is a policy proven to be effective. In cases where commissions do not allow the establishment of a new water system, the best hope for providing community water service to the area in the long term may be through the use of a more comprehensive approach.

Comprehensive Policies

Comprehensive policies toward emerging water systems emphasize better coordination among regulatory agencies, long-term structural solutions, and above all, integrated resource planning.[30] In this case, integrated planning is not of the least-cost variety that can be conducted by larger public utilities, but of the type that must be initiated by the state government and designed to encompass the small water systems under its jurisdiction. It is a paradigm that is still in its infancy in the water sector.

Historically, the interrelationships between water and land-use planning have been inadequately addressed, in large part due to organizational conflicts between federal water resource development and management on the one hand and local land-use planning on the other.[31] The emergence of small systems in the first place frequently is associated with real estate development. Moreover, flooding, urban runoff, and water supply adequacy are among the issues that can be jointly addressed in a more integrated process.

Particularly in arid climates, better planning also can promote ways to limit future water needs, such as reduced lot sizes, water-efficient plumbing codes, and

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30 Janice A. Beecher, James R. Landers, and Patrick C. Mann, *Integrated Resource Planning for Water Utilities* (Columbus, OH: The National Regulatory Research Institute, 1991).

31 American Society of Civil Engineers, *Urban Planning Guide* (New York: American Society for Civil Engineers, 1986), 308.

water-efficient landscaping (xeriscape) practices. Unfortunately, water supply adequacy has not always been recognized as a critical land-use planning factor:

> In many growth areas, development has been allowed to take place with little regard for the availability of services, including water supply. In the Charlotte Harbor area of southwest Florida, for example, land was platted for subdivisions which could add 2,000,000 people. The water supply requirements to accommodate such a population would be eight times greater than current consumption, and would have to be met through new storage capacity. Similarly, many rapidly growing areas of Texas, Arizona, and California have allowed land development with little regard for available water resources.[32]

Integrated resource planning can help alleviate the proliferation of nonviable small water systems by shifting the emphasis of utility planning and making it more comprehensive in scope. A former director of the now-defunct U.S. Water Resources Council observed this need over a decade ago:

> Water planning has to be revitalized by recognizing the interrelationships between land use and water use; a new basis has to be found for water planning. In the past, water planning has tended to be based on projected economic and population trends. Water resources planners have tended to use projections of population and economic activity. . . . as synonymous with public goals. As a result, planning decisions have tended to focus on when, where, and how a project can be built to meet future needs. Projections have become self-fulfilling prophecies.
>
> Such planning may have been appropriate in the past. . . . However, water planner must now consider. . . . an expanded set of issues. . . . Planning should become a positive force for desirable change rather than a reaction to uncontrolled growth.[33]

For planning to help resolve the small systems problem, several institutional mechanisms may be required. To be effective, integrated planning of this nature may require new legislative authorities as well as a redefinition of state and local agency roles and responsibilities. As certifiers of new investor-owned (and other) water utilities, the state drinking water administrators and the state public utility commissions can provide critical checkpoints to assure that new systems will not

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32 Ibid.

33 Warren D. Fairchild as quoted in William R. Smith, "Regional Allocation of Water Resources." *American Water Works Association Journal* 73 (May 1981): 229.

emerge if doing so is not in the public interest. To make this determination, however, these agencies need to coordinate their efforts as well as be aware of state water resource and land use planning mandates governed by other agencies. Local governments, too, must help assure that the establishment of new water systems comports with planned development and land use. Agencies with certification authority may need to find ways of integrating these planning considerations into regulatory proceedings (that is, making them part of the evidentiary records on which decisions are made).

Mechanisms are emerging that facilitate more comprehensive approaches. Some commissions may find rulemakings and generic proceedings appropriate for developing integrated policies. Another approach is the development of memoranda of understanding among state agencies responsible for water utility certification and regulation. Memoranda of understanding already are in place in California, under development, in Flordia, and under consideration in Pennsylvania and elsewhere. These agreements can help spell out agency roles and responsibilities and provide methods for coordination. A more coordinated regulatory process will help prevent some new water systems from falling through the regulatory cracks (as occurred with greater frequency in Texas prior to the creation of the Water Commission).

Highlights of three comprehensive state viability policies, all of which emphasize planning, are provided in table 3-5. Connecticut's process emphasizes interagency cooperation and planning as well as planning by individual water systems. At the state level, Maryland also emphasizes nonproliferation and planning. Regional authorities in Maryland, such as the Governor's Commission on Growth in the Chesapeake Bay Region, reinforce the idea of planned growth.[34] Another leading example, after which other state programs are being modeled, comes from Washington state, where recently adopted planning legislation calls for "improved coordination between states agencies engaged in water system planning and public health regulation and local governments responsible for land use planning and public health and safety."[35] The statute further provides for the strengthening of existing planning procedures and processes and inclusion of small systems.

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[34] Governor's Commission on Growth in the Chesapeake Bay Region, *Protecting the Future: A Vision for Maryland* (Baltimore, MD: Maryland Office of Planning, January 1991).

[35] State of Washington, *Substitute Senate Bill No. 6446* (signed into law March 21, 190).

TABLE 3-5

HIGHLIGHTS OF THREE COMPREHENSIVE STATE VIABILITY POLICIES

Connecticut

- The state's comprehensive program consists of three new state authorities: (1) a comprehensive water supply planning mandate, modeled after the Washington program; (2) a joint certification process for new systems, administered jointly by the Department of Health Services (DOHS), the Safe Drinking Water Act (SDWA) primacy agency, and the Department of Public Utility Control; and (3) a takeover law, jointly administered by the DOHS and DPUC.

- Individual water system plans are required for systems within a planning area serving more than 1,000 customers. An areawide supplement defines service area boundaries for the region, defines plans for providing new service, and provides an assessment of the potential for regionalization strategies.

- The joint DOHS and DPUC certification process for new systems provides the state with extensive authority to control new system formation and state officials report success in reducing the growth of new systems. Certification authority extends to all new systems regardless of ownership.

Maryland

- Strong controls on small system formation and operation are based on a tradition of strong county government, a concentrated pattern of urban and suburban development that lends itself to regionalization, and visionary legislation.

- Counties must develop comprehensive water supply plans that specify service areas, needs for new service over the next ten years, and how any proposed new water systems will be financed. Planning grants are available to counties.

- The Maryland Department of Environment (MDE) has the authority to require evidence of viability from proposed new system developers including financial, managerial, and technical data it deems relevant.

- The MDE has the authority to compel operation of existing systems in a manner that will protect public health.

- Municipalities have authority to take over failed private systems by condemnation or by agreement.

TABLE 3-5 (continued)

Washington

- Under the Public Water System Coordination Act (1977) coordinated water system plans are to be developed for critical water supply service areas to be defined throughout the state.
- The planning process proceeds in three steps: (1) a preliminary assessment, (2) preparation of individual water system plans, and (3) an areawide supplement. Required details for individual plans are graduated according to system size.
- Regulations of the drinking water program have expanded the scope of standards for finance, operation, and management to encompass small systems.

Source: Derived and adapted from Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991), chapter 3.

In Pennsylvania, where small system viability has a prominent place on the regulatory agenda, much attention is being paid to the development of better, more comprehensive procedures of water utility regulation. A recent report emphasizes the importance of the certification process as the state's principal screening device for emerging water systems.[36] The proposed screening process for new systems is illustrated in figure 3-1. It emphasizes early coordination among the Department of Environmental Resources (DER), the Public Utility Commission, and local planning agencies. The application process further emphasizes the water system's capability in preparing a facilities plan as well as a business plan consisting of relevant management and financial data. The state agencies would use these plans to explicitly evaluate the proposed system's viability. Again, regulatory involvement before a system is established is very important, especially for small water systems.

While many planning issues encompass large geographic regions, coordination with local planning or zoning agencies, such as county boards or development commissions, may prove to be a critical factor in reducing the proliferation of nonviable small water systems. Local officials approving real estate development must be accountable for the adequacy of water supply and other infrastructures for

[36] Wade Miller, *State Initiatives.* See also John E. Cromwell, III, Walter L. Harner, Jay C. Africa, and J. Stephen Schmidt, "Small Water Systems at a Crossroads," *Journal of the American Water Works Association* 84 no. 5 (May 1992), 40-8.

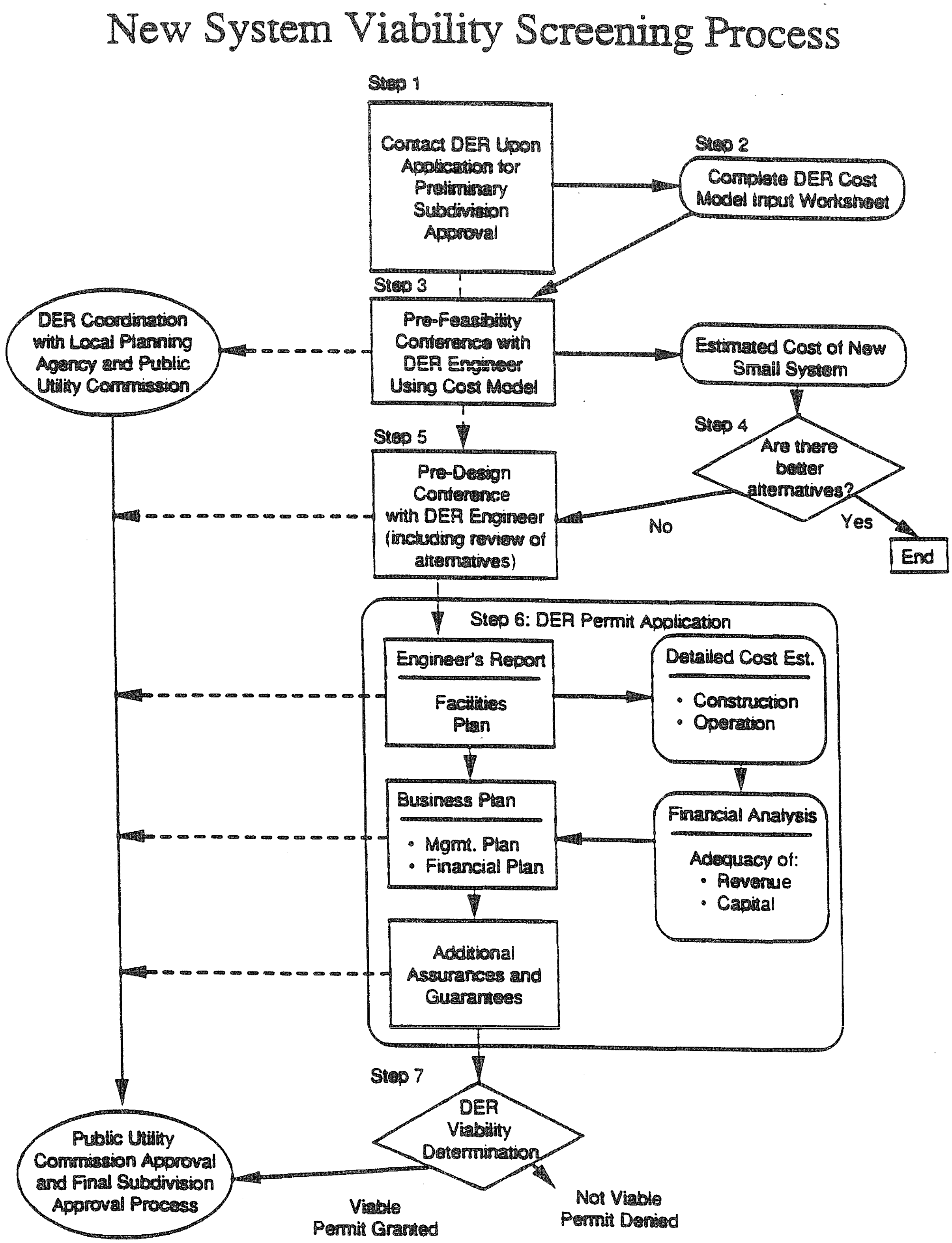

Fig. 3-1. Pennsylvania's proposed viability screening process for new water systems as depicted in Wade Miller Associates, Inc., *The Nation's Public Works: Report on Water Supply* (Washington, DC: National Council on Public Works Improvement, 1987), B-3.

that development. One way to ensure this is to make local government units themselves ultimately responsible for providing service should new systems fail.

The burden of proof in certification must fall on would-be water systems within a comprehensive, integrated water resource planning framework. Within this framework, regulators should ask whether the system can provide safe, adequate, reliable, and environmentally benign service at least cost and consistent with statewide, regional, and local planning goals. In the interest of promoting the long-term viability of the water supply industry, it is reasonable to require utilities seeking certification to demonstrate that alternatives to the creation of a new system have been exhausted. Further fragmentation of the industry only exacerbates its difficulty in complying with comprehensive policies. It also is reasonable to require new systems to back up their venture with assurances that another entity can provide water service should they fail to do so.

Although most policies toward new water systems can be classified as nonproliferation policies, because their aim is to prevent the emergence of new small water systems, some small systems will emerge anyway. Their emergence, in fact, may be well justified and well planned.[37] If public policies toward emerging systems are working well, only systems with a good chance of survival will get certified and begin operations. Unfortunately, past proliferation is to blame for the existence of many existing nonviable systems. Policies for these systems are addressed in the next chapter.

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[37] Using Ohio as a case study the Council of State Governments has published a citizen's "how-to" guide for creating a small community water supply system. The Council of State Governments, *An Insider's Guide to Creating a Small Community Water Supply System* (Lexington, KY: The Council of State Governments, undated).

CHAPTER 4

VIABILITY POLICIES FOR EXISTING WATER SYSTEMS

Past proliferation and financial distress caused by a variety of factors have resulted in the existence and persistence of thousands of small water systems whose viability is precarious. For failing water systems, institutional solutions--regulatory, structural, and comprehensive--are virtually imperative. While the primary issue for emerging water systems is a regulatory one (namely certification), for existing systems issues of structure are especially important, reflecting a strong interest in improving the industry's efficiency and, hence, viability.

Regulatory Policies

As emphasized in chapter 3, regulatory tools are essential in screening new water utilities to help assure viability at their inception. However, even the most carefully crafted certification policies will not prevent some systems from emerging that will have trouble down the road. The role of regulation in affecting viability goes well beyond certification, especially for small water utilities. As with emerging systems, two key state agencies that implement policies toward existing systems are the drinking water authorities and the public utility commissions.

Appendix C of this report provides several state statutes addressing the issue of small water system failure and empowering state regulators to do something about it: Connecticut (takeover statutes), Nevada (assumption of control by a local governing body), New Jersey (failure and takeover), Pennsylvania (acquisition adjustments, takeovers, and receivership), Texas (certification, receivership, and state supervision), and Washington (failure and receivership).

State Drinking Water Authorities

Small systems have long benefitted from assistance by state regulatory agencies, a situation that stands in stark contrast to the relationship of regulat*ors* to regulat*ed* in most other sectors. Over the years, state drinking water agencies have provided a variety of services, most of which are paid for by the utilities through fees. A mid-1980s survey identified several of these services:[1]

- Emergency assistance (provided by 100% of the states surveyed)
- Training courses (81%)
- Corrosion control consultation (81%)
- Calibrate monitoring equipment (81%)
- Engineering, materials, and equipment advice (81%)
- Laboratory support (80%)
- Guidance on institutional alternatives (72%)
- Operation and maintenance consultation (67%)
- Water accountability advice (54%)
- Water treatment studies (51%)
- Planning assistance (44%)
- Sanitary surveys (25%)
- Rate case assistance (23%)
- Preparation of rate case applications (5%)

Of course while few state drinking water program administrators provide rate case assistance to water systems, state public utility commissions often do, as noted below. In addition, half of the states surveyed reported being supported by other government units (such as county health departments) in regulating and providing technical assistance to small water systems.[2] State-sponsored local loan programs have been one of the traditional sources of financing for small water utilities.[3]

However, the *assistance* role of state drinking water authorities has been eclipsed by their *regulatory* role under federal drinking water regulations. As Robert McCall observed in 1986:

> Traditionally, state agencies were more oriented toward support services with the backup of regulation when needed. With the passage of the Safe Drinking Water Act of 1974, regulatory agencies were obligated to become more regulatory oriented resulting in discernible decreases in the traditional service

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[1] Robert G. McCall, *Institutional Alternatives for Small Water Systems* (Denver, CO: American Water Works Association Research Foundation, 1986), 65-7.

[2] Ibid.

[3] Barry R. Sagraves, John H. Peterson, and Paul C. Williams, "Financial Strategies for Small Systems," *Journal of the American Water Works Association* (August 1988): 42.

programs and the necessity in some states to charge for some services.[4]

The more stringent requirements of the 1986 amendments to the Safe Drinking Water Act (SDWA) along with more limited state resources have served to strengthen the emphasis of state drinking water programs on regulation as compared with assistance and service. While many states continue to offer grant and loan programs for small water systems, these programs generally have limited availability for privately owned firms, are constrained by state budgets, and are not sufficient to cover the financial needs of the industry. Unfortunately, at the time small systems need this assistance the most to improve regulatory compliance, it is far less accessible.

One type of assistance that still shows signs of life is state loan programs. Loan applications can be used by the states as a viability screening device for existing water utilities. The nation's most well established program is PENNVEST (established under the authority of the Pennsylvania Infrastructure Investment Authority Act). The application process for financial assistance under the PENNVEST program consists of consultation, planning, and coordination with the Department of Environmental Resources engineer.[5] Several other states, including Missouri, are developing loan programs for small systems, too. One important feature of these programs is that they involve assistance not only for publicly owned utilities (as is the case with many public programs), but privately owned ones as well.

Some forms of assistance once provided by the state are now being provided through private initiatives, something the U.S. Environmental Protection Agency encourages. Small utilities are encouraged to take advantage of the publications, programs, and services made available through such organizations as the American Water Works Association, the National Rural Water Association, the Rural Community Assistance Program, and the National Small Flows Clearinghouse.[6] Assistance organizations also are emerging at the state level. In Ohio, the

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4 Ibid., 65.

5 Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991), 9-3.

6 See the listing at the end of the bibliography.

Association of Rural Water Systems formed a nonprofit corporation, Small Systems Assistance, Inc., "to help small water systems achieve compliance with EPA regulations, providing training to the small system operator and have certified operators on call to work with system operators to solve operation, maintenance, and management concerns."[7]

In keeping with the increasing focus on regulation, strengthening operator certification has become a priority in a number of state drinking water agencies.[8] The New Hampshire Department of Environmental Services requires water system operators to attend a course and demonstrate proficiency in order to have their certificates renewed. The state facilitates the educational process and helps water systems build reference libraries by purchasing textbooks in bulk at a discount and making them available to operators attending classes sponsored by the state. Utah also plans to revise its program of minimum training requirements for water system operators and continuing education credits for renewals.

Regulatory enforcement of drinking water standards can play a key role in improving the viability of the water supply industry though the individual water suppliers may not see it that way. When a firm repeatedly cannot meet regulatory standards, this should send a signal to regulators that the firm's viability may be questionable. Many institutional alternatives that regulators can affect, including such drastic measures as mandatory takeovers, are grounded in the desire to improve regulatory compliance. Of course, SDWA compliance is only one measure of water system performance and only one type of trigger for intervention.

The EPA encourages state drinking water authorities to expand their role in improving small system viability. Its recommendations appear in table 4-1. Some methods (such as outreach) involve direct effects on system performance while others (such as certification and planning) are indirect, or more institutional in nature. The methods also vary in terms of cost to the agency with more costly alternatives probably requiring a longer implementation timeframe. Another strategy

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[7] Charles McFarland, "Small System Assistance Inc.: A Problem-Solving Approach," *The Ohio Small Systems News*, (Spring 1992).

[8] *Small System Viability Bulletin* (Office of Ground Water and Drinking Water, U.S. Environmental Protection Agency) no. 6 (August 1991): 2-3.

TABLE 4-1
EPA RECOMMENDATIONS FOR DRINKING WATER ADMINISTRATORS IN IMPROVING EXISTING SYSTEM VIABILITY

Recommendation	Direct or Indirect	Cost
Develop a policy	Direct	Low
Conduct outreach	Direct	Medium
Develop satellite plans	Direct	Medium
Obtain authority to implement involuntary mergers/acquisitions	Direct	Medium
Strengthen operator certification requirements	Indirect	Low
Implement operating permits	Indirect	High
Conduct areawide planning	Indirect	High

Source: U.S. Environmental Protection Agency, *Improving the Viability of Existing Small Drinking Water Systems* (Washington, DC: U.S. Environmental Protection Agency, 1990), 26.

encouraged by the EPA is better coordination among state regulatory agencies, including the public utility commissions, as discussed below under comprehensive policies..

State Public Utility Commissions

Because of the nature of commission jurisdiction, the state public utility commissions have a substantial role in addressing the small systems problem.[9] The viability of small water systems has long been a source of concern to regulators but only recently have some fairly aggressive regulatory tools emerged to help them

[9] Raymond W. Lawton and Vivian Witkind Davis, *Commission Regulation of Small Water Utilities: Some Issues and Solutions* (Columbus, OH: The National Regulatory Research Institute, 1983).

address it. These tools are not confined to the certification of new systems, as addressed in the previous chapter, but also apply to existing systems.

The mainstay of public utility regulation is ratemaking. It is in this process that many small systems come to the attention of regulators in the first place. Commissions spend an inordinate amount of time on water utility regulation relative to the size of this industry (compared with other regulated industries), because of the problems of small systems. Many commissions have tailored the regulatory process to the needs of small water systems.

Many states provide simplified procedures for small systems, including simplified rate filings (twenty-two commissions) simplified hearings or proceedings (twelve commissions), simplified reporting (twelve commissions) and other forms of assistance or simplification (eight commissions).[10] In addition to their regulatory roles, commissions also provide assistance to small utilities. Many have access to a variety of resources for improving the effectiveness of regulation and the condition of the systems they regulate.[11] Commission roles include referral and coordination with other organization, advocacy before other agencies, and direct provision of services or assistance to small systems. Agency staff in Arizona and Ohio are among those who publish occasional newsletters directed at the small water utilities under their jurisdiction.

Commission staff often have more expertise than small system operators in terms of ratemaking issues, especially in determining revenue requirements and designing rates. In some cases, staff have been known to recommend a rate increase higher than that requested by the utility in order to improve its financial picture (something almost unheard of in the regulation of other public utilities). State regulation also may force some utilities to do a better job of recordkeeping. The Public Utilities Commission of Ohio uses the annual reports both "to ensure that the financial integrity of each utility is being maintained" and to develop "financial ratio standards for the industry and studies in the long-term trends of

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[10] Janice A. Beecher and Patrick C. Mann, *Deregulation and Regulatory Alternatives for Water Utilities* (Columbus, OH: The National Regulatory Research Institute, 1990).

[11] Vivian Witkind Davis, J. Stephen Henderson, Robert E. Burns, and Peter A. Nagler, *Commission Regulation of Small Water Utilities: Outside Resources and their Effective Uses* (Columbus, OH: The National Regulatory Research Institute, 1984).

these measurements."[12] As in the case of enforcing state drinking water regulations, enforcing commission regulation can have a positive effect on viability because of the performance incentives (and disincentives) provided.

Commissions are being asked to design (and are being empowered to implement) new policies dealing with the problems of small water systems. Many of these policies concern structural solutions (such as acquisition adjustments and mandatory takeovers) and are discussed below. Some concern specific methods of ratemaking. For example, as noted in chapter 2, many small water systems have no rate base or even a negative rate base. The use of operating ratios to determine revenue requirements can be used in such cases.[13] However, this methodology does not resolve the underlying problem (assuming one perceives it as a problem), of lack of rate base.

Increasing in importance is the role of regulation in helping (or hindering) small water utilities cope with the financial pressures brought on by the Safe Drinking Water Act (SDWA). For example, one of the most promising developments in the area of financial assistance is the emergence of private lenders, such as Heartland Resources, Inc., whose program specifically is designed to meet the needs of small water systems.[14] Heartland emphasizes establishing good working relations with utility regulators, who must approve the project being financed and be familiar with the terms of the loan. Heartland also requires, however, that all needed rate increases or surcharges be put into effect prior to the loan's closing.

In addition to concerns about ratemaking treatment (such as the use of special surcharges) the issue of whether regulatory lag will present a potential barrier to financing also emerges. For some jurisdictions, this and similar situations may raise the issue of using a future test year in projecting utility expenses as well as other ratemaking issues, such as the use of phase-in plans, allowances for funds used during construction (AFUDC), funding for construction work in progress (CWIP), and contributions in aid of construction (CIAC). A big issue for debate is whether some

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[12] *Water and Sewer Newsletter* (Public Utilities Commission of Ohio) 4 no. 2 (November 1991): 12.

[13] Robert M. Clark, "Regulation Through Operating Revenues--An Alternative for Small Water Utilities," *NRRI Quarterly Bulletin,* 9 no. 3 (July 1988), 343-53.

[14] "Small Company Loans," *Water* (National Association of Water Companies) 32 no. 3 (Fall 1991): 41. Heartland Resources, Inc., can be reached at (212) 490-2464.

form of commission preapproval of utility investments (or the debt service associated with them) is desirable, especially in light of SDWA requirements.[15]

For systems in crisis, some fairly dramatic solutions can be imposed. As already discussed, public utilities rarely actually file for bankruptcy. Still, some states (such as Missouri, Pennsylvania, Texas, and Washington) have found it necessary to strengthen their receivership authority so they can, at least temporarily, assure that utility operations do not fail altogether. Receivership is a drastic measure but may become necessary to preserve service. It may lead to more permanent structural solutions, as discussed below.

Under significant new authority, the Texas Water Commission can now place water systems they consider to be in severe financial trouble under the direct supervision of the agency.[16] As of 1992, a few systems in the state were under such supervisory status. Commission staff put the systems on a "financial diet" and emphasize careful recordkeeping. Cash is set aside for contingencies, which is a practice many small water utilities probably do not follow. Major cash outflows must be approved according to priorities, and salaries to utility personnel have a lower priority than payments to creditors.

In an extreme case, some commissions may revoke a water system's certificate of convenience and necessity. In Texas, the Water Commission can, after notice and hearing, revoke a certificate if it finds that the certificate holder has never provided, is no longer providing, or has failed to provide continuous and adequate service in the area, or part of the area, covered by the certificate (see appendix C.) As a matter of policy it generally is used in conjunction with granting a certificate to another entity better able to provide service. Most commissions would be reluctant to exercise this authority in such a way that community water service was discontinued altogether.

On occasion, a reduction of regulatory jurisdiction is proposed as a means of solving "the small water systems problem." Drinking water authorities generally do not have the option of exempting problem systems from regulation. However, the jurisdiction of the state public utility commissions is defined by various forms of

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[15] The rationale for preapproval might be easier for small systems, whose access to capital is severely limited.

[16] Per interview with George Frietag of the Texas Water Commission in March 1992.

selective exemption. The Iowa State Utilities Board, for example, only regulates investor-owned systems serving more than 2,000 customers (only one system at the present time). Deregulation from an economic standpoint does reduce regulatory costs and administrative burdens on regulated firms. However, deregulation in no way solves the persistent problems of small water systems and, in fact, may make matters worse by eliminating oversight as well as opportunities for authoritative intervention. Regulation can enhance survival by compelling utilities to improve their technical, financial, and managerial performance. Another important role for regulators is to promote restructuring the water supply industry as opportunities arise to make it more efficient and ultimately more viable.

Structural Policies

A fundamental and necessary approach to the problems of existing nonviable small water systems is to promote changes in the institutional structure of water supply, specifically by promoting consolidation or regionalization. These structural (really, "restructural") policies will play a critical role in the industry's future. An early study on this point recognized that consolidation would not be advantageous only to the industry:

> The potential advantages of large regional systems appear to result from economies of scale and size that can partially offset rising consumer costs with the declining unit costs that occur as system size increases. . . . Another benefit of consolidation would be to regulatory agencies, who would have fewer systems to monitor. . . [17]

Because viability seems inexorably linked to economies of scale, there is a strong interest in consolidation solutions, which can be implemented gradually and may be essential to the long-term health of the water-supply industry.

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[17] Donald L. Hooks, *Treated Water Demand and the Economics of Regionalization* (Cincinnati, OH: Municipal Environmental Research Laboratory, U.S. Environmental Protection Agency, 1980), 2.

Consolidation not only is more efficient, but it also provides a means of reducing the risk of failure for individual water systems.[18]

Alternatives

Structural alternatives for existing water systems vary in complexity and the resources required for implementation. Informal agreements, for example, constitute a more modest solution, while consolidation through mergers and acquisitions involves a more substantial commitment to restructuring. The more substantial options usually affect the ownership character of a water system. Thus structural options in general reflect institutional relationships rather than physical or hydraulic ones, although hydraulic interconnection of systems is more likely to occur in more formalized, structured relationships. Economies can be manifested in physical facilities but also in other areas of utility operations (such as billing and collections).

The view adopted here is that any institutional change promoting economies of scale or scope for existing water systems is a structural solution. Other subclassification schemes (such as structural versus nonstructural regionalization) sometimes are used.[19] For this analysis, however, a continuum of relationships, each implying a more dramatic effect on the institutional character of utility service, seems to be more appropriate to the understanding of these structural choices. A prominent study of regionalization also begins with this view:

> Regionalization is the administrative or physical combination of two or more community water systems for improved planning, operation, and/or management. Regionalization should be viewed in the context of a *range of possible approaches,* from the actual physical interconnection of systems to an administrative and management arrangement to provide

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18 David W. Prasifka, *Current Trends in Water-Supply Planning: Issues, Concepts, and Risks* (New York: Van Nostrand Reinhold Company, 1988), 17-20.

19 Sometimes a useful distinction can be made between "software" approaches (such as agreements) and "hardware" approaches (such as sharing physical facilities).

common technical, operational, or financial services for two or more systems.[20]

Appendix D of this report provides definitions as well as a listing of the advantages and disadvantages associated with various regionalization options derived from research by SMC Martin, Inc. for the Environmental Protection Agency and by Robert G. McCall for the American Water Works Association Research Foundation.[21] Regionalization options range from fairly modest and informal methods to more permanent and structurally significant alternatives. Some examples, based on EPA case studies, appear in table 4-2 below. As discussed below, some of the structural options that might be undertaken to alleviate the problem of small water system viability include informal agreements among systems, formal agreements among systems, satellite management of a smaller system by a larger system, voluntary mergers and acquisitions, mandatory takeovers, and public ownership. Following their description is a discussion of implementation issues.

Informal Agreements

Informally, water systems can assist each other in a variety of ways. An informal agreement is a voluntary cooperative arrangement between water systems or between a water system and another service entity to provide a needed function or share a common facility. Systems can share laboratory facilities, storage facilities, and billing equipment; they can provide water to each other on an emergency basis; and they can share operation and maintenance functions or personnel. Perhaps most important in the era of the Safe Drinking Water Act is the sharing of technical expertise specifically directed toward improving regulatory compliance. Another form of informal agreement can be realized through regional councils of local officials, which provide a nonbinding forum for identifying

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20 SMC Martin, Inc., *Regionalization Options for Small Water Systems* (Washington, DC: U.S. Environmental Protection Agency, 1983), III-1. This study goes on the make the distinction between structural and nonstructural forms of regionalization, which is not adopted here in favor of the idea of a continuum of choices all involving structure.

21 SMC Martin, Inc., *Regionalization Options,* and Robert G. McCall, *Institutional Alternatives for Small Water Systems* (Denver, CO: American Water Works Association Research Foundation, 1986).

TABLE 4-2
USEPA CASE STUDIES OF STRUCTURAL SOLUTIONS FOR EXISTING WATER SYSTEMS

Contracts with Private Vendors	• Waterguard, Inc. provides small systems in Oregon with routine testing and maintenance, regulatory and ratemaking advice, financial analysis, and bookkeeping.
	• Wastewater Service, Inc., provides O&M services on contract with small water systems in North Carolina.
	• Crosby Water and Sewer Services, begun by a mobile home park owner who became a certified water supply operator, provides O&M and emergency and management services to small systems in North Carolina.
Contracts With Other Utilities	• A homeowners' association in Washington contracted with Public Utility District No. 1 of Kitsap county for a comprehensive system assessment.
	• Southern New Hampshire Water Company provides O&M services to a small municipal water system.
Mandatory Takeover (Private)	• Under the state's takeover legislation, the Connecticut Department of Health Services (DOHS) and the Department of Public Utility Control (DPUC) jointly determined that Bridgeport Hydraulic Company should takeover Greenacres Water Supply, a nonviable small water system.
	• Citing regulatory compliance problems with both agencies, the Connecticut DOHS and DPUC order the receivership and ultimately the takeover and improvement of two divisions of Helms, Inc. by the Connecticut Water Company.
Mandatory Takeover (Public)	• In 1981, in conjunction with county-based water planning authority, the Maryland Department of Environment ordered the extension of municipal water service from the City of Hagerstown to residents outside its boundaries.
Formation of a Public System	• Lakewood Village replaced its developer-run system with a benefited water district, made possible through a federal loan, a special tax assessment, and the negotiated purchase of wholesale water from the city of Des Moines, Iowa.
	• State loans and a grant made is possible for the formation of a regional water system in North Lakeport, replacing numerous small water systems.

Source: Authors' derivation from U.S. Environmental Protection Agency, *Improving the Viability of Existing Small Drinking Water Systems* (Washington, DC: U.S. Environmental Protection Agency, 1990).

problems common to a region and promoting mutually agreeable solutions.[22] This type of agreement may be especially appropriate for publicly-owned water systems. Water districts, rural cooperatives, and homeowners' associations, for example, might band together to share resources and expertise.

In some cases, informal agreements can yield certain economies of scale for the systems and ratepayers involved. The informality of the agreements, however, is both an advantage (in terms of flexibility) and a disadvantage (in terms of long-term stability). Also, more significant economies arguably can be gained through more formal agreements.

Formal Agreements

Informal relationships among water utilities can be formalized under a basic service contract, which is a legal agreement between water systems or between a system and a service company to provide a service.[23] Services potentially subject to such a contract include water plant operation and maintenance, distribution system maintenance, billing and collection activities, and emergency and repair functions. In addition, some systems may enter into water purchase contracts on a wholesale or retail basis. Some small systems can enter into contracts with "circuit riders" who provide operational and managerial services. Others might pool resources to hire engineering or consulting firms on a short-term basis. As in less formal arrangements, basic service contracts can improve system economies and mitigate against the risks associated with small system operations. Such agreements also may lead to more formalized arrangements.

A joint service agreement is a more formal and somewhat more complex method for sharing or exchanging activities among water systems or service entities.[24] Such agreements may be used for the development of water sources; common ownership of system facilities, equipment, and vehicles; purchase of equipment, chemicals, and mechanical parts; and the exchange or sharing of service activities, such as operation and maintenance, and billing and collections. An example is the joint purchase of meters by members of a regional water association

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22 Ibid. See appendix E.

23 Ibid.

24 Ibid.

in order to get a lower per-unit price. Another is the use of formalized agreements to help utilities respond to drought and other water supply emergencies.[25] In addition to economic advantages, such agreements are more stable than informal agreements. For systems where physical interconnection is precluded, informal and formal agreements can help systems take advantage of scale economies, even though they may be limited. For some systems, these agreements may precede more permanent structural relationships that seek to extract additional economies for the systems involved.

Satellite Management

Along the continuum of structural alternatives, satellite management is a further expansion of relationships defined under formal agreements. According to Robert G. McCall:

> A satellite operation refers to the process by which a larger or central water utility assists a small system by (1) providing varying levels of technical, operational, or managerial assistance on a contract basis; (2) providing wholesale treated water with or without additional services, or (3) assuming ownership, operation, and maintenance responsibility when the small system is physically separate from another source of supply. A system is not considered a satellite when it is physically connected to and owned by the larger utility.[26]

This very broad definition encompasses a variety of relationships, even changes in ownership (which typically constitute mergers or acquisitions). Similarly, Connecticut regulations specify that satellite management is accomplished through ownership or contractual arrangement by which a utility assumes full managerial and financial responsibility for any new noninterconnected systems within its exclusive service area.[27] In addition, utilities are responsible for using satellite management or other means of assisting failing water systems in their area.

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25 Donald Hooker, "A Regional Response to Water Supply Emergencies," *Journal of the American Water Works Association* 73 (May 1981): 232-37.

26 McCall, *Institutional Alternatives,* 35.

27 James R. McQueen, "Takeover of Small Failing Water Systems," *Proceedings of the Annual Conference of the American Water Works Association, 1991*. Denver, CO: American Water Works Association, 1991, 341-45.

Perhaps the most important elements of a satellite arrangement are the more formalized responsibilities of a larger, more viable entity and the fact that it remains physically separate from the small water system. The large and small water systems involved in a satellite relationship may be of like ownership (public or private) or not. Though the managing agent is typically another water utility, it might conceivably be another type of utility (such as an electric utility), a private vendor, a nonprofit association, or a government agency. Whatever the arrangement, satellite management provides a means of sharing managerial expertise with systems lacking this essential resource, although the technical and financial performance of managed systems should be positively affected as well. When a larger system assumes responsibility for several smaller systems, satellite management becomes a rudimentary form of industry consolidation and should result in improved economies.

Several water utilities now have had substantial experience with satellite management. There is some evidence that satellite management can improve system conditions, enhance reliability and adequacy of supplies, and bring systems into compliance with drinking water regulations.[28] Even though costs and rates may increase as a result, they may actually increase by amounts less that what would be required if the smaller system continued operations alone, particularly when trying to meet drinking water regulations. In other words, many small systems are operating in a deficit position in the first place, so an increase in costs (to remedy problems in quality and reliability) can be expected whether or not a structural change is implemented.

<u>Mergers and Acquisitions</u>

From a public policy perspective, the merger of utilities or the acquisition of one utility by another is an attractive solution to the viability problem. The larger utility resulting from the merger or acquisition should benefit from greater scale economies in production, better access to capital, a larger customer base, more management capabilities, and so on. The overall financial character of a larger system is less precarious than the smaller one. Finally, the larger system is in a better position to meet regulatory requirements (both economic and public health) and provide a higher standard of water service.

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28 McCall, *Institutional Alternatives.*

Acquisition activity among water systems subject to state commission regulation in 1990, not surprisingly, was most substantial in those states with many water systems, as reported in table A-7 of appendix A. Leading the states in mergers and acquisitions were North Carolina (ninety-one), Texas (seventy), Arizona (eighteen), Florida (fourteen), and California (twelve).[29] A 1989 NRRI survey reported acquisitions according to the nature of the acquiring entity. Nationally, acquisitions by nonprofit organizations (homeowners' association, cooperative, or other not-for-profit organization) were estimated at about thirty-three; acquisitions by local governmental units (city, county, or water district) were estimated at eighty-nine; and acquisition by investor-owned water systems at one-hundred forty-three.[30] Four other systems were acquired by another private entity, including other (nonwater) utilities.

According to a commission staff member, key factors for consideration in deciding to take over a water system include the systems' physical proximity, their condition, and the amount of capital needed to bring the smaller system into compliance with regulatory standards, and the disposition of the state public utility commission.[31] Mergers, acquisitions, and other transactions involving the assets of investor-owned and other types of water utilities generally require approval by the state public utility commission, which may attach conditions to the deal. If the resulting structure involves a parent company with subsidiaries, a variety of additional regulatory oversight issues arises.[32]

Acquisitions can occur in three distinct ways. First is the private, voluntary merger of a smaller system with a larger one. In this case, no regulatory involvement occurs until the transaction must be approved by appropriate regulatory agencies. A second type occurs because regulators provide a certain degree of

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[29] These findings are consistent with earlier findings by the NRRI reported in Mann, Dreese, and Tucker, *Mergers and Acquisitions.*

[30] *1990 NRRI Survey on Commission Regulation of Water Systems.*

[31] Kenneth D. Miceli, "The Problems of Small Water Companies and the Takeover as a Solution," *Proceedings of the Fifth NARUC Biennial Regulatory Information Conference* (Columbus, OH: The National Regulatory Research Institute, 1986), 1421-35.

[32] See Robert E. Burns, Peter A. Nagler, Kaye Pfister, and J. Stephen Henderson, *Regulating Electric Utilities with Subsidiaries* (Columbus, OH: The National Regulatory Research Institute, 1986).

pressure on larger utilities to acquire small nonviable systems. In California, Resolution M-4178 made it the Commission's policy to "support and promote the conversion of unviable or marginal investor owned water utilities to public ownership or to support their mergers with more viable entities when opportunities arise."[33] Some agencies may go a step further by considering specific ratemaking incentives, such as acquisition adjustments or higher rates of return, to make the deal more attractive. In Pennsylvania, a state statute provides for acquisition adjustments at the commission's discretion. Finally, as discussed below, some states now have takeover statutes whereby acquisitions can be mandated.

Although their small system viability policy has been largely successful, the staff of the California Commission continues to be concerned about the unwillingness of some small utilities to divest their companies at a reasonable price to willing buyers, as well as the possibility that purchase prices exceed depreciated rate base so that buyers cannot earn a reasonable return on their investment.[34] In one case, for example, the commission would not approve a sale because of the high sale-price-to-book-value ratio (2.57:1) and because of the high ratio of debt to equity (8:1) resulting from the sale.[35] The Commission believes that by scrutinizing highly leveraged sales it can help prevent the precarious situation in which new owners are strapped by debt service and lack sufficient revenues for maintenance and capital expenditures.

Mandatory Takeovers

As mentioned, the mandated takeover of a financially troubled water utility is now an option in some states and may become a trend if more states enact and exercise this authority. Municipalities in Maryland, for example, can take over failed private systems by agreement or, if necessary, by condemnation. In Nevada, a local governing body can take over an existing water system upon finding it necessary to do so to protect the public. After thirty days a court order is

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33 Ibid.

34 Fassil T. Fenikile, *Staff Report on Issues Related to Small Water Utilities* (San Francisco, CA: Public Utilities Commission, 1991), 13.

35 "Interim Order: Commission Denies Application for Sale of Madera Ranchos Water Co., Decision 91-07-067, July 24, 1991," *NRRI Quarterly Bulletin* 12 no. 4 (December 1991), 578.

required for an extension of the period of control. As noted in chapter 3, Nevada's state drinking water authority also can force a local governing body to assume responsibility for a water system in the case of failure.

Even more controversial is the mandatory takeover of a utility by a privately owned utility, legitimate in Connecticut, New Jersey, and Pennsylvania. In New Jersey, for example, the state can mandate the takeover of utilities unable to comply with water quality standards by another private or public water utilities. Mandatory takeover policies put state utility regulators in a position of implementing state policies that may go beyond traditional regulatory roles, namely the consolidation of the water supply industry.

Water utilities in Connecticut are among the first to report on their actual experience with the mandated takeover of failing water systems:

> The utilities in Connecticut are indeed cognizant of the problems with failing water systems. Some. . . . already have experienced the financial and operational burden of taking over poorly run systems. Although rate relief may be provided by the [Department of Public Utility Control] for regulated utilities that relief doesn't normally come until after the improvements have been made. Municipal-owned systems can be faced with additional bonding/ debt service requirements when they take over a failing system. Ideally, a loan system should be available to allow the failing system to solve its own problems. However, if it is determined by the state regulators that the failing system is incapable of generating its own solution, and financial assistance programs are not available, which will most likely be the case in Connecticut, the responsibility for a failing 'orphan' will fall upon the shoulder of the nearest healthy neighbor and be paid for from the pocket of the receiving utility's existing customers.[36]

As reported in table 4-3, the recent experience of the Connecticut Water Company (CWC) in providing both satellite management (to four systems) and service extensions (to six systems) has been mixed.[37] CWC equalizes rates to all customers under authority of the Department of Public Utility Control. When the company assumes responsibility for small systems, all customers are affected by increased revenues (associated with a larger customer base) and costs (associated

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36 McQueen, "Takeover of Small Failing Water Systems," 342.

37 Ibid.

TABLE 4-3
CONNECTICUT WATER COMPANY'S SATELLITES AND EXTENSIONS

Service By (a)	Number of Systems	Number of Customers	Investment per Customer	Total Investment(b) Mil. $	Annual Effect on All CWC Customers(c) Cost	Revenue	Net
Satellites	4	319	$8,363	$2.7	$11.00	$2.19	$8.81
Extensions	6	2,051	2,021	4.1	17.05	17.21	(0.16)
Total	10	2,370	$2,873	$6.8	$28.05	$19.40	$8.65

Source: James R. McQueen, "Takeover of Small Failing Water Systems," *Proceedings of the Annual Conference of the American Water Works Association* (Denver, CO: American Water Works Association, 1991), 345.

(a) Satellites are not physically connected to the parent system; extensions involve main extension from a larger system to a smaller one.
(b) Number of customers multiplied by investment per customer (in millions).
(c) These calculations approximate the impact on water bills for all Connecticut Water Company customers under the existing rate schedule (where rates are equalized).

with rehabilitation). According to a company analysis, satellite management required a higher investment per new customer than extensions (although the total investment required for extensions was higher). Also, because relatively few customers were added to the utility as a whole, the result of satellite management on all CWC customers was a net increase in their costs. The cost of physical extensions of service were greater per CWC customer but because more customers were added to the system through the extensions, the net effect was to lower customer costs (but only slightly). Taken together, the addition of the ten systems increased customer costs systemwide by approximately $8.65 per year. As discussed below under implementation issues, when exploring any structural option it is important to assess cost and ratepayer impacts.

Only time will tell whether mandatory takeovers prove to be an effective policy instrument in addressing the problem of small water system viability. In the meantime, it is important to amass empirical evidence on its impact. Given the alternatives of regulatory noncompliance, astronomical stand-alone costs, or, worse, failure, it would appear that the public interest might be well served by this form of industry consolidation, even though it is an extreme public policy solution that should not casually be chosen:

> Forced consolidation is an expensive legal process that is appropriate only as a last resort. Attempts to force consolidation have met with considerable opposition from water customers, who feel that their interest will be neglected by larger utilities, and from private utilities concerned with their property rights. Except in hopeless cases, consolidation should not be imposed from the top down; instead, it should be achieved through a process of voluntary cooperation.[38]

It is clear that when utilities are forced to put their investments in a failing system, they are assuming a certain degree of risk (not to mention managerial challenges). It is up to regulators to determine whether this risk is significant, how it may affect ratepayers as well as investors, and how to mitigate against it when appropriate. A combination of takeovers with an appropriate system of incentives (including the removal of disincentives) is not an unreasonable policy course once less extreme options have been fully explored. (These and other implementation issues are discussed below.)

Public Ownership

Public ownership through annexation is a structural option involving extending a publicly owned utility's service territory to include outlying areas, such as occurs when service boundaries or corporate limits change.[39] The Fairfax County Water Authority is a regionalized system in Virginia which, through a series of acquisitions around the original Alexandria Water Company, achieved significant economies of scale.[40] Local geopolitical circumstances may determine the feasibility of annexation. While economies of scale may be realized, their magnitude may depend on the potential for physically interconnecting systems. In any case, the

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38 Prasifka, *Current Trends,* 22.

39 Ibid. See appendix E.

40 Robert M. Clark, Minimizing Water Supply Costs: Regional and Management Options," *Proceedings of the American Water Works Association Seminar on Small Water System Problems, June 7, 1981* (Denver, CO: American Water Works Association, 1982), 65-82.

institutional result of annexation by municipalities is a net increase in public ownership, which may or may not be desirable, as discussed in the previous chapter.

Many of the available case studies of regionalization involve publicly owned utilities.[41] According to a study by the U.S. Environmental Protection Agency, acquisitions resulting in larger publicly owned systems could be considered attractive for a number of reasons:[42]

- Counties or municipalities with established water utilities frequently expand to meet new demands within or adjacent to their jurisdictions. In many states, county water districts are willing to provide service when small water systems within their borders become nonviable.
- Some states require publicly owned water systems to take over privately owned water service if a small system is failing.
- Grants and loans are frequently available to finance publicly owned water system, but usually are not available to privately owned water systems.
- Some publicly owned systems have the authority to raise revenues through taxes. These revenues can be used to fund system expansion and improvement.
- Most publicly owned systems can issue tax-exempt revenue bonds, giving them access to low-cost funds for expansion or system upgrades.[43]
- Many publicly owned systems have the power of eminent domain in their operating areas.

Institutionally, it may be easier for states to encourage local governments to acquire small water systems, compared with acquisitions by private utilities. Public ownership also may promote planning. California, for example, has used special

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41 SMC Martin, Inc., *Regionalization Options for Small Water Systems* (Washington, DC: U.S. Environmental Protection Agency, 1983), II-2.

42 U.S. Environmental Protection Agency, *Improving the Viability of Existing Small Drinking Water Systems* (Washington, DC: U.S. Environmental Protection Agency, 1990), 16-7.

43 The 1986 tax code amendments restricted the use of tax-exempt state bonds for industrial purposes. However, bonds still can be used for drinking water projects undertaken by public or private utilities, subject to a state volume cap.

water districts for planning and coordination.[44] However, it could be argued that the important step is in the consolidation with the issue of ownership (at least in the intermediate term) secondary in importance.

Implementation Issues

Actual implementation of structural changes in the water supply industry involves several other issues, such as the need for decision tools for choosing among the alternatives and the need to design incentives for change. The wide scope of issues involved is illustrated in table 4-4. While no simple answers are available, some specific questions that can be raised in choosing a particular approach appear in table 4-5. Of particular importance in evaluating structural alternatives are the issues of risk and reward. Economic regulators are especially concerned about protecting ratepayers.

Some studies have advanced decision criteria for choosing among the available structural alternatives for existing small water systems. In a study of regionalization for the Environmental Protection Agency, for example, SMC Martin, Inc., identified four such criteria:[45]

- **Economic efficiency** (to provide water supply service at the lowest possible cost).
- **Fiscal equity** (to distribute the cost of service equally among customers served).
- **Political accessibility** (to allow for high level of citizen participation in decisionmaking).
- **Administrative effectiveness** (to deliver water in an efficient and technically proficient manner).

Effective consolidation of the water supply industry, according to another study has several prerequisites for the protection of the entities involved as well as

44 William R. Smith, "Regional Allocation of Water Resources." *American Water Works Association Journal* 73 (May 1981): 226-31.

45 SMC Martin, Inc., *Regionalization Options for Small Water Systems* (Washington,DC: U.S. Environmental Protection Agency, 1983) I-3.

TABLE 4-4

ISSUE FRAMEWORK FOR STRUCTURAL ALTERNATIVES FOR EXISTING WATER SYSTEMS

Geopolitical Issues

- Geographic location of service territories and facilities
- Local politics and culture of each customer base
- Potential for structural and nonstructural relationships

Management Issues

- Degree of cooperation, conflict, and control
- Personnel roles and responsibilities
- Philosophical compatibility

Economics and Finance Issues

- Liabilities and risk
- Financial and accounting practices
- Revenue requirements and ratemaking implications

Planning Issues

- Financial planning
- Integrated least-cost resource planning
- Land-use, economic development, and other planning processes

Regulatory Issues

- Approval by safe drinking water administrator
- Approval by state public utility commission
- Federal and regional regulatory considerations

Source: Authors' construct.

TABLE 4-5
KEY QUESTIONS RELATED TO STRUCTURAL ALTERNATIVES FOR EXISTING WATER SYSTEMS

General

- Do state statutes restrict the authority of the participants to implement the approach? What legal requirements are imposed by these statutes?
- Is there adequate trust and mutual cooperation among the participants?
- Are the pooled resources of the participants adequate to meet any increased requirements created by the implementation of the regionalization option?
- How will costs incurred in implementing and administering the entity be distributed among the participants and customers served? What is an appropriate method for determining these costs? What financing and funding sources become available to the entity?

Legal Authority

- For local governments, can expenditures and revenues be increased without going through a supplemental budgetary process? If not, what steps must be taken to get supplemental funding?
- For agreements, does state law indicate that it is binding on future governmental bodies? Does the law specify or suggest language to be used on the agreement? (Uniform language facilitates multijurisdictional participation.)
- What is the normal life cycle of the regional entity or what is the general term of the service agreement?
- Who possesses the legal authority to create the regional entity or service agreement? Must the regional entity or service agreement be reviewed for conformance with the requirements of state law or local charters?
- Under what conditions can the entity or service agreement be terminated or dissolved? What steps must be taken to initiate termination or dissolution?
- What sources of revenue are available to pay for the service?
- Do specific legal requirements address such issues as liability, damages, and property disposition at the termination of the service agreement?
- Does the law address requirements for the hiring, release, or status of personnel affected by the service agreement or employed by the regional entity?
- Are specific requirements available to amend basic service contracts and service agreements to adjust to different levels of service and attendant costs?

TABLE 4-5 (continued)

Costs and Resources

- If a customer does not pay for the actual costs of a service provided, will the question of subsidization arise and what problems can be expected?

- Should an overhead factor be based on a prorated cost of all labor costs, depreciation of assets, rent, and liability insurance? Should only costs identified over and above overheads be used?

- What is an adequate method of determining costs and payment schedules? What mechanisms should be used to adjust costs to reflect inflation of labor, equipment, and supply costs?

- In determining costs, should consideration be given to the financial status of the recipient systems? How will this affect the delivery of service to the individual systems in terms of their ability to pay for the service?

- What forms of federal and state funding are available to the regional entity? How do funding requirements affect the general financing of a capital improvements project, including user charges?

- What changes in resources are expected to be necessary to provide the service (personnel, facilities, equipment, etc.)?

- Are sufficient resources available to provide areawide service coverage to benefit from increasing economies of scale?

- Will the approach require a reallocation and relocation of personnel and facilities? How will total costs be affected and who should pay?

Policy and Political Constraints

- What is the expected public reaction to the regional proposal, including a possible tax increase or user charge? Is public support sufficient?

- Will the increase in the level and quality of service offset any negative public reaction to a tax or user charge increase? What are the best methods to publicize the benefits accruing from a regional approach?

- To which entity should citizens complain about the service: the provider or recipient water system or the governmental unit?

- What policy control will the participants lose to the regional entity?

- What problems are anticipated during the transition of service?

Source: Adapted from SMC Martin, Inc., *Regionalization Options for Small Water Systems* (Washington, DC: Environmental Protection Agency, 1983).

their ratepayers.[46] First, it is necessary to establish strong institutional arrangements to surmount local and regional jurisdictional barriers. Second, it is necessary to agree on methodologies for assigning costs associated with the joint use of existing facilities on a fair and equitable basis. Finally, economic responsibility (the cost of service) must be properly assigned to customer groups. These questions are rightly asked by public utility regulators.

Ideally, from an economic standpoint a structural alternative will pass three fundamental tests: the least-cost test, the no-losers test, and the viability test. A simple representation of these tests is provided in table 4-6. In reality, of course, most alternatives do not live up to ideal standards. Policymakers must seek out solutions that are administratively feasible and that optimize results among competing policy goals. These tests, then, serve mainly as general decisionmaking tools rather than definitive criteria.

For the first test, methodologies are emerging for evaluating prospective water utility projects on the basis of least-cost, borrowing substantial from the literature in the energy field. Safe drinking water regulations complicate the analysis to the extent that comparing a stand-alone system that is out of compliance with a consolidated system that is in compliance raises an "apples-and-oranges" problem. Care should be taken to measure costs realistically and use an appropriate time frame in the analysis. A short-term jolt in costs, for example, might be offset by long-term system economies associated with an expanded customer base.

Whether a structural alternative meets the least-cost test may depend on whether economies of scale can be realized in changing the structural relationship between two utilities (such as through a merger). While in general, it is presumed that the water utility industry can benefit through consolidation, economies of scale achievable through physical extension of facilities are limited. A computer simulation model can facilitate the analysis of tradeoffs made in hydraulic interconnection. An early application of this type of analysis was made by Robert M. Clark, who showed how unit costs vary over the service area with respect to the distance water must be transmitted.[47] Clark found that unit costs decreased

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[46] Johnstone (1985) as cited in Prasifka, *Current Trends,* 20.

[47] Clark, "Minimizing Water Supply Costs," 69.

TABLE 4-6
THREE TESTS FOR ANALYZING STRUCTURAL CHANGES

Least-Cost Test

Desirable Outcomes

Total cost of Utility AB is less than (<)
Total cost of Utility A plus (+)
Total cost of Utility B.

Where Utility AB is a restructured relationship between Utility A and Utility B and total cost reflects all costs necessary to have both systems in compliance with all appropriate regulations.

Undesirable Outomes

Any restructured relationship between Utility A and Utility B resulting in a higher total cost than the sum of their total stand-alone costs.

No-Losers Test

Costs to Ratepayers of Utility A	Costs to Ratepayers of Utility B	Outcome
No change	No change	Desirable
Decrease	No change	Desirable
No change	Decrease	Desirable
Decrease	Decrease	Desirable
Increase	Increase	Undesirable
Increase	No change	Undesirable
No change	Increase	Undesirable

Viability Test

Desirable Outcomes

Strong utility + strong utility = strong utility.
Strong utility + weak utility = strong utility.
Weak utility + weak utility = strong utility.

Undesirable Outcomes

Any structural change resulting in a utility (or utilities) weaker or less viable than before.

Source: Authors' construct.

until about the seven-mile or eight-mile point, suggesting that systems extending beyond this point may not be achieving least-cost goals. According to Clark:

> This [finding] demonstrates that a minimum unit cost of supply exists in relation to distance. The implication for regional water supply is that economies of market area gained by a centralized plant dissipate in the transmission/distribution system at approximately 7-8 miles from the plant. After than point, unit costs continue to rise. Therefore, regionalization of water utilities may not be a priori justified by the economies of scale argument. It depends on how close the respective utilities are, as well as the difference between marginal costs of all-on treatment technologies and the additional costs of the transmission/ distribution system expanded to link the utilities.[48]

Water utility managers and regulators interested in consolidation options would be well advised to replicate this type of analysis for their own circumstances and with current cost data. Noneconomic hydraulic interconnection should be avoided in favor of other forms of consolidation (such as satellite management) where other economies may be readily achievable. Limits to economies of scale suggest that small and middle-sized water systems may continue to have a role in the provision of water service. However, in accordance with least-cost goals, nonhydraulic forms of consolidation may affect their role in dramatic ways.

The second test, the no-losers test, emphasizes analyzing structural changes in terms of how all ratepayers might be affected by a structural change in the way water service is provided. In an acquisition, for example, the rates of the acquiring and the acquired utilities both may change. If costs rise and rates are equalized for all customers (as for the Connecticut Water Company), one group of ratepayers (usually core customers) may end up subsidizing another group (usually satellite customers). This raises questions of equity (as well as perceptions about equity) on the part of ratepayers. Thus even when such subsidies are allowed, utilities and regulators should be prepared to defend them in terms of the policy benefits that they are expected to yield. The no-losers test is the easiest test to fail and can be especially political. However, policymakers may sacrifice no-losers goals in favor of achieving least-cost and viability goals as well as broader public interest goals. They also might be inclined to give up a strict no-losers policy if the losers lose little relative to the gains made on the whole.

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48 Ibid.

The third test to consider is a viability test. Unfortunately, some structural alternatives may pass the least-cost or no-losers tests but not the viability test, or vice versa. Rate equalization, for example, creates winners and losers but also tends to enhance viability. Depending on the magnitude of the costs and the number of customers involved, changing the structural relationships among utilities can have different viability outcomes. A merger of two weak or nonviable utilities might result in a stronger, more viable utility (which requires only one treatment operator, one billing department, and so on). However, it is possible to restructure the relationship between two weak utilities or a weak and a strong utility and end up with a weak utility. Satellite management and mandatory takeovers frequently raise this concern. In considering any structural change, implications for technical, financial, and managerial performance in relation to the viability of the utility (or utilities) involved should be examined. Methodologies for assessing performance along these dimensions are examined in chapters 5 and 6 of this report.

Even when structural alternatives promise positive outcomes, this may not be incentive enough for utilities to engage in restructuring activities, particularly if institutional barriers to implementation exist. Some states are beginning to design incentives for restructuring that operate through various regulatory and assistance programs. A form of incentive can be implemented through state funding programs. One of the criteria for identifying priority projects for funding by PENNVEST, for example, is "Whether the project encourages consolidation of water or sewer systems, where such consolidation would enable the customers of the systems to be more effectively and efficiently served."[49] More recently, Pennsylvania also established a small water system assistance program, including a grant program "for the purpose of making grants to local sponsors in order to assist small water systems with the cost of feasibility studies for the development of regionalized water systems."[50]

Certain ratemaking methods (such as acquisition adjustments) can provide restructuring incentives. Most larger water utilities would argue that they should be rewarded with an acquisition adjustment for taking on the added risk and

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49 "Eligibility and Priority Criteria from Section 10 of the Pennsylvania Infrastructure Investment authority Act," as reported in Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991), 9-5 and 9-6.

50 *Pennsylvania House Bill No., 1403,* Session of 1991, passed March 16, 1992.

responsibility that comes with absorbing a troubled water system. Many regulators, however, regard acquisition adjustments as inconsistent with traditional ratemaking practices. When acquiring troubled systems, the water utilities also would like to have flexibility in meeting other regulatory requirements of the jurisdiction in which they operate, such as metering of all connections.[51] In decreasing order of benefits to the acquiring utility's investors are methods dealing with acquisitions:[52]

- Full amortization of the excess acquisition cost and inclusion of the unamortized balance in the rate base.
- Various mixes of rate base inclusion and amortization of the excess acquisition cost.
- Full amortization of the excess acquisition cost coupled with rate base exclusion of the unamortized balance.
- Partial amortization of the excess acquisition cost coupled with rate base exclusion.
- Treatment of the excess acquisition cost as a current expense (thus affecting current revenue requirements only).
- No amortization of the excess acquisition cost and rate base exclusion but allowance of a higher than market-justified rate of return.
- Inclusion of the excess acquisition cost in the rate base coupled with delayed recovery of capital (that is, phase in).
- No amortization of the excess acquisition cost and rate base exclusion (that is, complete disallowance).

The more favorable the ratemaking treatment to the acquiring utility, the stronger the incentive to acquire small water systems. Selecting a treatment is a matter of public policy that in some cases may go beyond traditional boundaries of regulatory policy in the interest of achieving long-term policy goals. Again, the implications of the treatment for achieving least-cost, viability, and no-losers goals should be assessed.

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51 William D. Holmes, "The Take Over of Troubled Water Companies," 371-76.

52 Patrick C. Mann, G. Richard Dreese, and Miriam A. Tucker, *Commission Regulation of Small Water Utilities: Mergers and Acquisitions* (Columbus, OH: The National Regulatory Research Institute, 1986).

In addition to these issues, other ratemaking incentives are available for use by the commissions, including higher rates of return in recognition of increased risks. Using these tools, regulators can induce some utilities into activities they otherwise might not undertake by making it worthwhile to do so. In some cases, "building goodwill" with regulators can be incentive enough. A utility's efforts to improve the overall viability of the industry (for example, through satellite management) might be viewed positively by regulators who share this policy goal.

Perhaps most difficult to grasp, and certainly most difficult to quantify, is the role of local politics in implementing structural solutions. Regionalization may make economic sense but many small communities may not want to sacrifice control of their water system to an "outside" entity.[53] Control of the water system may be tied politically to other aspects of local control, such as schools and public safety services. A community may believe that giving up control of the water system is a precursor to loss of control elsewhere. For some municipal water systems, revenues may be used to subsidize other city services. The system might even provide service outside its boundaries at rates higher than within city limits as another way to supplement revenues.

It follows, according to one study, that the states will continue to play an essential role in the policies emphasizing consolidation or regionalization of water supply, one that surpasses the federal and local roles:

> The benefits of regionalizing water services are widely recognized. Because federal intervention is not likely to be looked upon favorably and because local efforts can be expected only among a few of the major population centers, the impetus for regionalization as a means of addressing the difficulties created by the fragmentation of water services in the United States must remain with the states. Several states have already begun to take important initiatives, and professionals in the water supply sector must continue working with local and state officials to create a climate where regionalization efforts can prosper.[54]

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53 Issues of local control and autonomy also arise in public utility areas, such as the provision of 911 emergency telephone service.

54 Daniel A. Okun, "State Initiatives for Regionalization," *American Water Works Association Journal* 73 (May 1981): 245.

In the very long term, as in the case of emerging water systems, structural policies toward existing systems are dependent on the development of a more comprehensive policy framework.

Comprehensive Policies

Comprehensive planning for new water systems, as discussed in the previous chapter, naturally correlates with planning by and for existing water systems. As in the case of emerging systems, small water systems themselves cannot bear the full burden of comprehensive planning. As previous NRRI research has emphasized, integrated planning principles can be adapted to the needs of small systems and a truly integrated planning approach will take the needs of these systems into account.[55] This includes planning by government agencies and even planning by larger water systems. Furthermore, even small systems should have the capability to prepare a basic business plan.[56]

The U.S. Environmental Protection Agency has recognized the importance of planning in improving the viability of the water supply industry while also recognizing the role of existing systems in meeting future needs:

> Water supply planning is recognized as a means of addressing current and future problems. It allows the identification of all regulated water systems in a given area and the determination of how best to coordinate future development. Planning facilitates interconnections and satellite operations by detailing the future expansion plans and capabilities of existing water systems.[57]

Early state initiatives promoting planning and consolidation for water supply include North Carolina's Regional Water Supply and Sewage Disposal Planning Acts

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55 Janice A. Beecher, James R. Landers, and Patrick C. Mann, *Integrated Resource Planning for Water Utilities* (Columbus, OH: The National Regulatory Research Institute, 1991).

56 Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991).

57 U.S. Environmental Protection Agency, *Developing Solutions: On the Road to Unraveling the Small Systems Dilemma* (Bulletin no. 1, July 1990), 1.

(1971) and Washington's Public Water System Coordination Act (1977).[58] One of the most recent initiatives, passed in March 1992, is Pennsylvania's House Bill No. 1403, which establishes an assistance program including state grants for "comprehensive small water systems regionalization studies."

Growing interest integrated planning also is demonstrated by the development of memoranda of understanding among various governmental agencies involved in water system regulation, as mentioned in the previous chapter. California took the lead in this area in early 1987. In 1991, the Florida Public Service Commission entered into a comprehensive memorandum of understanding with the state's water management districts; a memorandum between the commission and the Department of Environmental Regulation is in draft form. These agreements serve to coordinate not only certification of new systems but ongoing regulation of existing systems.

In Connecticut, 1985 legislation ("An Act Concerning a Connecticut Plan for Public Water Supply Coordination") provided for coordination of long-term water supply planning by the state's Department of Health Services.[59] The state has been divided into seven areas each with a Water Utility Coordinating Committee to facilitate the planning process, which includes public and private water utilities and regional planning organizations. A key part of the strategy is to define the boundaries of exclusive service territories as well as new rights and responsibilities for the water utilities operating within them. Regulations under the act call for supply development, main extension, and satellite management of noninterconnected systems within the exclusive service area.

The state of Washington engages in a comprehensive water system planning process, as summarized in table 4-7. In 1985, state drinking water regulators developed a detailed handbook to guide water systems through the state-mandated planning process.[60] Recently published guidelines make it possible for even the smallest systems in the state (serving 100 to 999 services) to participate in the planning process. Another recent development is the emphasis on coordination between the Department of Health and the Utilities and Transportation Commission in regulation and planning for water utilities.

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58 Okun, "State Initiatives for Regionalization," 243-45.

59 McQueen, "Takeover of Small Failing Water Systems," 341.

60 Alan Rowe and Richard Siffert, *Planning Handbook: A Guide for Preparing Water System Plans* (Olympia, WA: Department of Social and Health Services, 1985).

TABLE 4-7
WASHINGTON STATE'S
COMPREHENSIVE WATER SUPPLY PLANNING PROCESS

Preliminary Assessment

1. Existing water systems

   a. History of water quality, reliability, service
   b. Fire fighting capability
   c. Evaluation of facilities

2. Future water sources

   a. Availability
   b. Adequacy

3. Service area boundaries

   a. Map of established boundaries
   b. Identification of systems without boundaries

4. Growth in the area

   a. Current population and land use patterns
   b. Population and land use trends

5. Status of planning

   a. Water system
   b. Land use
   c. Coordination

Individual Water System Plans

1. Basic Planning Data

   a. Service area description
   b. History of system (planning, sources, etc.)
   c. Present and future land use
   d. Present and future population
   e. Present and future water use

2. Inventory of Existing Facilities

   a. Description of existing sources and system facilities
   b. Hydraulic analysis
   c. Water quality and conformance with standards
   d. Fire fighting capability and conformance with standards

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TABLE 4-7 (continued)

Individual Water System Plans (continued)

3. System improvements

   a. Projection of 10-year water demand
   b. Describe alternatives to meet demand (and cost)
   c. Selection and justification of alternative
   d. Schedule of improvements
   e. Financial program

4. Other topics

   a. Watershed control program
   b. Service area agreements
   c. Analysis of shared facilities (interties, reservoirs)
   d. Relation between water and land use plans
   e. Operations program
   f. Consideration of State Environmental Policy Act
   g. Maps supporting the plan

Area-Wide Supplement

1. Assessment of related plans and policies
2. Future service areas in the region
3. Minimum areawide design standards
4. Process for authorizing new water systems
5. Future areawide source plans (supporting studies, reservation)
6. Plans for development of joint use or regional facilities
7. Application of satellite support systems
8. Other topics pertaining to the region
9. Compatibility of supplement with other plans and policies
10. Continuing role of Water Utility Coordinating Committee
11. Consideration of State Environmental Policy Act

Source: Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991), 3-4 and 3-5.

Long-term consolidation of the water supply industry may require some rather invasive government policies, such as the takeover of water systems by public agencies. However, this is not to say that major industry restructuring cannot be accomplished in the long term through private sector initiatives, as through voluntary mergers and acquisitions. The experience of the Indianapolis Water Company (IWC), which in its origins served 1,300 customers and today serves more than 750,000, is a case in point:

> Investor-owned IWC, in its one-hundredth year of public water service, has become a regional utility serving both incorporated and unincorporated areas of four counties in central Indiana. Through careful planning in the areas of management, finance, and engineering, the company continues to offer new regional water service by marketing main extensions, developing satellite supply and distribution systems, and acquiring existing utilities.[61]

Thus in contemplating regulatory, structural, and comprehensive policies for the water supply sector, it is probably best to keep an open mind about institutional alternatives. In fact, institutional diversity is probably desirable because it allows for experimentation, comparison, and competition among specific options, all of which should enhance viability in the long term.

Ideally, comprehensive, integrated planning by the states will involve not only drinking water authorities and public utility commissions, but also water resource agencies and others with an interest in water. State natural resource departments, for example, may have substantial permitting and planning authority as well as a strong interest in improving coordination among suppliers. Given the growing concern about environmental issues, other branches of government (such as legislatures and governors' offices) can be expected to launch their own water resource planning initiatives. Beyond the states, planning and coordination also occur at a regional level, through river basin agreements and compacts. All of these policies may influence the industry's restructuring and the future role of small water systems. Regulators can help assure that planning by jurisdictional water systems comports with the provisions of these other planning processes in addition to least-cost and other utility planning principles.

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61 J. Darrell Bakken, "Evolution of a Regional System," *Journal of the American Water Works Association* 73 (May 1981): 238-42.

CHAPTER 5

WATER SYSTEM PERFORMANCE ASSESSMENT

In light of the growing interest in viability policies for both emerging and existing water systems, the need for performance assessment techniques also has grown. Today, water utilities, their regulators, and others concerned about viability can apply a variety of rudimentary assessment techniques to evaluate or "screen" water utilities. Utilities themselves may use these techniques to appraise their own condition or that of another utility with which they might want to do business. Regulators may use the same techniques to evaluate certificate applications, survey the health of existing utilities, or to trigger intervention. Public policy analysts may use them to measure the effectiveness of policies designed to improve water system viability.

Assessment techniques vary in the amount of resources they require, the degree to which they involve quantitative and qualitative evaluation methods, and their capacity to predict whether a water system will become nonviable. Such distinctions are important. First, the issue of resources arises in the context of the debate over the appropriate role of government in general, and water regulators in particular, when it comes to assuring water system viability. To most regulators, issuing (and maintaining) a certificate of need carries with it some responsibility to ensure that the certified entity is actually capable of providing the service in question. But how much should a government spend in monitoring and assessing water system viability? Resources spent in this endeavor cannot be used elsewhere in regulation or state government. Thus regulators may choose techniques requiring the level of resources they determine to be appropriate.

Second, many emerging assessment methods (including the approach presented in chapter 6) lean toward the quantification of viability. Quantification does not necessarily make a method more accurate, precise, or reliable. Such methods can ignore some of the more qualitative aspects of performance, such as management competence, which require judgment on the part of the evaluator. Certain viable systems may fail a poorly constructed quantitative test, while certain nonviable systems may pass. However, there are efficiency advantages in using certain quantitative methods because they reduce the resource demands mentioned above.

Also, quantitative methods provide a degree of objectivity and may be particularly useful in establishing basic threshold levels. Systems falling below the chosen threshold are good candidates for further assessment, including the application of qualitative evaluation methods.

Finally, the art of water utility performance measurement and assessment is new and not well established. What is needed is further application of the methods so that appropriate refinements can be made. However rough it may be, performance assessment is a logical next step in developing viability policies. To aid in performance measurement and assessment, a select group of techniques is presented here. Most can be adapted readily for use in evaluating new or existing water systems and methods can be combined to suit the needs of individual jurisdictions. Several states already have incorporated assessment in their certification and other water system policies. Connecticut, for example, has a comprehensive certification policy and its regulatory agencies conduct many of the background checks necessary for ensuring viability.[1] This chapter briefly reviews some general methods before turning to a more detailed study of failure prediction modeling in the following chapter.

Performance Assessment in Banking

As noted earlier in this report, the banking industry provides a useful perspective on water utilities, particularly with regard to screening new firms for potential problems in viability. The failure rate of new banks in general is extremely low, suggesting that the requirements for new bank charters may provide a source of information for other regulators seeking to improve their certification processes. Although in recent years the integrity of the banking industry has drawn considerable fire, it can be observed that it was not necessarily the performance assessment methods that failed but the policy process that should have ensured their judicious use.

Applications for new banks can go to the Office of the Comptroller of the Currency (OCC) or to state bank commissions. All applicants must seek deposit insurance so the applicants also must file an application to the Federal Deposition

[1] Larry Morandi and B. Foster, *Compliance with the Safe Drinking Water Act: State Legislative Options* (Denver, CO: National Conference of State Legislators, 1990).

Insurance Corporation (FDIC) regardless of whether they are seeking a federal charter or a state charter. Evaluation methods by the OCC and FDIC are based on statutory requirements and are similar for both agencies. In analyzing applications the Comptroller is guided by "decision factors" listed in its *Manual* as follows:[2]

- The bank's future earning prospects.
- The general character of the bank's management.
- The adequacy of the bank's capital structure.
- The convenience and needs of the community to be served by the bank.
- The bank's compliance with the National Bank Act and Federal Deposit Insurance Act.

The Comptroller's *Manual* also clearly points out that for survival, a new bank should have a growing economic market area and be shielded from potentially destructive competition.[3] Especially in a stagnant market area the presence of too many banks is considered unhealthy. Thus charters are seldom, if ever, approved in a weak economic area. The OCC *Manual* goes on to state that "operating plan assumptions about the market must be reasonable and projections must be consistent."[4] The FDIC has similar requirements that are thoroughly discussed in its application packet of information which contains 600 pages of instructions.[5] The major requirements are summarized in table 5-1. It is apparent that banking regulators look upon economic growth and the quality of management as the key predictors of success for a new bank. These factors also are essential for the success of any new firm.

Bank chartering agencies and the FDIC also require new firms to file a business plan, much like those filed by new firms applying to a bank for a line of

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2 Office of the Comptroller of the Currency, *Comptroller's Manual for Corporate Activities,* Section 2.1, Charters, Washington, DC: December 1988.

3 In essence, the new bank should have a monopoly with only nondestructive competition.

4 Ibid., 4.

5 *FDIC Rules and Regulations: Statement of Policy,* Washington, DC: 3-31-83 (December 31, 1989) 5086+, Section C.

TABLE 5-1

FDIC FINANCIAL REQUIREMENTS
FOR BANK CERTIFICATION

Financial history and condition	Restricts investment in fixed assets, leases, insider transactions, and sets accounting standards.
Adequacy of capital structure	Requires that initial and unimpaired capital should be equal to at least 10% of estimated assets at the end of the third year of operation.
Future earnings prospects	Requires reasonable and supportable estimates that within a reasonable time (normally 3 years) break-even will occur and a reasonable profit will be earned.
General character of the management	States that the quality of a bank's management is vital and is perhaps the single most important element in determining the applicant's acceptability for deposit insurance. A detailed evaluation procedure is set out by the FDIC for measuring the management's qualifications.
Convenience and needs of the community to be served	Requires massive amounts of economic, demographic, competitive, and other supporting data and projections and trends for the future for presentation to the FDIC.

Source: *FDIC Rules and Regulations: Statement of Policy,* Washington, DC: 3-31-83 (December 31, 1989) 5086 et seq., Section C.

(a) See page 5088 of the source.
(b) Recall that the OCC study *Bank Failure* (1986) determined that poor management was the single most important cause of bank failure, and a similar finding was presented in Pantalone and Platt (1987).

credit or loan. Business planning forces entrepreneurs to isolate the important economic, social, demographic, and even political factors that will affect the new firm positively or negatively. Projections of these factors must be made for several years into the future to determine the "break even" year for the firm and its earnings potential.

New water companies frequently spring up in new housing developments after the homes are built and the development stabilizes. This implies that the growth phase has passed and slow growth (at best) will occur in new hook-ups and per capita consumption. Per capita water demand does not increase in the United States very much, even for large and financially successful water utilities. Once a development is completed small water utilities must rely on relatively constant revenue flows and regular inflation-induced increases in operating costs. Thus potential earnings growth, so essential for new banks, often is lacking for new water companies.

The analogy of banking to the water industry is instructive but imperfect. Both are regulated industries, to be sure, and both face viability challenges. However, when a bank fails, an existing bank can assume its services. Customer can even conduct their banking through the mail with almost any bank. If a water system fails, the available substitutes are limited. Well water can be costly and may not meet community drinking water standards; bottled water also is costly and is not practical for uses other than drinking. The failure of a public utility can cause considerable hardship on the customers to which the utility was obligated to serve.

Thus it can be argued that applicants for water utility certificates could be subjected to at least the same rigorous requirements of new bank applicants, as set forth in table 5-1. For emerging water systems, a business plan approach has been advocated by Wade Miller Associates, Inc., as discussed below.[6] For existing systems, some variations on the banking model already are being applied, not surprisingly, under state loan programs targeted at small water systems. As reported in table 5-2, Pennsylvania's PENNVEST loan program consists of a fairly rigorous screening process, which helps assure system viability as well as loan repayment.

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[6] Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991).

TABLE 5-2

PENNVEST APPLICATION PROCESS

Viability Screening Elements	Steps
(None)	Applicant arranges planning consultation with Department of Environmental Resources (DER) engineer.
Review/Discussion of Project Alternatives	Planning consultation meeting with DER engineer.
Analysis of Alternatives and Cost-Effectiveness	DER engineer prepares planning consultation and prefeasibility assessment report; transmits to applicant.
Analysis of Alternatives and Cost-Effectiveness	Applicant prepares planning and feasibility report; submits to engineer.
Analysis of Alternatives and Cost-Effectiveness	Preapplication conference with DER engineer to review planning and feasibility report.
Statement of Income and Expenses, Debt History, Demographic Data	Submission of application for financial assistance.
Credit Analyses; Assurances of Need and Ability to Pay	Review of application and decision.

Source: Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991), 9-3.

Under current economic conditions regulators must be especially skeptical about the future of emerging water systems and nonviable existing systems and want to use appropriate assessment methods in determining their fate.

Performance Assessment Methods

For those interested, a variety of water system performance assessment methods is available. Most can be adapted to the needs of the user. As noted above, these methods vary in complexity and in the resources required to use them. Some regulatory commissions, for example, may want to invest additional resources in performance assessment if they believe the cost of doing so will be made up later in improved regulatory compliance. In other words, dollars invested in assessment and early intervention could save regulators from the expense of enforcement actions down the road.

The three-legged stool of water system performance--technical, financial, and managerial--provides a basic guideline for performance assessment by water utilities and their regulators, as seen in table 5-3.[7] Specific tools and applications are available for assessment within each of these areas, although they sometimes overlap. In more comprehensive policies, such as integrated resource planning, attention is paid to all three legs of the stool simultaneously in recognition that all three are necessary for water system viability.

Technical Performance

In chapter 1, along with identifying the dimensions of water system performance, some basic technical questions asked were: Can the system provide safe, adequate, and reliable water service? Does the system comply with drinking water regulations? Does the system operate with engineering efficiency? Is the system technologically current? Is the system run by a certified operator?

For specific evaluation guidelines on technical performance in relation to drinking water quality, deference to the state drinking water agencies generally is

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[7] For a similar classification, see Kearney: Management Consultants, *Management Audit Manual for the Utility Industry* (not dated).

TABLE 5-3

SAMPLE UTILITY AND REGULATORY USES OF WATER SYSTEM PERFORMANCE ASSESSMENT

Area of Concern	Sample of Uses by Water Utilities	Sample of Uses by Regulatory Agencies
Technical	Use in-house expertise, nearby utilities, regulatory agencies, professional associations, and other resources to monitor and evaluate technical performance.	Evaluate technical needs and capabilities of emerging and existing water systems (state drinking water agencies in cooperation with other agencies).
Financial	Assess financial condition using standardized worksheets; meet financial reporting requirements; maintain accurate and reliable records.	Assess financial condition of emerging and existing water systems; review financial reports; conduct financial audits as needed; use methods that trigger other regulatory actions (state public utility commissions in cooperation with other agencies).
Managerial	Prepare a comprehensive business plan with an emphasis on management capabilities and practices; use outside resources for assistance.	Conduct a management audit or simplified assessment of management capabilities capabilities; monitor compliance with reporting requirements.

Source: Authors' construct.

appropriate. These agencies have responsibility for implementing federal standards under the Safe Drinking Water Act (SDWA), including monitoring and enforcement. The SDWA and the rules for its implementation spell in great detail unacceptable levels of contamination and reporting requirements for systems. As seen in chapter 2, the U.S. Environmental Protection Agency spends considerable effort amassing data on compliance with the SDWA. It should not be necessary for the technical staff of the public utility commissions to duplicate the efforts of state drinking water agencies when commission staff time is better spent on other technical and policy issues related to economic regulation.

While the utility commissions may need to defer to their sister agencies on certain technical matters, they can provide a system of checks and balances to help assure that technical performance standards are met. In rate cases and other proceedings, for example, commissions could require that the record include a statement from drinking water regulators that the system is in compliance. Where costs associated with the SDWA are reviewed, agency coordination on technical issues is especially important. This information, for example, may have a direct bearing on a commission's determining whether or not a proposed facility will be "used and useful" or if a proposed investment is "prudent." The technical expertise of commission staff also can be applied in the evaluation of water system programs in such areas as drought or emergency planning, leak detection and repair, corrosion control, cross-connections, and water source protection and preservation.

Finally, consistent with integrated planning principles, both utility commissions and drinking water regulators can use planning processes to improve technical performance. Planning guidelines are available for this purpose.[8] Borrowing from the Pennsylvania proposal, a simple approach is to require a facilities plan for emerging and existing systems, as described in table 5-4. The capacity of water systems to prepare a workable facilities plan can be used as a viability screening device. For emerging systems, approval of a facilities plan by the various state regulatory agencies can be a prerequisite to certification. As seen in the table,

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[8] See Tennessee Department of Health and Environment, *Local Drought Management Planning Guide for Public Water Suppliers* (Nashville, TN: Office of Water Management, Tennessee Department of Health and Environment Office of Water Management, 1988).

TABLE 5-4

TECHNICAL ASSESSMENT OF WATER SYSTEM VIABILITY USING A FACILITIES PLAN

For emerging water systems, the facilities plan:

- Describes the facilities to be constructed, including a description of the phasing of construction and future plans for expansion;
- Incorporates a forward-looking assessment of SDWA compliance requirements based on monitoring data from proposed source of supply; and
- Describes the alternatives considered and the rationale for the selected approach to providing water service.

For existing water systems, the facilities plan:

- Provides an evaluation of the condition of existing facilities and an inventory of needs for rehabilitation and replacement;
- Provides a forecast of needs for system expansion;
- Provides a forward-looking assessment of SDWA compliance requirements based on monitoring for unregulated contaminants; and
- Presents an analysis of alternative approaches to providing water service, including absorption via interconnection into a neighboring system; purchased water arrangements; alternative ownership and management arrangements; and satellite management arrangements of various types.

Source: Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991), 6-3.

these plans can go well beyond traditional technical considerations. Facilities planning can be used to assess structural alternatives for water systems as well. Insome cases, the best *technical* solution may be a *structural* one that changes the very character of the water service (such as a change in utility ownership).

Financial Performance

In chapter 1, financial performance questions were: Does the system have or can it acquire the capital needed to provide water service that meets regulatory standards? Do the existing or proposed rates accurately, adequately, and equitably reflect the full cost of water service? Are the system's customers willing and able to pay the rates necessary for the provision of water service?

Understandably, water system viability frequently is defined in financial terms. Technical and managerial performance depend heavily on the financial performance of any firm, and water utilities are no exception. Financial performance assessment methods range from simple (a checklist approach) to complex (regression-based risk analysis), as discussed below. The following chapter sets out a more detailed financial assessment method focused on the issue of failure prediction. The methods discussed here are budgetary analysis, financial indicator analysis, financial ratio analysis, risk analysis, and demographic analysis.

Budgetary Analysis

The U.S. Environmental Protection Agency, in the interest of improving compliance with federal drinking water standards and building a more viable water supply industry, has prepared several resources that utilities can use to assess their financial well-being. For very small systems, some fairly simple methods are available. One method is a basic comparison of a utility's *budgeted* revenues with its *realized* revenues.[9] Using a simple spreadsheet, a utility can monitor its revenues from rates, fees, and other user charges (and, for public utilities, taxes and other revenues sources) on a monthly basis. Budgeted amounts are compared to dollars received on a year-to-date basis. In this way, a potential shortfall is recognized early enough for the utility manager to take action.

Recently, regulators in Washington state have begun to develop a budgetary approach for assessing water system financial viability.[10] A draft of their model,

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[9] Paul L. Shinn, Steven Turtil, Benjamin Mays, and Haig Farmer, *A Water and Wastewater Manager's Guide for Staying Financially Healthy* (Washington, DC: U.S. Environmental Protection Agency, 1989), (brochure).

[10] Washington State Department of Health and U.S. Environmental Protection Agency, *Financial Manual for Small Water Utilities* (Draft dated October 1991).

TABLE 5-5
WASHINGTON STATE'S PROPOSED FINANCIAL VIABILITY ASSESSMENT TEST FOR SMALL WATER SYSTEMS

TEST 1	BUDGET BASIS FOR YEAR 1	CALCULATION
1. REVENUE		
2. Water rates	$______	From worksheet
3. Total other revenue	______	From worksheet
4. TOTAL REVENUE	$______	Add lines 2 - 3
5. EXPENSES		
6. Total C&M and A&G expenses	$______	From worksheet
7. Taxes (property, B&O)	______	From worksheet
8. Debt service payments	______	From worksheet
9. Net CIP from rates	______	From worksheet
10. Operating cash reserve(increase)	______	From worksheet
11. Capital cash reserve(increase)	______	From worksheet
12. TOTAL EXPENSES	$______	Add lines 6 - 11
13. Required water rates	$______	Total expenses less other revenue
14. Is line 2 = > than line 13	$______	Yes or no. If no, go back and raise rates or reduce expenses
TEST 2		
15. Current operating cash reserve	$______	Separate operating cash from your bank statement
16. Budgeted increase	______	Line 10
17. Total operating cash reserve funds	$______	Line 15 + 16
18. Required operating cash reserve	$______	Line 6 X 0.125 (see note below)
19. Is line 17 = > line 13	$______	Yes or no. If no, continue to budget annual increases in operating budget
TEST 3		
20. Current capital cash reserve	$______	Separate capital cash reserve From your bank statement
21. Budgeted increase	______	Line 11
22. Total capital cash reserve funds	$______	Line 20 + 21
23. Cost of replacing supply or critical mechanical equipment	$______	Current replacement cost
24. Is line 22 = > than line 23	______	Yes or no. If no, continue to budget annual increases in operating budget

TABLE 5-5 (continued)

TEST 4			
25.	Median household income	$_____	Line 29
26.	Median household income X .015	_____	Line 25 X .015
27.	Cost/equivalent residential units (ERU)	$_____	Line 13/Line 30 or 31
28.	Is line 26 = > than line 27	_____	Yes or no. If no, pursue other ownership options or establish improvement implementation schedule
	Customer Data		
29.	Median household income	$_____	From Washington State Department of Health
30.	Total # of equivalent residential units (ERU) method 1 -	_____	From your customer records
31.	Total # of equivalent residential units (ERU) method 2 -	_____	Utility annual water use/ (average monthly household use x 12 months)

Note: (45 Days/365 Days) = 1/8 = 0.125

Source: Washington State Department of Health and U.S. Environmental Protection Agency, *Financial Manual for Small Water Utilities* (draft dated October 1991), A-1.

which also includes an ability-to-pay test, appears in table 5-5. The model consists of four tests through which the adequacy of existing revenues and reserves can be assessed:

- **Test 1:** Is a budget in place and are rates sufficient to cover expenses?
- **Test 2:** Is the operating cash reserve sufficient?
- **Test 3:** Is the capital cash reserve sufficient to cover the cost of replacing source of supply or critical mechanical equipment?
- **Test 4:** Is the cost of water per equivalent residential units (ERU) equal to or greater than 1.5 percent of median household income?

As seen in table 5-5, the calculations for this type of assessment actually are fairly simple. Additional worksheets provide an opportunity for utilities to develop detailed five-year budget data that are fed into the overall assessment model. The model is especially useful in making a general assessment of the adequacy of existing rate revenues. A side benefit of budgetary analysis is that it forces utilities to maintain accurate and reliable data.

Financial Indicator Analysis

Beyond a budgetary analysis, utilities and regulators can conduct a more detailed assessment of financial performance using a variety of indicators. Clearly, there is no shortage of general financial performance indicators for utilities, as seen in table 5-6. These indicators are more comprehensive and can be used not only to evaluate financial conditions but management performance. A thorough financial report or audit of a public utility could make use of all of these indicators and probably more. For many states, auditing every jurisdictional water utility would be virtually impossible. However, an audit framework can be used to design annual utility reports, make data requests in the course of rate case and other regulatory proceedings, and for general evaluation purposes. Water utilities should monitor these financial performance indicators for self-evaluation purposes. Time series data are particularly helpful. Early identification of a downward trend can provide an opportunity for intervention.

Financial Ratio Analysis

Financial ratios (many of which also are key financial indicators discussed above) constitute one of the leading methods of financial performance assessment for all types of businesses. Dun & Bradstreet Credit Services, for example, are renowned for their use of financial ratio analysis.[11] Their key ratios are summarized in table 5-7 and described in detail in appendix E.

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11 Dun & Bradstreet Credit Services, *Industry Norms & Key Business Ratios, One Year Edition 1988-89* (New York: Dun & Bradstreet, 1989).

TABLE 5-6

GENERAL FINANCIAL PERFORMANCE INDICATORS FOR PUBLIC UTILITIES

- Operating ratios
- Return (net plant; assets; long-term capitalization; stockholders equity)
- Rates of growth (earnings per share; dividends)
- Capitalization ratio
- Bond ratings
- Interest coverage
- Internal generation of funds
- Depreciation (as percent of revenues; as percent of plant)
- Tax deferrals as percent of revenues
- Generation of funds from internal sources to meet total needs (employee stock plans; dividend reinvestment)
- Return on pension plan (return versus external measures, i.e., S&P 500, Kuhn Loebs Index; return versus actuarial requirement)
- Accounts receivable (days in accounts receivable; aging by customer grouping; bad debt as percent of collections)
- Delinquency experience (write-offs as percent of revenues; cut-off notices; disconnects; agency collections)
- Cash management (days invested in cash; number of bank accounts and average daily balances; time between meter readings and billings; short-term borrowing by type and rates)
- Rate filings and results

Source: Kearney: Management Consultants, *Management Audit Manual for the Utility Industry* (not dated).

TABLE 5-7

DUN & BRADSTREET FINANCIAL RATIOS FOR FIRMS

Solvency

- Quick ratio (cash plus accounts receivable/current liabilities)
- Current ratio (assets/liabilities)
- Current liabilities to net worth
- Current liabilities to inventory
- Total liabilities to net worth
- Fixed assets to net worth

Efficiency

- Collection period
- Net sales to inventory
- Asset to sales
- Sales to net working capital
- Accounts payable to sales

Profitability

- Return on sales (profit margin)
- Return on assets
- Return on net worth (return on equity)

Source: Dun & Bradstreet Credit Services, *Industry Norms & Key Business Ratios, One Year Edition 1988-89* (New York: Dun & Bradstreet, 1989), v-vi. For complete descriptions see appendix E.

Utility managers can and should evaluate their system's key financial ratios on a periodic basis. The U.S. Environmental Protection Agency provides guidelines for doing so:[12]

- Check the operating ratio every month (using twelve months of data) and compare it to past values, it will show you the trend of finances for your utility. To calculate the ratio, divide the total revenues by the total operating expenses.

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[12] Paul L. Shinn, Steven Turtil, Benjamin Mays, and Haig Farmer, *A Water and Wastewater Manager's Guide for Staying Financially Healthy* (Washington, DC: U.S. Environmental Protection Agency, brochure, 1989).

- Use historical accounting data, separate water and wastewater records, and use a worksheet.

- Revenues for a financially self-sufficient utility are mainly obtained from user service charges, but they often include other charges for special services. Interest earnings are counted as revenues.

- Operating expenses are the costs associated with providing and maintaining the utility's services. Examples are wages and benefits for employees, administrative overhead, chemicals and electricity for treatment, parts, tools, money spent or put in reserve for routine replacement of equipment, and the principal and interest on loans or bonds.

Worksheets for three basic financial ratios--the operating ratio, the coverage ratio, and the capital investment ratio--are provided in table 5-8. With proper recordkeeping, these ratios should be fairly easy to calculate and monitor over time. In the following chapter, several key financial ratios are used in the context of a failure prediction model.

Risk Analysis

Risk analysis makes use of financial ratios and other variables in modeling business risk. The staff of the California Public Utilities Commission devised a measure of water utility risk using the standardized covariance between the rate of return for the water utility and the rate of return for an industry sample, represented by a risk factor called beta (B).[13] A higher beta for an individual water utility indicates a higher level of risk. Using multiple regression techniques, the analysts explored a variety of variables that might be associated with variations in risk; the variables that proved to be statistically significant are presented in table 5-9.[14] Class D utilities (the smallest in terms of revenues) were found to

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[13] Fassil T. Fenikile, *Staff Report on Issues Related to Small Water Utilities* (San Francisco, CA: Public Utilities Commission, 1991), 18-27.

[14] For the variables defined in table 5-9, the following risk model for Class D utilities was adopted (t-statistics appear in brackets):

$$B_i = \underset{}{3.1131} - \underset{[-2.04]}{0.0463 * CGR} - \underset{[-2.55]}{2.9843 * RBTP} - \underset{[-2.79]}{0.0022 * OEPC} + \underset{[4.93]}{1.9665 * NPTOR} -$$

$$\underset{[-1.58]}{6.2404 * RORTA} + \underset{[1.67]}{1.7860 * RBGR} - \underset{[-3.31]}{1.9594 * PM} + \underset{[2.60]}{0.01251 * OMPC} - \underset{[-2.28]}{2.1689 * ROI}$$

TABLE 5-8

BASIC FINANCIAL RATIO WORKSHEETS FOR WATER AND WASTEWATER MANAGERS

<u>Operating Ratio Worksheet</u>			
<u>Revenues</u>			
User service charges	$	________	
Hookup/impact fees		________	
Taxes/assessments		________	
Interest earnings		________	
Other revenues		________	
Total Revenues	$	________	
<u>Operating Expenses</u>			
Administration	$	________	
Wages		________	
Benefits		________	
Electricity		________	
Chemicals		________	
Fuel and utilities		________	
Parts		________	
Equipment replacement fund (municipalities)		________	
Principal and interest payments		________	
Depreciation (investor-owned utilities)		________	
Taxes (investor-owned utilities)		________	
Other		________	
Total Operating Expenses	$	________	
<u>Operating Ratio</u>			
Total Revenues	$	________	divided by
Total Operating Expenses	$	________	equals
Operating Ratio		________	
<u>Coverage Ratio Worksheet</u>			
Total Revenues	$	________	minus
Nondebt Expenses	$	________	equals
Revenues Available for Debt Service	$	________	divided by
Debt Service Expenses	$	________	equals
Coverage Ratio		________	
<u>Capital Investment Ratio Worksheet</u>			
Total capital outlays	$	________	divided by
Total revenue	$	________	equals
Capital investment ratio		________	

Source: Adapted from Paul L. Shinn, Steven Turtil, Benjamin Mays, and Haig Farmer, *A Water and Wastewater Manager's Guide for Staying Financially Healthy* (Washington, DC: U.S. Environmental Protection Agency, brochure, 1989).

TABLE 5-9

STATISTICALLY SIGNIFICANT VARIABLES IDENTIFIED IN THE CALIFORNIA RISK ASSESSMENT MODEL

Customer Growth per Year (CGR) *Relation to risk:* Negative (-)

Operationalization. The average customer growth rate as a percentage of total number of customers.

Comment. This is intuitively expected since utilities experiencing high growth will benefit from increased revenue as a customers result of an increase in number of customers. However, the CGR benefit that customer growth has on risk is not because utilities with high growth will spend less per customer.

Ratio of Rate Base to Total Plant (RBTP) *Relation to risk:* Negative (-)

Operationalization. Rate base divided by total plant.

Comment. This was an anticipated result, confirming that risk for a utility increases with greater use of advances and contributions to fund utility plant.

Operating Expense per Customer (OEPC) *Relation to risk:* Negative (-)

Operationalization. Total operating and maintenance expense divided by total number of customers.

Comment. This is an unexpected result. One reason could be that, because utilities are regulated, higher expense translates directly into higher revenues and hence lower risk.

Net Plant Turnover Ratio (NPTOR) *Relation to risk:* Positive (+)

Operationalization. Gross operating revenue divided by net-plant (net plant is total utility plant less accumulated depreciation reserve).

Comment. This is the most statistically significant variable. A high turnover ratio could result from either a small net plant or a high gross income or both. Because the revenue requirement depends more on expenses than rate base for small utilities, the direct relation between risk and turnover ratio should be interpreted as showing the risk the utility faces on a small investment.

TABLE 5-9 (continued)

Return on Total Assets (RORTA) *Relation to risk:* Negative (-)

Operationalization. Net income divided by total assets.

Comment. The rate of return on total asset has marginal statistical significance.

Rate Base Growth (RBGR) *Relation to risk:* Positive (+)

Operationalization. Change in rate base divided by prior year's rate base.

Comment. The positive association indicates a direct and unexpected correlation between rate base growth and risk. However, because of its low statistical significance, this effect is discounted.

Profit Margin (PM) *Relation to risk:* Negative (-)

Operationalization. Operating revenue less operating expense divided by operating revenue.

Comment. A low profit margin could result from high operating expenses or lower operating revenues or both. Because we have discounted the effect of high expenses on risk, the remaining determinative factor is low operating revenues. A low operating revenue is affected by operating expenses, authorized rate of return and the size of rate base.

Operating Margin per Customer (OMPC) *Relation to risk:* Positive (+)

Operationalization. Operating revenue less operating expense divided by total number of customers.

Comment. The effect of the denominator, number of customers, is this variable and OEPC is suspect and appears to have a cancelling effect.

Return on Owner's Investment (ROI) *Relation to risk:* Negative (-)

Operationalization. Operating income divided by common equity. (No additional explanation or comments.)

Source: Adapted from Fassil T. Fenikile, *Staff Report on Issues Related to Small Water Utilities* (San Francisco, CA: Public Utilities Commission, 1991), 18-27. Based on an analysis of Class D utilities. A variable representing the average number of customers was not statistically significant.

have the highest risk factor, although Class C utilities also appear risky.[15] According to the author, other key findings were:[16]

- The net-plant turnover ratio (NPTOR) is the largest determinant of a utility's risk. The NPTOR is directly related with risk. Utilities with high turnover ratios are likely to have higher risk than those with low turnover ratios.

- The relative size of the rate base of a utility is closely related with a utility's risk. The lower the rate base to total plant (RBTP) the higher the risk and vice versa.

- Average customer size (ACS) a utility serves appeared to have no bearing on its risk. Small companies are not financially troubled just because they are small.

- Although number of customers (ACS) is not significant within a class of utilities, Class C and Class D utilities are riskier and face higher fluctuations in their earnings than Class A and Class B utilities. Economies of scale appear to exist in water companies.

- Customer growth per year (CGR) is indirectly related to utility's risk; the higher the growth rate, the lower the risk.

- The risk Class D utilities face is possibly exacerbated by a perceived unfavorable regulatory environment. This possibility is exemplified by the direct relation of years between general rate cases and risk.

Based on the model the five key determinants of small water utility risk, to which mitigative regulatory policies might be directed, are:[17]

- Small and declining rate base.

- Infrequent rate increases.

- A low authorized rate of return.

- Inadequate recovery of fixed charges.

- High operating expense per customer and low customer growth.

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15 Class A utilities have gross revenues in excess of $500,000; Class B utilities have gross revenues of $250,000 to $500,000; Class C have gross revenues from $50,000 to $250,000; and Class D utilities have gross revenues less than $50,000.

16 Fenikile, *Staff Report.*

17 Ibid., 28.

Thus a simple and preliminary risk assessment model could be designed on the basis of these five risk factors alone. Utilities facing one or perhaps two of these problems could be considered somewhat at risk, but utilities facing three or more sources of risk are probably in fairly serious trouble. While further research in this area is needed, the results of the California study provide a fairly straightforward and parsimonious model that could be replicated for other jurisdictions. More complex models of risk, of course, can be devised by adding some of the additional variables of significance.

The critical role that economic growth plays in determining risk was confirmed in the study by the Small Business Administration discussed in chapter 2, whose authors concluded that "Growth, not initial size, is the over-riding factor correlated with survival."[18] Moreover, just a little economic growth assures survival of *most* new firms: "If firms grow at all, even by adding only one employee, almost two thirds of new firms (over three out of five) will survive at least six years-regardless of initial size."[19] Absent economic growth, water utilities are more risky than the typical new firm. The economic growth variable is so important in predicting success or failure of new firms that it might be worth "weighting" in statistical models of risk.

Demographic Analysis

Finally, given the current economic climate, there is a growing interest in how the community's ability to pay (not simply willingness to pay) may ultimately determine the viability of a water system as well as other enterprises within a local economic system. This is not a normative issue of whether water rates *should* be kept affordable, but a practical one having to do with whether a local economy can sustain a water system at its full cost. It has been suggested that if water utility rates exceed 1.5 percent of median household income, the community cannot

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18 Phillips and Kirchhoff, "Formation, Growth and Survival: Small Firm Dynamics in the U.S. Economy," 69.

19 Ibid.

financially sustain the cost of water service and alternatives should be explored.[20] This threshold was used in Washington state's proposed financial viability test presented above (see table 5-5). It is a test that can be applied to emerging or existing water systems, not necessarily as the sole determinant of a water system's fate but as a tool for use along with other assessment methods.

Table 5-10 presents a framework for evaluating a community's demographic character in terms of those factors that might affect customers' ability to pay for water service. These indicators cover population characteristics, income characteristics, employment, government finances, utility service, and other quality-of-life issues. Many of these relate to the issue of growth, discussed above in relation to utility risk. This type of analysis may be especially important in weighing the potential advantages of structural alternatives. Where a community simply cannot support the cost of water service by an independent small system, the future viability of such a system is doubtful and structural alternatives should be sought.

Management Performance

Chapter 1 posed the following questions in relation to managerial performance of water systems: Does the system benefit from management expertise? Is management competent to comply with environmental, public health, and economic regulations? Does the system have a business plan to assure viability? Does management avail itself of outside resources and assistance? Is management responsive to customer needs?

Lack of growth (especially when expected growth does not materialize) shifts the burden of success onto the shoulders of management. Yet as noted in chapter 2, lack of business knowledge or experience also is a key issue in business failure. The importance of management competence is growing along with the technical and financial demands on water systems. Thus a management assessment would be appropriate in certifying emerging systems and evaluating existing ones. Currently, however, management capability is not a major focus of the investigation performed by many states on new applicants for water certificates. One reason for this is

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[20] "Financial Manual for Small Water Utilities," (A joint project of the Washington State Department of Health and the U.S. Environmental Protection Agency, unpublished draft dated October 1991).

TABLE 5-10
INDICATORS FOR USE IN A DEMOGRAPHIC ANALYSIS OF A UTILITY SERVICE AREA

Population Characteristics

- Population of the service territory
- Trends in population
- Household size

Income Characteristics

- Median family income
- Percent below the poverty line
- Public assistance data

Employment

- Employment and unemployment rates
- Trends in employment and unemployment
- Listing and assessment of major employers
- Evaluation of potential future employment losses and opportunities

Government Finances

- Property tax revenues
- Other local revenue sources
- Condition of local government finances (including debt)

Utility Service

- Stability of the customer base
- Shutoffs and disconnections
- Uncollectible accounts
- Payment assistance programs
- Comparison with other utilities (electric, gas, telephone)

Quality of Life

- Crime and law enforcement statistics
- Housing availability and conditions
- Property values and trends in property values
- Education and employment training opportunities
- Availability and quality of medical care

Source: Author's construct.

that management assessment tends to be somewhat more qualitative in nature, particularly when compared with financial assessment.

Still, it is possible to develop performance indicators for evaluating water utility management. The U.S. Environmental Protection Agency provides numerous resources for assessing managerial capability, although their orientation leans somewhat toward publicly owned utilities.[21] Table 5-11 presents some simple checklists (financial reporting, purchasing, and user service charges) that can be used in evaluating the management of an existing system. The utility manager can use such a checklist in self-evaluation. Regulators can use a similar approach in a simplified management audit or other proceeding.

When additional resources are available, a more complex management analysis can be used. Table 5-12 provides a management performance assessment matrix derived from NRRI research on management auditing.[22] Utility performance in the areas of planning, organizing, and controlling are evaluated across seven functional areas. The research report on which the matrix is based presents detailed diagnostic guidelines for performing a comprehensive assessment of management practices and performance. In a simplified approach, suitable for smaller utilities, symbols (+/-) or grades (A,B,C) could be assigned for each cell of the matrix to indicate problem areas. This type of model could be adapted to the interests and needs of any particular regulatory jurisdiction or utilities of different size.

A larger utility, with its higher level of resources and more complex management structure, may require a more detailed audit. The investment in a detailed audit for larger utilities is likely to pay off in terms of identifying areas of potential improvement that will yield savings for both utilities and ratepayers. In this type of analysis, detailed questions can be used for each cell of the matrix to develop an in-depth understanding of each management issue. For example, in assessing *resource capability* in the area of *customer service and information,* training and development of customer service and meter reading personnel are

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21 U.S. Environmental Protection Agency, *Financial Capability Guidebook* (Washington, DC: U.S. Environmental Protection Agency, 1984).

22 Vivian Witkind Davis, Raymond W. Lawton, Raymond J. Krasniewski, Robert W. Backoff, and Margaret C. Allen, *A Qualitative Indicator System for Assessing Utility Management Practices and Performance* (Columbus, OH: The National Regulatory Research Institute, 1986).

TABLE 5-11

SIMPLE CHECKLISTS FOR ASSESSING UTILITY MANAGEMENT PERFORMANCE

Financial Reporting Checklist

[ ] Water and wastewater operations are accounted separately.
[ ] The utility uses accrual accounting methods.
[ ] The utility receives monthly reports of revenue and expenses.
[ ] Reports show both budget and actual figures.
[ ] Reports arrive by the 10th day of the following month.
[ ] The utility keeps its financial reports for at least four years.

Purchasing Checklist

[ ] Purchasing is centralized.
[ ] Major purchases are based on specifications that define requirements.
[ ] Standard quote/bid forms are used.
[ ] No purchases are made without a purchase order.
[ ] Exceptions are specified for emergency purchases.
[ ] Goods are inspected immediately for quality and damage.
[ ] Stock quantities are specified for all inventory items.

User Service Charges Checklist

[ ] All costs are identified.
[ ] Costs are allocated proportion.
[ ] Flow characteristics are known for each customer class.
[ ] Each customer's use is known or fairly estimated.
[ ] Customers are billed proportionally to use.
[ ] Billing cycle provides timely revenues.
[ ] Established procedures assure collection of delinquent bills.

Source: Adapted from Paul L. Shinn, Steven Turtil, Benjamin Mays, and Haig Farmer, *A Water and Wastewater Manager's Guide for Staying Financially Healthy* (Washington, DC: U.S. Environmental Protection Agency, 1989), (brochure).

TABLE 5-12

UTILITY MANAGEMENT PERFORMANCE ASSESSMENT MATRIX

	Functional Areas						
	Utility executive management process	Construction project management and control	Internal auditing	Rate program analytical process	Customer service and information	Management information systems	Work force productivity
ASSESSMENT CRITERIA							
Planning							
Policy and philosophy	_____	_____	_____	_____	_____	_____	_____
Planning & forecasts	_____	_____	_____	_____	_____	_____	_____
Scope of function	_____	_____	_____	_____	_____	_____	_____
Priorities	_____	_____	_____	_____	_____	_____	_____
Roles & responsibilities	_____	_____	_____	_____	_____	_____	_____
Organizing							
Resource capabilities	_____	_____	_____	_____	_____	_____	_____
Resource allocation	_____	_____	_____	_____	_____	_____	_____
Program plan	_____	_____	_____	_____	_____	_____	_____
Implementation	_____	_____	_____	_____	_____	_____	_____
Controlling							
Program & project control	_____	_____	_____	_____	_____	_____	_____
Reports & progress reviews	_____	_____	_____	_____	_____	_____	_____
Output evaluation	_____	_____	_____	_____	_____	_____	_____
Impact evaluation	_____	_____	_____	_____	_____	_____	_____

Source: Adapted from Vivian Witkind Davis, Raymond W. Lawton, Raymond J. Krasniewski, Robert W. Backoff, and Margaret C. Allen, A Qualitative Indicator System for Assessing Utility Management Practices and Performance (Columbus, OH: The National Regulatory Research Institute, 1986). The source provides detailed diagnostic guidelines for performing a comprehensive assessment of management practices and performance. For a cursory assessment, symbols or grades could be used to indicate general problem areas.

positive performance indicators, while inadequate training and excessive reliance on estimation (rather than actual meter reading) are negative indicators.

In comparison, given their less complex structure, it makes little sense to invest an excessive amount of resources in a detailed management audit for small utilities. However, small utilities also have much room for improvement, so even a rudimentary analysis can yield high returns. The matrix can be adapted for use in a low-cost assessment of management practices and performance by utilities themselves or regulatory agency staff. Once actual or potential problem areas for the small utility are identified, possible solutions can be devised with an assignment of priority to those yielding the highest return. Some solutions might address more than one problem simultaneously, as management audits often reveal.

Management capability for both emerging and existing water systems also can be evaluated on the basis of planning capability, an idea advanced by Wade Miller Associates, Inc. in their study for Pennsylvania:

> [One] attribute of the business plan requirement is that the exercise itself is a good test of the caliber of management and of the ability to run a successful operation. No doubt there are many existing small systems that will need assistance in going through the steps of the business plan process the first time. The process teaches very fundamental management principles, however, and can therefore make a tangible contribution to enhanced viability in the course of plan development.[23]

The business plan proposed in the Wade Miller analysis consists of four subcomponents, for which detailed outlines are presented in appendix F of this report:[24]

- A **facilities plan** describing proposed new facilities and the condition of existing facilities; needs for rehabilitation and replacement; and future needs to meet requirements of the SDWA.

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23 Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991), 6-2.

24 Ibid., ii. The adaptation used here recognizes four rather than three planning components, without having a substantive effect on the recommendations. In the original study, the "management and administrative plan" and the "operations and maintenance plan" are subsumed under a "management plan."

- A **management and administration plan** describing arrangements to assure performance of functions necessary to properly administer the enterprise, including documentation of the credentials of management personnel.

- An **operations and maintenance plan** describing provisions for performance of all routine O&M tasks necessary to assure proper functioning of the system.

- A **financial plan** describing provisions to assure: adequate revenues to meet cash flow requirements computed on the basis of the *full costs* of providing the service; adequate initial capitalization; and access to additional capital to meet contingency needs.

A planning approach to viability is especially consistent with the comprehensive viability policies discussed in chapters 3 and 4. Planning not only improves management performance, but it has relevance for designing and implementing institutional policies for improving the viability of the water supply industry over the long term.[25]

Institutional Assessment

While the focus here is mainly on methods of assessing water utility performance, it is worth noting that the institutional dimensions can and should be subjected to periodic assessment as well. The questions posed in chapter 1 can be used to develop a framework for assessing the adequacy of institutional arrangements:

- **Regulatory.** Is the certification process for emerging water systems adequate for assuring viability? Is regulatory oversight of existing water systems adequate for assuring their viability? Are regulators implementing appropriate tools for improving the viability of the water industry?

- **Structural.** Is the water supply industry structured to exploit economies of scale and operate efficiently? Are there barriers to industry restructuring? Are there barriers to coordination and sharing of facilities?

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[25] See also, Janice A. Beecher, James R. Landers, and Patrick C. Mann, *Integrated Resource Planning for Water Utilities* (Columbus, OH: The National Regulatory Research Institute, 1991).

- **Comprehensive.** Are governmental roles in water resource management coordinated? Is integrated resource planning a guiding paradigm? Does the regulatory system promote structural solutions, such as consolidation and other means of achieving economies of scale and optimal performance?

Any jurisdiction interested in the viability of water systems can and probably should assess these institutional issues on an ongoing basis. In many ways, these evaluations are as essential as evaluations of utility performance. On the basis of this study, it can be concluded that many states have made considerable headway in designing appropriate policies to address small system viability. While it would be vastly premature to suggest that methods are available for resolving all of the problems of small systems, the recent institutional achievements in this area are notable. More success seems likely.

CHAPTER 6

FINANCIAL DISTRESS MODELS

Effective viability policies require assessment methods that can be used by regulators and others for screening utilities and triggering intervention as needed. Because financial performance is so vital to water system viability, a need exists for methods specifically designed to assess the financial health of existing water systems and the expected health of emerging water systems. Some basic assessment methods were introduced in the previous chapter, but more complex modeling approaches can be used as well.

Modeling financial failure has emerged almost as a contemporary art form, becoming more important with the recent failure or near failure of numerous banks, savings and loans, and nonregulated companies. The reason for the surge in interest is obvious. Investors, lenders, depositors, legislators, potential merger partners, and so on all are concerned about the potential failure of an institution. Tumultuous economic times, the record number of bankruptcies, and the financial catastrophe in banking are ample reasons to study the causes and prevention of business failure.

Some of the business failure models and the techniques used in them can be used by regulators for diagnosing and monitoring the financial distress of water utilities. Identifying distressed water utilities as early as possible is important since their distress can affect investors, creditors, ratepayers, local government agencies, and regulatory commissions in serious ways. In additional to financial risk, the potential health risk of weak and failing water companies is another reason for regulators to get involved in identifying and taking regulatory action toward distressed systems.

This chapter reviews the bankruptcy and failure prediction models that have appeared in the finance literature and develops a distress classification model for water utilities. The methodology can be used as an early warning system to identify potentially bankrupt or financially distressed water utilities, as a screening device applied to systems seeking certification, and as a viability test for evaluating prospective structural changes among existing systems. All of these outcomes singly or together should help reduce the future impact of distressed water utilities.

Business Failure Research

Interest in finding financial models that will predict business failure is widespread among financial institutions such as investment banks, commercial banks, pension funds, insurance companies and other lenders, investors, federal banking agencies, and so on. The rapid development of "leveraged buyouts" (LBOs) in the late 1980s created even greater concern about predicting failure for the issuers of the "junk bonds" used in most leveraged buyouts.[1]

Two types of bankruptcy models have been reported in the literature beginning with the Beaver model in 1966.[2] The major focus of most published research has been on publicly owned firms whose stock is widely traded such as manufacturing, retailing, construction and similar companies. A secondary but smaller focus has been on models to detect financial distress in the banking and savings and loan industries. The bank related models are generically referred to as "early warning" models. While much of the early research was aimed at preventing bank failures, interest in bank related models diminished in the late 1970s as models immediately applicable to large nonregulated firms that were failing were developed.[3]

Part of the shift in interest was due to the realization by some researchers that the federal banking agencies were not likely to adopt their approach because the models lacked a high degree of accuracy in predicting failure more than one year preceding the failure.[4] One type of prediction error in the models (a type I error) would risk predicting the failure of a healthy bank. The potential

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1 Edward I. Altman, *Distressed Securities: Analyzing and Evaluating Market Potential and Investment Risk* (Chicago, IL: Probus Publishing, 1991). The analysis presented in this chapter is an extension of Altman's research on bankruptcy, failure, and default.

2 William Beaver, "Financial Ratios as Predictors of Failure," *Journal of Accounting Research (Supplement)* 4 (1966): 71-102.

3 Edward Altman, "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy," *Journal of Finance* 23 (September 1968): 589-609; Joseph F. Sinkey Jr. and D. A. Walker, "Problem Banks: Identification and Characteristics," *Journal of Bank Research* 5 (Winter 1975): 208-217; Joseph F. Sinkey Jr. and D. A. Walker, "Identifying Problem Banks and How Do the Banking Authorities Measure a Bank's Risk Exposure?" *Journal of Money, Credit and Banking* 10 (May 1978): 184-193.

4 Harlan D. Platt and Marjorie Platt, "Development of a Class of Stable Predictive Variables: The Case of Bankruptcy Prediction," *Journal of Business, Finance and Accounting* 17 (Spring 1990): 31-51.

consequence of such errors was a possible run on the bank (a self-fulfilling failure), something that federal bank regulators want to avoid.

Those engaged in business failure research in the nonregulated sectors seldom refer to the research coming from the banking literature. Likewise, banking studies seldom review or refer to the research in the nonbanking sectors. This is surprising since, as noted earlier, much of the early research in bankruptcy prediction focused on the banking sector.[5] Research begun in the FDIC eventually shifted to the private nonbanking sectors as researchers left the federal bank regulatory agencies.[6]

In developing a model or models that could be made applicable to regulated industries, the banking industry models seem useful. After all, early detection of financial weakness is an on-going part of the federal bank regulatory framework, even though prediction per se is not done by federal banking agencies. Moreover, most early warning bank models are not empirically derived as are the nonbanking models; that is, they are not statistically estimated from a sample of bankrupt firms since banks seldom file for bankruptcy protection.

Early warning banking models may have applicability to water utility regulation for other reasons as well. Banks are chartered by the Comptroller of the Currency (called national banks) and by individual states (called state banks). All banks must apply to the Federal Deposit Insurance Corporation (FDIC) for deposit insurance. The FDIC insurance approval investigation is extremely rigorous since all failed banks must be merged, restructured, or managed by the FDIC (as of 1990 by the newly established Resolution Trust Corporation within the FDIC which was created by Congress in 1989). Thus the interest of the government in assuring the viability of new banks is not unlike its interest in assuring the viability of new water systems. Like the FDIC, government agencies may have ultimate responsibility for managing a failed system (as in Texas), operating it completely (as in Nevada), or forcing its takeover by another entity (as in Connecticut).

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5 Altman, "Financial Ratios, Discriminate Analysis and the Prediction of Corporate Bankruptcy," 589-609; Sinkey, "Problem Banks: Identification and Characteristics," 208-217.

6 For example, Joseph Sinkey and Robert Eisenbeis.

Surveillance Models Used in Banking

A brief description of the surveillance system used by all banking agencies to monitor banks helps explain the rating system used by all federal and state banking agencies. Improving the rating system is an ongoing enterprise by federal bank regulators. The monitoring system used by banking agencies identifies key ratios, including peer comparison ratios, that are used in bank reviews and examinations. Bank reviews are done quarterly (off-site reviews) or annually (on-site examinations). Subsequent to the various examinations and reviews the ratios are condensed into a rating system known as CAMEL between 1 (excellent condition) to 5 (approaching failure). CAMEL is an acronym for capital adequacy (C), asset management and turnover (A), management (M), efficiency (E), and liquidity (L).

The FDIC and other agencies use the standard quarterly uniform bank performance reports (UBPR) filed by all federally insured banks to assign a quarterly CAEL rating (CAMEL without the M). The CAEL is derived from 250 financial ratios which are calculated from the quarterly reports. The 250 ratios are reduced to nineteen "key" ratios to determine the final CAEL rating. Three years of data are incorporated into the ratios. The ratios for an individual bank are compared with "benchmark" or "base-line" ratios eventually to set a rating for that bank. The benchmark ratios are confidential and even these are updated regularly to reflect current economic and financial conditions affecting individual banks and their regions. CAMEL ratings are assigned by bank examiners after an on-site examination using established guidelines and compared with CAEL ratings. Large banks typically are examined every twelve months and small banks every eighteen.

The FDIC also uses an "early-early" warning system based on three key warning ratios. One of these three is the "internal equity growth rate" which is similar to the retained earnings rate of change which is the best predictor ratio in several failure models.[7] The CAEL rating system is considered quantitative and objective and this is regularly compared with the more subjective and qualitative CAMEL rating to see where and why differences exist. The major difference between CAMEL and CAEL is the "M" for management which is only assigned by the examiner after evaluating the bank on site. It is by nature very subjective.

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[7] Altman, Haldeman, and Narayanan, "ZETA Analysis: A New Model to Identify Bankruptcy Risk of Corporations, 29-54; Demirguc-Kunt, "Deposit-Institution Failures: A Review of Empirical Literature," 2-18.

Quarterly changes in the CAEL rating are rigorously reviewed by the FDIC and subsequent nonscheduled on-site examinations may be required by the FDIC to explain divergences from quarter to quarter of CAEL or between CAEL and CAMEL.

Thus CAEL also serves as a supervisory tool in reviewing the CAMEL rating of examiners. It is described by FDIC officials as a "ratings prediction model" not a "failure prediction model." Failure prediction continues to occupy some researchers at the federal agencies but their models are mainly theoretical and there is no consensus when it comes to independent variables, statistical techniques, and other issues.[8] To date no agency has adopted any specific model from the finance literature for use in failure prediction although failure prediction and early warning surveillance models have the same goal: to flag weak and distressed banks far in advance of insolvency or liquidation.

One of the truly significant findings in bank failure research is that management factors, namely poor management, is usually the primary cause of bank failure and closure.[9] The Comptroller of the Currency concluded in its study *Bank Failure* that poor management was the single most important cause of failure.[10] These findings should impress utility regulators enough to look seriously at the quality and experience of managers in certifying new water companies.

Basic Feature of Business Failure Models

In recent review articles several authors discuss the major accomplishments and defects of the business failure research and suggest research needs in the field.[11] In his 1987 review article, Frederick Jones identifies fifty-two major

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8 Demirguc-Kunt, "Deposit-Institution Failures."

9 Pantalone and Platt, "Predicting Commercial Bank Failure Since Deregulation," 37-46.

10 Office of the Comptroller of the Currency, *Bank Failure*, Washington, DC, (June 1988).

11 Frederick L. Jones, "Current Techniques in Bankruptcy Prediction, *Journal of Accounting Literature* 6 (1987): 131-164; Coleen Pantalone and Marjorie Platt, "Predicting Commercial Bank Failure Since Deregulation," *New England Economic Review* 4 (July/August 1987): 37-46; Platt and Platt, "Development of a Class of Stable Predictive Variables: The Case of Bankruptcy Prediction, 31-51; Asli Demirguc-Kunt, "Deposit-Institution Failures: A Review of Empirical Literature," *Economic Review,* Federal Reserve Bank of Cleveland (Quarter 4, 1989): 2-18.

articles on bankruptcy prediction since 1966 and there have been many since.[12] Some of the basic features of the predominant models are reviewed here.

Most of the business failure models are empirically derived; that is, there is no theoretical basis for choosing a variable other than the fact that it has been used previously and found to be statistically significant. In fact, there is no widely accepted theory of bankruptcy that determines when or why a firm does or should enter into a Chapter 11 reorganization as opposed to Chapter 7 liquidation, or a merger, or some other option. Nothing about the process seems very predictable and in the banking industry there is accumulating evidence that the agenda and desires of the regulators, political pressures, and other factors may be significant in explaining bankruptcy or closure of banks.[13] Interestingly, these observations may be important for jurisdictional water systems. Water systems, too, can be affected by both regulatory and political pressures.

Much of the business failure research outside of banking is focused on relatively large firms since data are not readily available for models based on small firm failure. This is unfortunate since the bankruptcy rate among small firms (including banks) is somewhat greater than among large firms even though the economic impact is probably less severe in the case of a small-firm failure.

In banking, the majority of failures historically have been of small banks. With the rash of recent bankruptcies among large banks this may change. But the large data base needed to empirically estimate a model and replicate it with an out-of-sample group of failed banks makes research difficult in both nonbank and bank modeling. The recent trend of large bank failures partially explains the renewed interest in failure prediction by the Federal Reserve System.[14]

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12 Jones, "Current Techniques."

13 Demirguc-Kunt, "Deposit-Institution Failures: A Review of Empirical Literature," 2-18.

14 The renewed interest is indicated by the publication of two forthcoming articles on the subject by the Cleveland Federal Reserve Bank (Dr. William Gavin, by phone, March 1991).

Statistical Methods

Early business failure models started with univariate (one-variable) models and progressed to multivariate models.[15] Interestingly, one researcher was able to predict bankruptcy with an 87 percent accuracy with just one ratio, cash flow to total debt.[16] More recent models have used discriminant analysis, probit and logit models, and recursive partitioning models.[17]

Probit and logit models (one of which is applied later in this chapter) avoid some statistical problems of discriminant analysis but the results with classification accuracy seems to be equally as good with any statistical technique.[18] Probit and logit models use cumulative probability functions so as each variable enters the model the cumulative probability of bankruptcy or nonbankruptcy rises, albeit nonproportionally. Finally, many mathematical transformations are used to make models more realistic and statistically legitimate. For example, one research team uses a log transformation on one of the variables--asset size--to normalize its effects on the probability prediction, since there were large differences in the sizes of sample firms.[19] As noted later one of the difficulties of adopting an existing model to water systems is the model's complexity. Manipulating mathematically complicated models requires time, patience, and expertise; in some cases the data base necessary to use them is not readily available.

Many independent variables (or predictors) have been tested for their accuracy in predicting future bankruptcies. Approximately 100 different variables have been

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15 On univariate modeling, see Beaver, "Financial Ratios as Predictors of Failure," 71-102; on multivariate modeling, see Edward Altman, *Corporate Financial Distress* (New York: John Wiley & Sons, 1983).

16 Jones, "Current Techniques in Bankruptcy Prediction," 131-164.

17 Halina Frydman, E. Altman and Duen-Li Kao, "Introducing Recursive Partitioning for Financial Classification: The Case of Financial Distress," *Journal of Finance* 11 (March 1985): 269-291.

18 Jones, "Current Techniques in Bankruptcy Prediction," 131-164.

19 Edward Altman, Robert Haldeman and P. Narayanan, "ZETA Analysis: A New Model to Identify Bankruptcy Risk of Corporations," *Journal of Banking and Finance* 1 (June 1977): 29-54.

tested in bankruptcy studies.[20] The FDIC has used upwards of 250 variables in searching for its ongoing surveillance model (discussed below). The abundance of potential explanatory variables in this area of research calls for statistical methods that narrow the field to the most important predictors. To develop parsimonious models (fewer variables) as well as avoid the problem of multicollinearity (intercorrelation among the independent variables) a stepwise program is frequently used with discriminant analysis or logit models. Factor analysis is also used to reduce the number of variables to "factors" which are common sets of variables with similar characteristics.

Significant Variables

The types of financial ratios that appear to be common to most failure prediction studies are leverage ratios, liquidity ratios, income ratios, and historical earnings ratios. Considerable evidence suggests that as long as each type is represented (for example, liquidity or leverage ratios) specific variables make little difference in the predictive accuracy of the models.[21]

There also is much research centering on cash flow as a key predictor variable, but conflicting notions exist over the best definition of cash flow especially with reference to the accruals versus nonaccrual items used to define cash flow (for example, taxes payable are deducted in accrual models). Cash flow is one of the key ratios in the classification model developed below because it is one of the most consistently significant variables in prediction models. In summary, what appears to be a primary outcome of this research is the substitutability of ratios within the four basic groups. This finding influences the choice of key ratios reported later in this chapter.

As noted earlier, Chen and Shimerda identify 100 variables that have been used in failure prediction research and thirty-one of these have been significant in a

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[20] K. Chen and T. Shimerda, "An Empirical Analysis of Useful Financial Ratios," *Financial Management* 10 (Spring 1981): 51-60.

[21] M. Hamer, "Failure Prediction: Sensitivity of Classification Accuracy to Alternative Statistical Methods and Variable Sets," *Journal of Accounting and Public Policy* 2 (1983): 289-307.

statistical sense.[22] Pinches reduced many variables to seven factors similar to the factors of Chen and Shimerda and those used by other researchers.[23] The Pinches factors were used by Platt and Platt, and it is this model that is applied to water utilities in this study.[24] The Pinches factors are: return on investment, capital turnover, leverage, liquidity, cash position, inventory turnover, and receivables turnover. These factors were used by Zavgren in a series of combinations that led her to find three key sets of ratios to be successful predictors of corporate bankruptcy: financial leverage, asset turnover, and liquidity (the best short-term predictor of failure).[25] In an important study, Hamer used four variable "sets" that she derived from several major studies including that by Altman.[26] Each set of variables measured profitability, liquidity, and leverage. For each of the five years studied she found no significant differences in classification results using any set.

Many if not most of the prediction models found in the literature have used quite similar key financial ratios in their construction. In banking studies similar variables also appear consistently as predictors of failure, although some banking related variables are industry specific and have no counterpart in nonbank firms. An example is the loan/deposit ratio, which is commonly used in banking studies. While banking related ratios are somewhat unique the words of Demirguc-Kunt are a useful summary: "all authors find capital adequacy (C), generally proxied by the book value of net worth, to be significant. . . . In addition, earnings (E), usually a

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[22] Chen and Shimerda, "An Empirical Analysis of Useful Financial Ratios," 51-60.

[23] G. Pinches, K. Mingo and J. Caruthers, "The Stability of Financial Patterns in Industrial Organizations," *Journal of Finance* 28 (May 1973): 389-396; Chen and Shimerda, "An Empirical Analysis of Useful Financial Ratios," 51-60.

[24] Platt and Platt, "Development of a Class of Stable Predictive Variables: The Case of Bankruptcy Prediction," 31-51.

[25] C. Zavgren, "The Prediction of Corporate Failure: The State of the Art," *Journal of Accounting Literature* 2 (1983): 1-37.

[26] Hamer, "Failure Prediction: Sensitivity of Classification Accuracy to Alternative Statistical Methods and Variable Sets," 269-291; Altman, "Financial Ratios, Discriminate Analysis and the Prediction of Corporate Bankruptcy," 589-609.

measure of net income, are a significant indicator of financial condition."[27] Capital adequacy, though not specifically used in the models below, is reflected in the cumulative profitability variables and essentially affects retained earnings, one of the variables found in many nonbank models.

Application of the Available Models to Water Utilities

The finance literature clearly emphasizes the idea that a few key financial ratios can be used to predict bankruptcy and distress. The comparability of key variables is illustrated in table 6-1. To further illustrate this reality the Altman 1968 model, the most widely discussed model in financial textbooks, and the Platt and Platt model are applied below using water utility data. Water companies are unique in many ways and therefore no published model fits them perfectly. But the key ratios developed from the literature help identify several that can legitimately be used to detect weak water systems.

Because water systems have similarities both to banking and nonbanking firms the bankruptcy and early warning models can be used to identify variables and ratios applicable to the water sector. None of these models is perfectly adaptable to water systems. Most make use of financial variables and techniques suggestive of what utility regulators could do relatively easily and inexpensively to develop water-industry-specific prediction models. A set of key financial ratios has been successfully used in this line of research and they can be used simply and quickly to detect weaknesses in water systems.

Two failure models that are commercially available, the Altman model and the Platt and Platt model, are applied to water utility data in appendix G. The 1968 Altman model, referred to as the *Z-Score Model,* was updated and slightly changed in 1977. It is referred to as the *Zeta* model and sold by Dr. Altman's firm. The 1968 and 1977 models are similar and the prediction accuracy equally good.[28] The coefficients for the 1977 model only are available to client users so the 1968 version is used. The fact that the Platts obtained a copyright for their model also indicates the increasingly important commercial market for these models.

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27 Demirguc-Kunt, "Deposit-Institution Failures": A Review of Empirical Literature," 14.

28 Altman, *Corporate Financial Distress.*

TABLE 6-1

COMPARISON OF KEY FINANCIAL RATIOS USED IN FINANCIAL DISTRESS MODELS

Variable	Altman Model	Platt and Platt Model
Profitability	Operating income / Total assets	Cash flow / Sales
Leverage	Market value equity / Book value debt	Total debt / Total assets
Liquidity	Current assets / Current liabilities	Net fixed assets / Total assets
Profit trend	Retained earnings / Total assets	Sales growth / Industry growth

Source: Edward Altman, "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy," *Journal of Finance* 23 (September 1968): 589-609; Edward Altman, Robert Haldeman and P. Narayanan, "ZETA Analysis: A New Model to Identify Bankruptcy Risk of Corporations," *Journal of Banking and Finance* 1 (June 1977): 29-54; and Harlan D. Platt and Marjorie Platt, "Development of a Class of Stable Predictive Variables: The Case of Bankruptcy Prediction," *Journal of Business, Finance and Accounting* 17 (Spring 1990): 31-51.

As mentioned, water companies are different from the types of firms that were used to derive these models. In fact, both models were empirically estimated from a sample of bankrupt firms called the in-sample group, and then replicated with another group of failed firms called the out-of-sample group. When applied to an out-of-sample group the models classified them as bankrupt or nonbankrupt very accurately. These are among only a few prediction models that have been replicated, which improves confidence in the reliability of models according to most researchers.[29] Unfortunately, none of the in-sample or out-of-sample companies were utility companies.

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29 Platt and Platt, "Development of a Class of Stable Predictive Variables: The Case of Bankruptcy Prediction," 31-51.

The models performed poorly in terms of measuring financial distress of water utilities, as expected. The reason for the poor showing for both the Altman and Platt and Platt models is simply that utilities are too different for these models to be applied in their current form. However, an important aspect of the Platt and Platt model is the role that industry-specific factors play on firms and their potential for bankruptcy. Industry sales growth and industry output significantly affect firm bankruptcy in this model. Sales growth can be a key determinant of the viability of newly certified water utilities. However, for many distressed systems overall water sales and water sales per capita are not growing so industry-relative factors can severely affect water company profits, especially newly certified water company profits. The ratios used in the model developed below are industry-relative for that reason.

The application of the Altman and Platt and Platt models confirms again that a few key ratios similar to the sets used by other researchers can easily be used in the analysis of financial distress. The development of a model specifically designed to measure distress for water utilities clearly is justified.

NRRI Distress Classification Model for Water Utilities

Although commercially available failure prediction models are not readily applicable to regulated water utilities, they do shed light on the key ratios that are consistently good failure predictors in a variety of models. A first step in identifying weak water companies as early as possible is to calculate several key financial ratios, such as those used in commercially available prediction models.

The method proposed here follows previous NRRI research on this issue.[30] Table 6-2 presents the key financial ratios chosen for the analysis. The ratios measure profitability (X1 and X7), liquidity (X2), leverage (X3, X8, and X10), profitability trend (X4), growth (X5), and efficiency (X6). The first seven are expected to vary inversely (negatively) with financial distress, while the last three are expected to vary positively. These ten ratios, standard in that they commonly are part of the variable sets referred to throughout the previous discussion, were calculated for two groups of companies: the fifteen strongest and the fifteen

[30] Patrick C. Mann, G. Richard Dreese, and Miriam A. Tucker, *Commission Regulation of Small Water Utilities: Mergers and Acquisitions* (Columbus, OH: The National Regulatory Research Institute, 1986).

TABLE 6-2
KEY FINANCIAL RATIOS USED IN ASSESSING FINANCIAL DISTRESS

Ratio	Measure	Definition	Relation to Failure
X1	Profitability	Cash flow/sales	-
X2	Liquidity	Current assets/current liabilities	-
X3	Leverage	Book common equity/total assets	-
X4	Profitability trend	Retained earnings/common equity	-
X5	Growth and efficiency	Sales/total assets	-
X6	Efficiency and profit	Operating revenues/operating expenses	-
X7	Profitability	Net income/sales	-
X8	Leverage	Total debt/total assets	+
X9	Liquidity	Net fixed assets/total assets	+
X10	Leverage	Current liabilities/total debt	+

Comparison with Other Models		Platt & Platt	Altman
X1	Profitability	X2	X2 & X3
X2	Liquidity	X3	X1
X3	Leverage	X4	X4
X4	Profitability trend	X2	X2
X5	Growth and efficiency	X1	X5
X6	Efficiency and profit	X2	X2 & X3
X7	Profitability	X2	X2 & X3
X8	Leverage	X4	X4
X9	Liquidity	X3	X1
X10	Leverage	X5	X4

Comparison of NAWC Firms		Viable Firms	Distressed Firms	Viable/ Distressed
X1	Profitability	0.258	0.095	2.71
X2	Liquidity	1.702	1.157	1.47
X3	Leverage	0.294	0.226	1.30
X4	Profitability trend	0.500	0.318	1.57
X5	Growth and efficiency	0.275	0.236	1.17
X6	Efficiency and profit	1.321	1.121	1.18
X7	Profitability	0.175	-0.029	-6.03
X8	Leverage	0.699	0.754	0.93
X9	Liquidity	0.823	0.734	1.12
X10	Leverage	0.100	0.181	0.55

Source: Authors' construct.

weakest water utilities from the 1989 NAWC *Operating and Financial Data* based on their return on equity (ROE). For the strong firms, ROE averaged 15.4 percent and for the weak firms, it averaged -3.7 percent.[31] It is clear that the ratios in table 6-2 are quite different between the two groups of water companies. Ratios X7 and X1, both of which measure profitability, show the greatest relative difference in the table.

As also seen in table 6-2, the ten ratios are similar to those used by Altman and by Platt and Platt. The ratios may be slightly different in construction but they essentially measure the same thing financially. For example, ratio X7 (net income/sales) is a simpler ratio that can be substituted for ratio X1 (cash flow/sales). Cash flow/sales is the most common ratio found in prediction models and is a standards and broad measure of financial health for cash generating companies. Net income/sales is an absolute and narrow measure of distress and can always be used as a preliminary distress test. Cash flow (measured by net income plus depreciation, which are the two primary sources of funds in a cash flow statement) assigns an important role to depreciation. Depreciation must be added to determine cash flow since it is deducted originally to calculate net income. Finally, a firm can be considered bankrupt when total liabilities exceed assets and the firm's equity cushion is negative. For water systems, these unfortunate conditions are too often present.

Developing the Classification Scheme

As noted, the first seven of the financial ratios presented are inversely related to financial distress, that is, the higher the ratio the lower the probability of distress. For simplicity, and because of the redundance in the variables, values of the seven inversely related ratios can be added together to comprise a distress score. This is illustrated in table 6-3 for a viable and a distressed water system.

Interpreting these findings requires a classification model using data for comparable firms. Again using the NAWC data, the sum of the seven ratios for the fifteen strong firms was 4.50 (with a standard deviation of .99); for the fifteen weak firms, the sum was 3.10. A statistical probability function as illustrated by

[31] Many of the strong firms were also strong in 1985 and many of the weak firms were weak in 1985. In fact, for the strong firms, ratios were nearly identical for the years compared (1985, 1989, and 1990).

TABLE 6-3
DISTRESS CLASSIFICATION MODEL WITH ILLUSTRATIVE DATA

	Viable System*		Distressed System*	
Ratio X1: Profitability				
Net income + depreciation / Annual operating revenues	$3.3 + 1.3 / 22.9	= .200	$.240 + 1.6 / 14.3	= .129
Ratio X2: Liquidity				
Current assets / Current liabilities	5.8 / 3.7	= 1.570	3.1 / 5.1	= .607
Ratio X3: Leverage				
Common stock equity / Total assets	16.9 / 51.8	= .326	11.1 / 65.3	= .170
Ratio X4: Profit Trend				
Retained earnings / Common stock equity	11.1 / 16.9	= .657	5.0 / 11.1	= .450
Ratio X5: Growth and Efficiency				
Annual operating revenues / Total assets	22.9 / 51.8	= .442	14.3 / 65.3	= .219
Ratio X6: Efficiency and Profitability				
Annual operating revenues / Annual operating expenses	22.9 / 18.7	= 1.220	14.3 / 12.0	= 1.190
Ratio X7: Profitability				
Net income / Annual operating revenues	3.3 / 22.9	= .144	.240 / 14.3	= .017
Distress Score (sum of the ratios)		= 4.56		= 2.78

* Dollar values are in millions.

the normal curve in figure 6-1, shows that 82 percent of all NAWC water companies would have values between 3.0 and 6.0 in 1989, using 1.5 standard deviations in each direction. Water companies with values below 3.0 could be considered "distressed" those at 4.5 and above "viable." Using similar logic, those firms with values between 3.0 and 4.5 can be considered "weak" or "marginal."[32]

This technique provides a simple and practical means of classifying water systems. Although not necessarily complete and somewhat limited from a statistical viewpoint, it can provide regulators with a basic tool that may be preferred to no method at all or some purely subjective approach. Moreover, ratio analysis is the most common, simple, and widely used of all financial analysis techniques. The use of the classification model is strengthened by the fact that the total of the seven ratios for the weak firms is 3.1, a figure close to the 3.0 that results under the normal curve discussed above.

Thus, a generalized evaluation system can be developed using these results, whereby water systems can be classified as follows:

If the distress score is:	The system can be classified as:
4.0 or more	Good to excellent
3.0 to 3.99	Weak to marginal
3.0 or less	Distressed

Water companies with an overall distress score of 3.0 or below are likely to be in need of immediate attention. Companies with a distress score totaling more

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[32] Since the statistical technique is based on the fifteen "best" NAWC water companies, the classification system will find about 9 percent of the "best" companies distressed (that is, 9 percent of the normal curve in the left tail as shown in figure 7-1). The average value for the "worst" fifteen NAWC companies is approximately 3.1 so that about 50 percent of the "worst" companies (that is, 50 percent of the left side of the normal curve) will have values of 3.1 or lower. While there is an overlapping region of "best" and "worst" companies, the value used to classify the truly distressed companies, 3.0, will capture most of them (as various experiments with the model have shown, including the use of 1985 and 1990 data for the strongest and weakest companies in various combinations). The only way to avoid this statistical and classification overlap is to have more than three classification categories. To keep the model and its interpretation simple, three categories were selected for this analysis.

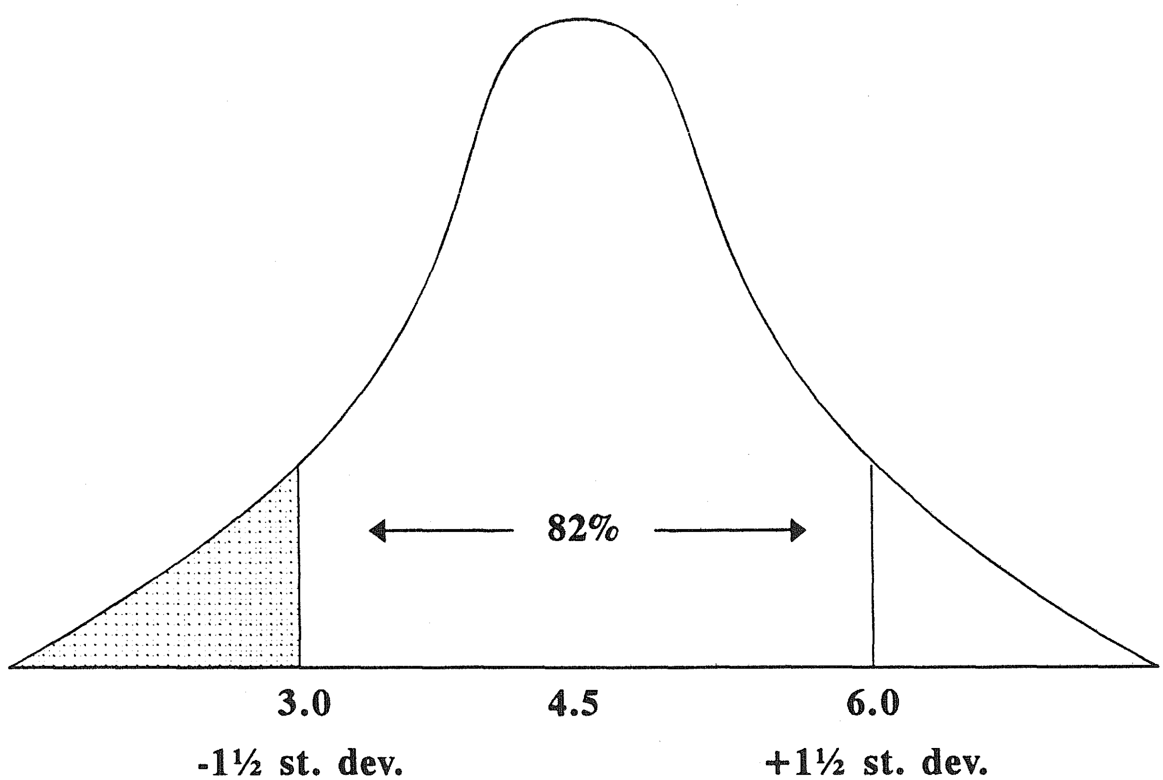

Fig. 6-1. Normal probability distribution (based on 15 "best" companies).

than 4.0 are likely to be in good condition. Those in between are weak or marginal depending on whether they are closer to 3.0 (weak) or 4.0 (good). Scores can be calculated for previous years to indicate the direction of distress. Some water companies have been distressed for years and are getting worse as the classification model will indicate.

The distress score approach was applied to the fifteen strong NAWC water companies and the fifteen weak ones as a check. Of the strong firms, ten were classified as "good," while five were classified as "marginal." Of the weak firms, two were classified as "good," five were classified as "marginal," and eight were found to be "distressed."

The model did not incorrectly rate any strong firm as distressed. Most weak firms were rated as weak or distressed. The high rating of two weak companies was due to an extremely high value for the indicator of liquidity (X2). This result occurred with two of the fifteen weak water companies in 1989 and in other simulations using data submitted by various commissions and of other randomly selected NAWC firms. In both cases the unusually high liquidity ratio was due to inordinately high accounts receivable or notes receivable. The high level of accounts receivable may in fact be a bad thing if they are old or uncollectible accounts, or note loans made by the firms or their owners that are uncollectible. After all, too much liquidity can be as harmful as too little. An example is when a firm has all of its investments in cash. In one of the two companies where the unusually high liquidity ratio was adjusted downward to a normal 1.5, the high rating of the weak firm disappeared.[33] The other firm had a strong earnings position and a strong liquidity position and is not really distressed, though its return on equity happened to be low in 1989.

Of the forty-five strong and weak firms used in the study (fifteen of each group for the years 1985, 1989, and 1990), the range of return on equity (ROE for 1989) was much greater than for the other years. That is why 1989 was chosen as the preferred model year. In applying the model to the forty-five best companies for the three years, only two of the forty-five were classified as distressed. In both cases, the ROE was not especially low and the companies had strong liquidity and earnings positions, and their operating efficiency (X6) was quite good. It would

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[33] In deriving the model, the liquidity ratio (X2), was constrained to 3.0 for firms that exceeded 3.0 (three firms). The average liquidity ratio in the model is 1.70, which is close to the normal 1.5 used here.

not be appropriate to consider them financially distressed. This result indicates that the model cannot be interpreted automatically without attention to the individual ratios driving the results, particularly with respect to firms that show a healthy earnings trend and a strong equity cushion.

Application of the Model

Commission staff in three states provided financial data for selected small systems to test the proposed methodology. For reasons of confidentiality, the states are identified as A, B, and C and the individual jurisdictional water companies as One and Two. In the judgment of staff members, the utilities in states A and B all could be considered distressed; for state C one utility was considered distressed and one was considered viable. The data are for 1988 and 1989 and the results of the analysis are presented in table 6-4.

The seven-ratio classification technique appeared to work well. An exception was the need to adjust the liquidity ratio to the normal 1.5 for two systems, a problem discussed above. It was found that all of the systems, with the exception of the one from state C, were severely distressed from a financial standpoint. These distressed systems would probably file for bankruptcy protection in the nonregulated world; indeed, creditors would force them to do so.

Another test of the model is presented in table 6-5. Examined here are thirty-five water systems under one state's jurisdiction using data for 1990. The analysis reveals the disconcerting reality of widespread financial distress in the water utility industry. Using the distress classification scheme, only eleven systems could be considered in good to excellent financial health, while another four are marginal. Twenty systems could be classified as distressed and thirteen of these are technically bankrupt, based on the bankruptcy criteria described above. For illustrative purposes, financial data for one of the technically bankrupt firms appears in table 6-6.

In general, the distress classification model developed here should consistently identify water utilities that are currently distressed and in need of attention by regulators. The technique is similar to what could be accomplished in a statistically and empirically derived model such as the Altman or Platt and Platt models. The technique presented here is simpler and reasonably accurate for regulatory needs. The method seldom misclassifies strong companies as distressed (only two of

TABLE 6-4
VARIATIONS IN DISTRESS CLASSIFICATION SCORES

Company One	1988	1989	Company Two	1988	1989
State A					
X1	.160	.406	X1	.036	.024
X2	.726	.028	X2	.872	.973
X3	.133	-.009	X3	.072	.023
X4	-1.010	-1.040	X4	-.845	-4.440
X5	.709	.191	X5	.728	.741
X6	1.330	1.160	X6	.950	.932
X7	-.155	.076	X7	-.073	-.099
Distress Score	1.930	.808	Distress Score	1.740	-1.840
Classification: Distressed			Classification: Distressed		
State B					
X1	.083	-.045	X1	-.296	-.371
X2	7.640*	1.930	X2	-.028	-.007
X3	-.226	-.278	X3	-.093	-.222
X4	-1.030	-1.026	X4	-10.310	-4.880
X5	.157	.162	X5	1.740	.162
X6	.881	.788	X6	.768	.745
X7	-.135	-.268	X7	-.323	-.401
Distress Score	1.23	1.26	Distress Score	-8.54	-4.97
Classification: Distressed			Classification: Distressed		
State C					
X1	.014	.087	X1	na	.438
X2	.141	.141	X2	na	14.360*
X3	-.293	-.262	X3	na	.738
X4	-4.125	-4.950	X4	na	.244
X5	2.350	2.486	X5	na	.287
X6	1.093	1.192	X6	na	1.970
X7	-.049	.025	X7	na	.315
Distress Score	-.87	-1.281	Distress Score	na	5.49
Classification: Distressed			Classification: Good to Excellent		

Source: Calculated from data provided by state commissions. The identity of the companies is not revealed for confidentiality purposes.

* Liquidity ratio adjusted to normal 1.5.

TABLE 6-5
DISTRESS SCORES FOR ONE STATE'S WATER UTILITIES, 1990

	Number of Water Systems	
Good to excellent (4.0 or over)	11 (31%)	
Weak to marginal (3.0 to 3.99)	4 (11%)	
Distressed (3.0 or below)	20 (57%)	
Bankrupt (assets < liabilities)		13 (37%)
Total	**35 (100%)**	

Source: Analysis of water system annual reports.

TABLE 6-6
DISTRESS ANALYSIS OF A TECHNICALLY BANKRUPT WATER SYSTEM

Financial Indicator	Data	Calculation of Key Financial Ratios
Operating revenue	16.5	X1 = 0.024
Depreciation (book)	2.9	X2 = 1.500
Total operating expenses	19.4	X3 = -0.315
Net income	-2.5	X4 = -1.024
Total current assets	3.9	X5 = 0.178
Total assets	92.5	X6 = 0.851
Total current liabilities	0.8	X7 = -0.152
Total liabilities	121.0	
Retained earnings	-29.8	Total = 1.063
Total common equity	-29.1	
Total preferred equity	0.0	
Total equity	-29.1	
Total liabilities and equity	91.8	

Source: Analysis of one water system's annual report.

forty-five), but more importantly it appears consistently to identify truly weak and distressed water companies. At the very least, the analysis provides an objective initial indication of financial viability. The method can be readily performed using a computer spreadsheet program.

An important aspect of this technique is that it can be adapted to the particular needs and interests of the analysts. It is possible to construct a classification model, for example, based on a fewer number of ratios. If desirable, the ratios could be weighted to reflect the differential importance assigned to particular variables. All ten ratios could be used, as long as the analyst corrects for the fact that some ratios are positively related to failure, while those used in the model above are all inversely related to failure. Although the model developed here is considered generally valid, it may be possible to construct a classification scheme based on a different set of water systems. The referent group of water systems could be based on geographic considerations (such as all systems within a state or region), utility ownership (such as all investor-owned, municipality-owned, or cooperative systems), or some other criterion. Modifying the model in these ways, however, requires the analyst to recalculate the ranges used to define viable as opposed to distressed systems. In general, the resulting classification scheme would not be dramatically different.

Analyst judgment becomes essential when values for individual ratios fall outside of expected bounds. When this occurs, it is important to check for errors, identify the cause of the deviation, and determine whether it is a temporary anomaly or long term condition. An "off year" in sales, for example, can produce ratios affecting the entire classification system. A series of "off years" should trigger further investigation. In some cases, as long as the procedure is justified and well documented, it may be desirable to substitute normal values for statistically deviant ones.

In the regulated world, the finding of distress might trigger some other action to try to put an end to the system's persistent financial troubles. For many distressed systems, one or two financial ratios will identify the most serious problem areas. Knowing these problem ratios, specific problem areas can be identified, as illustrated in table 6-7. Rate relief may be the solution in some cases but not necessarily in others where, for example, an infusion of equity would improve the financial picture. For systems where most or all of the seven individual ratios signal distress, more drastic solutions are worth considering,

TABLE 6-7

POTENTIAL PROBLEM AREAS RELATED TO FINANCIAL DISTRESS FOR WATER UTILITIES

Ratio	Measurement	Potential Problem Areas
Profitability (X1)	Net income + depreciation / Annual operating revenues	· Rate adequacy · Depreciation rates · Sales trends · Expenses · Financial planning · Management capability
Liquidity (X2)	Current assets / Current liabilities	· Liabilities · Capitalization · Financial planning
Leverage (X3)	Common stock equity / Total assets	· Equity needs · Interest coverage ratios · Indebtedness
Profitability Trend (X4)	Retained earnings / Common stock equity	· Equity needs · Sales trends
Growth and Efficiency (X5)	Annual operating revenues / Total assets	· Rate adequacy · Asset turnovers · Sales trends
Efficiency and Profitability (X6)	Annual operating revenues / Annual operating expenses	· Sales trends · Rate adequacy · Financial planning · Management capability
Profitability (X7)	Net income / Annual operating revenues	· Rate adequacy · Sales trends · Financial planning · Management capability

Source: Authors' construct.

including the termination of the system's certificate and other means to force a merger, acquisition, or other structural alternatives. In the long term, persistent financial distress cannot be ignored.

It should be noted that the "best" companies in each year analyzed typically experienced an increase in their customer base (that is, economic growth). A significant number of these firms also received rate increases during the current or previous year, meaning their financial health was not affected by regulatory lag (that is, a delay in the recovery of costs or the inclusion of investments in the rate base). Absent economic growth, rate relief (assuming it is cost-based) is essential for the survival of distressed water companies.

One of the goals of this study was to develop a procedure or analytical technique that commissions could use when certifying new water companies to prevent their subsequent failure. At birth, key ratios do not exist for firms nor for newly certified water companies or newly chartered banks. However, it still makes sense to consider applying the distress classification method or a similar methodology to new systems during the certification process. In other words, new systems could be required to present projected financial ratios for the system's first year of operation, validated by data supporting the system's initial financial and rate structures. Because these projections are only best guesses, regulators must judge their reasonableness as well as rely heavily on judgments about capital adequacy, management experience, demographics of the service territory, and other factors. Trends in the actual ratios for new firms, particularly the profitability trends, could be monitored. Monitoring is especially important during the utility's early years of existence so that remedial measures can be taken if necessary.

There is no way to predict with certainty success or failure of a water system or of any new firm. Still, failure is guaranteed for many new small water systems since the ingredients for success are frequently absent: namely economic growth and management expertise. Operating margins shrink, earnings deteriorate, and the endless cycle of rate increases and negative net worth continues. Hard choices must be made in rejecting new applications for water utility certificates and finding a municipal or other nearby water delivery system for the home owners. The onus should be placed on developers to find alternate water supplies as some states are attempting to do. Otherwise proliferation will continue to be a threat and the failure of many small new water utilities will be predictable even without a model.

Another important application of the distress classification methodology is in evaluating structural alternatives for existing water systems, both those under distress and those that might be required to assume responsibility for water service under mandatory takeovers or other circumstances. As discussed in chapter 4, mergers, acquisition, satellite management, and other options for existing systems can be evaluated according to how they pass the least-cost, no-losers, and viability tests. Distress classification provides a means of assessing viability by comparing the current financial condition of systems with the expected outcome of a structural change. Ideally, for example, two weak utilities or a weak and a strong utility can be combined to make a stronger utility. However, if a prospective structural change is not likely to improve distress scores, its implementation should be reevaluated and either modified or abandoned in favor of an alternative that will result in measurable improvement in the well-being of the water utility or utilities involved.

CHAPTER 7

FUTURE DIRECTIONS

Signs of change for the water industry, and especially for its small systems component, can be seen. In many ways, this study has attempted to hit a moving target, as some significant water system viability policies have been adopted as recently as early 1992. The states clearly have found ways to address the serious problems of small water systems. Continued experimentation in this area is needed along with monitoring to assess the effectiveness of various policy alternatives. In addition to policy directions, several potential research directions also are identifiable.

Policy Directions

Following the basic framework that has guided this investigation, another representation of the institutional dimensions of viability--regulatory, structural, and comprehensive--appears in table 7-1. As shown, these viability dimensions vary in terms of the principal timeframe, tools, and goals involved in their application. In general, comprehensive solutions are of a long-term nature compared with the shorter timeframe required to implement regulatory solutions or the intermediate period needed to implement structural solutions. For each institutional dimension the principal tools also are somewhat different. The principal viability tool from a regulatory standpoint seems to be the certification process for emerging water systems, while the principal tool from a structural standpoint appears to be the consolidation of existing systems. Planning is the principal tool in more comprehensive policies.

In terms of principal goals, regulatory policies such as strengthened certification processes emphasize improving system *performance* along technical, financial, and managerial dimensions. Structural policies such as mergers and acquisitions go further in emphasizing *efficiency*. Economies of scale achievable through structural policies may be the most important financial resource available to the water supply industry as a whole. Finally, comprehensive policies, such as

TABLE 7-1

INSTITUTIONAL DIMENSIONS OF VIABILITY

Dimension	Principal TimeFrame	Principal Tools	Principal Goals
Regulatory	Short term	Certification	Performance
Structural	Intermediate term	Consolidation	Efficiency
Comprehensive	Long term	Planning	Viability

Source: Authors' construct.

integrated resource planning, emphasize the long-term goal of a more *viable* water-supply industry. These dimensions should be regarded as cumulative, such that the comprehensive strategies follow an accumulation of regulatory and structural strategies. Comprehensive policies are most complex in terms of implementation but also are expected to be most effective in the long term.

Clearly, the state regulatory process can go a long way to improve water system performance. The first step, certification, is the most important one in screening water system using viability criteria. The better the certification process for emerging systems, the fewer the problems once they have emerged. Thus establishing performance standards for emerging systems is critical for an overall state viability policy.

Beyond certification, regulatory oversight through monitoring and rate reviews can be used to improve the viability of some, but certainly not all, regulated firms. Next in the process the commission can consider consolidation strategies, such as mergers and acquisitions. Direct supervision and decertification become last resorts. Most experts agree, however, that even dedicated implementation of this regulatory model is not likely to result in 100 percent viability. As one expert has remarked, "All roads lead to restructuring."[1]

The states are beginning to exert more authority in restructuring the water supply industry. Most emerging water systems now must bear the burden of proof that structural alternatives to their creation are not feasible. Some policies go further in asserting that the absence of a structural alternative is not reason enough to obtain a certificate of convenience and necessity. A nonviable water system is not preferable to no water system at all. Long-term restructuring of the water supply industry can occur with the accumulation of newer and better knowledge. It depends on knowing the full range of structural alternatives and the institutional barriers to restructuring that might get in the way. Ultimately it may depend on the capability of the states to devise regulatory policy incentives (or remove disincentives) that make restructuring possible while protecting ratepayers and assuring they get their fair share of any economies.

Comprehensive policies take a global and long-term view, incorporating regulatory and structural policies along the way. One of the key instruments here is integrated water resource planning, broadly defined to encompass institutional planning processes such as those conducted by state governments. Integration among regulatory agencies is important as are least-cost planning principles in guiding decisions about the industry's future. Some recent policy developments seem to embrace a more comprehensive perspective and thus provide a framework for regulatory and structural policy alternatives as well. One could argue, for example, that true least-cost solutions to future water supply issues can be discovered only through a comprehensive approach that takes account of the full range of options, including alternative structures for providing them. For many communities, it may be impossible for small systems to meet least-cost and other planning criteria.

Based on these observations, a general typology of institutional policy alternatives for improving the viability of both emerging and existing water systems appears in table 7-2. As a matter of state policy, the immediate priority might be regulatory solutions, followed soon after by structural policies, and then comprehensive policies. However, the earlier the investment in long-term solutions, the earlier the returns.

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[1] John E. Cromwell, III of Wade Miller Associates, Inc. at an EPA sponsored seminar in Colorado Springs, September 1991.

TABLE 7-2

A GENERAL TYPOLOGY OF INSTITUTIONAL POLICY ALTERNATIVES FOR IMPROVING WATER SYSTEM VIABILITY

	Emerging Systems	Existing Systems
Regulatory	Strengthen and improve use of the existing certification process and improve coordination among state agencies with certification authority	Improve the use of existing regulatory oversight processes, assistance, and simplification to improve water system performance
Structural	Explore and promote structural alternatives to the creation of new water systems in concert with local officials	Consider incentives to promote industry restructuring, especially consolidation, to create a more efficient water supply industry
Comprehensive	Integrate certification process with long-term water-resource and land-use planning for the states	Implement integrated water resource planning with an emphasis on creating a more viable water supply industry

Source: Authors' construct.

Several states now provide useful legislative policy models for viability policies. The evolution of Pennsylvania's viability policy is worth highlighting. House Bill No. 24 (Session of 1989) provided for acquisition adjustments in cases where acquisition costs are greater than depreciated original cost and spells out specific criteria for doing so. House Bill No. 26 (Session of 1991) provided for mandatory takeovers of small water utilities by a "capable public utility" after all other structural alternatives have been investigated. Finally, House Bill No. 1403 (Session of 1991) is the state's most comprehensive policy yet:

> AN ACT providing for the establishment, implementation and administration of the small water systems technical, financial and management assistance program; providing for technical, financial and management assistance for small water systems; providing for the small water systems regionalization grant program; providing for financial assistance for comprehensive small water systems regionalization studies; imposing additional duties on the Department of Environmental Resources; authorizing the indebtedness, with the approval of the electors, of an additional $350,000,000 for loans for the acquisition, repair, construction, reconstruction, rehabilitation, extension, expansion and improvement of water supply, storm water control and sewage treatment systems; and transferring an appropriation.[2]

How Pennsylvania and other states have gotten to where they are today also is instructive. At the federal level, the U.S. Environmental Protection Agency has invested considerable effort in encouraging the states to improve their viability policies. EPA reports and workshops have provided guidelines for the development of state action plans to ensure small water system viability.[3] They emphasize developing a mission statement and implementation objectives for the state and a description of needed authorities and administrative resources. They also recommend that state policies specifically address water supply planning, permitting and review; assistance to small systems; and certification and licensing.

Consultants to Pennsylvania, Wade Miller Associates, Inc., prepared a viability study which placed an emphasis on comprehensive approaches. Their draft viability policy for state, which can readily be adapted to most any state, appears in table 7-3. The policy consists of five basic elements: control of new system development, coordination of authorities, improvements in assistance programs, development of a safety net program, and public education.

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2 *Pennsylvania House Bill No. 1403* (Session of 1991, passed March 16, 1992).

3 U.S. Environmental Protection Agency, *Establishing Programs to Resolve Small Drinking Water System Viability: A Summary of the Federal/State Workshop* (Washington, DC: U.S. Environmental Protection Agency, 1991).

TABLE 7-3

DRAFT VIABILITY POLICY STATEMENT FOR PENNSYLVANIA

A. Control the development of new nonviable systems by encouraging:

- A business plan for finances, management and operations.
- Performance guarantees.
- Annual financial reporting.
- Alternatives to stand-alone systems, such as interconnections, regionalization, mergers, etc.

B. Coordinate water supply planning by encouraging the use of existing municipal statutory authority at county, regional, and local levels to:

- Assure adequate customer base and financial compatibility.
- Encourage water system interconnections and water system compatibility.
- Enforce minimum standards for adequate yield, storage supply, and facility needs.
- Assure coordination planning and permitting activities.
- Foster wellhead protection, financial assurances, land-use planning and zoning to minimize water quality impacts and user costs.

C. Improve water supply regulatory and financial/technical assistance programs by:

- Developing a coordinated and consistent approach between DER and PUC to regulating community water systems and encouraging small system restructure.
- Focusing the financial/technical assistance efforts of agencies such as PENNVEST, DCA, Commerce, FmHA, and PRWA to promote consolidation, area-wide management and other restructuring schemes.
- Pursuing alternative mechanisms for state safe drinking water programs to provide sufficient resources to conduct effective regulatory control.
- Developing and adopting additional regulations and requirements to assure water system viability.

TABLE 7-3 (continued)

D. Develop a safety net program to deal with insolvent or abandoned water systems by:

- Structuring incentives for voluntary takeover by private entities.
- Utilizing existing statutes for municipal takeovers, bankruptcy, or receivership.

E. Provide a public education program for:

- Informing realtors, developers, investors and lending institutions about community water system viability issues.
- Enlightening the public about the problems with public water supply, the costs of providing an adequate supply of high-quality drinking water and the importance of a strong Safe Drinking Water Program in PA.
- Educating municipal officials about their authority under existing statutes to prevent proliferation.

Source: Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991), 10-4 to 10-5.

Besides this outline, the Pennsylvania consultants also identified specific steps the state can take to improve small water system viability, as summarized in table 7-4. These steps are organized into four areas: new system viability screening, existing system viability screening, comprehensive planning, and sympathetic initiatives of state government. The last category, of course, is likely to be especially controversial because it calls for rethinking some traditional regulatory processes. Yet the recent legislative activities in the state indicate a fairly significant commitment among policymakers to take this step.

As a whole, the experiences in Pennsylvania and other states provide a good basis for the diffusion of policy innovations. Ideally, the next few years will see further experimentation with and refinement of the small system viability policies emerging today.

TABLE 7-4

PROPOSED VIABILITY INITIATIVES FOR PENNSYLVANIA

New System Viability Screening

Initial Steps

- Implement cost analysis and alternatives analysis elements of the new system screening process on an interim, voluntary basis.
- Modify DER regulations to redefine the scope of the Engineers Report to require expanded cost and alternatives analyses.
- Establish a permitting and certification work group to begin to develop coordination protocols between new system approval processes.

Ultimate Steps

- Convene a legal and policy review work group to draft legislative proposals to support full implementation of the new system viability screening process.

Existing System Viability Screening

Initial Steps

- Convene an interagency work group to assess the proposal to adapt the PENNVEST application process as a viability screening mechanisms.
- Specify the details for the business plan requirement for existing systems and evaluate the mechanics of integrating the business plan requirement with the PENNVEST application process.

Ultimate Steps

- Implement the business plan requirement as a component of the PENNVEST application process, accompanied by a Management Assistance Program for Small Systems.
- Assess prospects for utilizing currently available annual financial reports as a third-tier viability screen.

TABLE 7-4 (continued)

Compreh/e Planning

Initial ste

- Donstrate and refine the planning process
- ucture DER, PUC, and PENNVEST Viability Policy Statements to provide :entives to comprehensive water supply planning.

Ultiʼte steps

- Draft a legislative proposal for a statewide planning mandate at the county level, including provision for funding and technical assistance, following the model of stormwater management law.

Sympathetic Initiatives of State Government

Initial Steps

- Develop individual viability policy statements for DER, PENNVEST, and the PUC as well as an umbrella policy statement defining the continuing functions of the interagency viability steering committee.
- Evaluate the potential for sympathetic modification in the DER Water Allocation Permit process.
- Evaluate the potential for sympathetic modifications in PUC regulation of rates and finances.
- Evaluate the potential to implement a coordinated state initiative to promote contract O&M for small systems.
- Develop targeted public information campaigns to cover two groups: 1) homeowners, home buyers, mobile home park tenants, and the banking community; and 2) water system developers, owners, and managers.

Ultimate Steps

- Assess additional needs for takeover authority to provide a safety net for systems unable to attain viable status by other means.

Source: Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991), chapter 11.

APPENDIX A

1991 NRRI SURVEY ON WATER SYSTEM VIABILITY

TABLE A-1
JURISDICTIONAL WATER UTILITIES BY STATE, 1990

State Commission	Total Jurisdictional Utilities(a)	Total Investor-Owned Utilities(a)	Total Small Utilities(b)
Alabama	13	13	13
Alaska	65	21	22
Arizona	409	378	365
Arkansas	3	3	2
California	225	225	190
Colorado	5	5	5
Connecticut	61	61	52
Delaware	14	14	12
Florida	812*	357	339
Hawaii	11	11	11
Idaho	23	23	16
Illinois	55	55	41
Indiana	375	23	176
Iowa	1	1	0
Kansas	7	7	7
Kentucky	212	36	191
Louisiana	116	116	109
Maine	155	38	116
Maryland	28	28	23
Massachusetts	38	37	30
Michigan	21	1	20
Mississippi	144	71	109
Missouri	78	78	71
Montana	152	35	135
Nevada	23	23	20
New Hampshire	41	40	36
New Jersey	77	64	68
New Mexico	38	38	35
New York	2,677	317	303
North Carolina	1,485*	336	332
Ohio	35	35	25
Oklahoma	30	30	30
Oregon	6	6	4
Pennsylvania	336	269	184
Rhode Island	na	7	1

TABLE A-1 (continued)

State Commission	Total Jurisdictional Utilities(a)	Total Investor-Owned Utilities(a)	Total Small Utilities(b)
South Carolina	72	72	67
Tennessee	9	9	6
Texas	4,707	1,402	1,385
Utah	330	33	329
Vermont	80	80	80
Virginia	70	70	68
Washington	60	60	56
West Virginia	413	58	266
Wisconsin	558	12	385
Wyoming	16	16	16

Source: *1991 NRRI Survey of Commission Regulation of Water Systems.* Some numbers are approximations.

* Water systems

(a) Definitions may vary.
(b) Systems serving under 3,300 customers or 1,000 connections.

na = not applicable or not available.

TABLE A-2

JURISDICTIONAL WATER SYSTEMS WITH
NEGATIVE NET INCOME AND NEGATIVE NET WORTH, 1991

State Commission	Small Systems With Negative Net Income(a)	Small Systems With Negative Net Worth(b)	State Commission	Small Systems With Negative Net Income(a)	Small Systems With Negative Net Worth(b)
Alabama	6	6	New Hampshire	1	0
Alaska	7	0	New Jersey	25	28
Arizona	226	91	New Mexico	7	15
Arkansas	0	0	New York	na	na
California	25	0	North Carolina	na	na
Colorado	0	0	Ohio	10	11
Connecticut	10	9	Oklahoma	11	0
Delaware	5	0	Oregon	0	0
Florida	462	39	Pennsylvania	91	55
Hawaii	8	6	Rhode Island	na	na
Idaho	12	7	South Carolina	na	23
Illinois	22	9	Tennessee	4	3
Indiana	90	90	Texas	291	na
Iowa	na	na	Utah	60	15
Kansas	5	5	Vermont	50	0
Kentucky	95	2	Virginia	na	na
Louisiana	58	58	Washington	21	9
Maine	na	na	West Virginia	na	na
Maryland	18	7	Wisconsin	103	52
Massachusetts	17	6	Wyoming	7	0
Michigan	0	0			
Mississippi	45	25			
Missouri	0	0			
Montana	100	na			
Nevada	15	18			

Source: *1991 NRRI Survey on Commission Regulation of Water Systems.*

(a) Approximate number of small systems (under 3,300 customers or 1,000 connections) having a negative net income (losses) in two of the last three years.
(b) Approximate number of small systems (under 3,300 customers or 1,000 connections) having a negative net worth at the time of the survey.

TABLE A-3

CERTIFICATION OF WATER SYSTEMS, 1990

State Commission	Systems Requesting Certification	Systems Receiving Certification	State Commission	Systems Requesting Certification	Systems Receiving Certification
Alabama	3	3	New Hampshire	4	4
Alaska	0	0	New Jersey	0	1
Arizona	4	2	New Mexico	2	2
Arkansas	0	0	New York	48	15(c)
California	0	0	North Carolina	30	30
Colorado	0	0	Ohio	3	1
Connecticut	15-20(a)	15-20(a)	Oklahoma	(b)	(b)
Delaware	1	1	Oregon	(b)	(b)
Florida	16	15	Pennsylvania	6	5
Hawaii	1	1	Rhode Island	na	na
Idaho	1	2	South Carolina	4	4
Illinois	0	0	Tennessee	2	1
Indiana	0	0	Texas	54	54
Iowa	(b)	(b)	Utah	0	0
Kansas	0	0	Vermont	0	0
Kentucky	0	0	Virginia	4	4
Louisiana	8	7	Washington	3	3
Maine	0	0	West Virginia	72	73
Maryland	1	1	Wisconsin	1	1
Massachusetts	0	na	Wyoming	0	0
Michigan	1	1			
Mississippi	3	3			
Missouri	5	4			
Montana	0	0			
Nevada	1	1			

Source: *1991 NRRI Survey on Commission Regulation of Water Systems.* Systems requesting certification and systems receiving certification may not be comparable because of cases carried over from one year to the next. Some numbers are approximations.

(a) Certification process for small water systems that are not regulated water companies. These systems serve over 25 individuals or have 25 service connections.
(b) The commission or board has no certification authority.
(c) One certification request was not approved and 32 were pending at the time of the survey.

TABLE A-4

STATE CONSIDERATION OF WATER SYSTEM VIABILITY

State Commission	Addressed by Statute (a)	Considered in Certification (b)	Interagency Coordination (c)	Viability Defined (d)
Alabama	no	yes	yes	no
Alaska	no	yes	yes	no
Arizona	no	yes	yes	no
Arkansas	no	yes	na	no
California	yes	yes	yes	yes
Colorado	no	yes	no	no
Connecticut	yes	yes	yes	yes
Delaware	no	yes	yes	no
Florida	no(e)	yes	yes	yes
Hawaii	no	yes	yes	no
Idaho	no	yes	yes	no
Illinois	no	yes	yes	yes
Indiana	no	no	no	no
Iowa(f)	na	na	na	na
Kansas	no	yes	no	yes
Kentucky	no	yes	yes	no
Louisiana	no	no	yes	no
Maine	no	yes	no	no
Maryland	no	yes	yes	no
Massachusetts	no	no(g)	no(h)	yes(i)
Michigan	no	yes	yes	yes
Mississippi	no	yes	yes	no
Missouri	no	yes	yes	no
Montana	no	no	no	no
Nevada	no	no	no	no
New Hampshire	no	yes	yes	yes
New Jersey	yes	yes	yes	no
New Mexico	no	yes	yes	yes
New York	no	yes	yes	no
North Carolina	yes	yes	yes	no
Ohio	no	yes	yes	no
Oklahoma	no	(f)	(f)	no
Oregon	no	(f)	(f)	no
Pennsylvania	no	yes	yes	no
Rhode Island	no	yes	na	no

TABLE A-4 (continued)

State Commission	Addressed by Statute (a)	Considered in Certification (b)	Interagency Coordination (c)	Viability Defined (d)
South Carolina	no	yes	yes	no
Tennessee	no	yes	yes	yes
Texas	yes	yes	yes	no
Utah	no	yes	yes	yes
Vermont	no	yes	yes	no
Virginia	no	yes	yes	no
Washington	yes	no	no	no
West Virginia	no	yes	yes	no
Wisconsin	no	yes	yes	yes
Wyoming	yes	yes	yes	no

Source: *1991 NRRI Survey of Commission Regulation of Water Systems.*

(a) State statute addressing viability of small water systems
(b) Commission considers financial viability in the certification process.
(c) Certification of new systems is coordinated with the state drinking water administrator (e.g., Environmental Protection or Health Agency).
(d) Commission has defined a nonviable water system.
(e) A state statute addresses wastewater system viability. Commission rules address water system viability.
(f) The commission or board has no certification authority.
(g) Department of Environmental Protection regulations require examination of viability.
(h) Informal arrangement exists between the Department of Public Utilities and the Department of Environmental Protection; at the time of the survey, this procedure was about to be formalized.
(i) Defined in the Department of Environmental Protection legislation.

na = not applicable or not available.

TABLE A-5

COMMISSION USE OF CERTIFICATION TO ASSURE VIABILITY

State Commission	Stronger Process (a)	Certificates Denied (b)	State Commission	Stronger Process (a)	Certificates Denied (b)
Alabama	no	no	New Hampshire	yes	no
Alaska	no	no	New Jersey	no	yes
Arizona	yes	yes	New Mexico	no	no
Arkansas	no	no	New York	no	no
California	yes	yes	North Carolina	yes	no
Colorado	no	no	Ohio	no	no
Connecticut	yes	yes	Oklahoma	(c)	(c)
Delaware	yes	no	Oregon	(c)	(c)
Florida	yes	yes	Pennsylvania	no	no
Hawaii	no	no	Rhode Island	yes	no
Idaho	yes	no	South Carolina	yes	no
Illinois	no	no	Tennessee	yes	no
Indiana	no	no	Texas	yes	no
Iowa	(c)	(c)	Utah	yes	no
Kansas	no	no	Vermont	yes	no
Kentucky	no	no	Virginia	yes	yes
Louisiana	no	no	Washington	no	no
Maine	no	no	West Virginia	no	yes
Maryland	yes	no	Wisconsin	no	no
Massachusetts	no	no	Wyoming	yes	yes
Michigan	no	no			
Mississippi	no	no			
Missouri	no	no			
Montana	no	no			
Nevada	yes	no			

Source: *1991 NRRI Survey on Commission Regulation of Water Systems.*

(a) States that have strengthened certification to help ensure water system viability.
(b) States that have denied certification on the basis of the viability issue.
(c) The commission or board has no certification authority.

TABLE A-6
MERGERS, ACQUISITIONS, AND CESSATION OF WATER SYSTEM OPERATIONS, 1990

State Commission	Number of Mergers	Number of Acquisitions	Number of Systems Ceasing Operations for Financial Reasons
Alabama	2	0	0
Alaska	1	0	0
Arizona	0	18	0
Arkansas	0	0	0
California	6	6	1
Colorado	0	0	0
Connecticut	-	3	3
Delaware	0	0	0
Florida	4	10	1
Hawaii	0	0	0
Idaho	0	0	0
Illinois	0	3	0
Indiana	2-3	0	0
Iowa	na	na	na
Kansas	0	1	0
Kentucky	0	6	0
Louisiana	5(a)	(a)	1
Maine	0	2	0
Maryland	0	2	0
Massachusetts	0	1	1
Michigan	1	1	0
Mississippi	0	4	0
Missouri	0	2	0
Montana	0	1	0
Nevada	0	0	0
New Hampshire	1	1	0
New Jersey	1	1	0
New Mexico	0	2	1
New York	0	5	0
North Carolina	1	90	20
Ohio	1	0	0
Oklahoma	0	0	0
Oregon	0	2	1
Pennsylvania	0	11	5
Rhode Island	na	na	na

TABLE A-6 (continued)

State Commission	Number of Mergers	Number of Acquisitions	Number of Systems Ceasing Operations for Financial Reasons
South Carolina	2	2	6
Tennessee	0	1	1
Texas	0	70	6
Utah	0	0	0
Vermont	2	3	0
Virginia	0	2	0
Washington	0	0	0
West Virginia	2	4	1
Wisconsin	0	0	0
Wyoming	0	0	0

Source: *1991 NRRI Survey of Commission Regulation of Water Systems.* Sme numbers are approximations.

(a) Mergers and acquisitions are considered the same.

na = not applicable or not available.

TABLE A-7

CHANGE IN THE NUMBER OF INVESTOR-OWNED WATER UTILITIES, 1980-1990

State	1980	1985	1990	1980-1990	1985-1990
Alabama	17	13	13	-4	0
Alaska*	24	24	21	-3	-3
Arizona*	475	390	378	-97	-12
Arkansas	12	10	3	-9	-7
California*	346	270	225	-121	-45
Colorado	12	10	5	-7	-5
Connecticut	106	100	61	-45	-39
Delaware	14	14	14	0	0
Florida(a)	260	285	357	+97	+72
Hawaii	8	8	11	+3	+3
Idaho	22	22	23	+1	+1
Illinois	73	57	55	-18	-2
Indiana*	123	24	23	-100	-1
Iowa	15	3	1	-14	-2
Kansas	7	7	7	0	0
Kentucky	46	41	36	-10	-5
Louisiana	144	152	116	-28	-36
Maine	61	38	38	-23	0
Maryland	60	29	28	-32	-1
Massachusetts	51	51	37	-14	-14
Michigan	18	18	1	-17	-17
Mississippi	108	93	71	-37	-22
Missouri	75	75	78	+3	+3
Montana	27	24	35	+8	+11
Nevada	13	24	23	+10	-1
New Hampshire	31	26	40	+9	+14
New Jersey	88	77	64	-24	-13
New Mexico	30	47	38	+8	-9
New York	491	465	317	-174	-148
North Carolina(b)	343	317	336	-7	+19
Ohio	42	35*	35	-7	0
Oklahoma	46	33	30	-16	-3
Oregon	25	24*	6	-19	-18
Pennsylvania	345	285	269	-76	-16
Rhode Island	8	8	7	-1	-1

TABLE A-7 (continued)

State	1980	1985	1990	1980-1990	1985-1990
South Carolina	52	58	72	+20	+14
Tennessee	13	9	9	-4	0
Texas(c)	445	628	1,402	+957	+774
Utah	18	16	33	+15	+17
Vermont	71	71	80	+9	+9
Virginia	73	76	70	-3	-6
Washington	55	58	60	+5	+2
West Virginia	70	51	58	-12	+7
Wisconsin	15	12	12	-3	0
Wyoming	17	13	16	-1	+3
Total	4,395	4,091	4,614	+219	+523
Totals without Texas	3,950	3,463	3,212	-738	-251

Source: National Association of Regulatory Utility Commissioners, *NARUC Annual Report on Utility and Carrier Regulation 1980* and *1985* (Washington, DC: National Association of Regulatory Utility Commissioners, 1981 and 1986); and *1991 NRRI Survey of Commission Regulation of Water Systems.*

* Estimate.

(a) Florida distinguishes water systems (812 in 1990) from water companies and reports companies.
(b) North Carolina reports water companies, not systems.
(c) As of 1990, the authority of the Texas Water Commission extended to 4,707 community water systems, of which 1,402 were considered "active" and included in this table.

APPENDIX B

COMMISSION RULES CONCERNING WATER SYSTEM VIABILITY

CONNECTICUT

Rules of the Department of Public Utility Control
Section 16-262m-9

(a) If the Department of Public Utility Control and Department of Health Services determined that a main extension is not feasible or no utility is willing to extend such main, and that no existing regulated public service or municipal utility or regional water authority is willing to own, operate and maintain the final constructed water supply facilities as a non-connected, satellite system, and if it is not feasible to install private individual wells, the applicant may continue forward with the application by satisfactorily providing the following additional information:

(1) A description of the applicant's business organization along with certified copies of the executed documents or any authority granted pursuant to Section 2-20a of the General Statutes of Connecticut;

(2) Certified copy of most current 12-month balance sheet and income statement of proposed owner of water system including a statement of current assets and liabilities;

(3) Copy of most current income tax return of proposed owner of water system;

(4) Indicated source of financial resources that would be used to fund the daily operations and any needed future capital improvements;

(5) Describe the financial ability of the proposed owner of the water system to provide a continuous, adequate and pure supply of water in routine and emergency situations including a pro forma cash flow statement for one year starting immediately after construction is completed;

(6) Describe the annual budget formulation process;

(7) Indicate the name, address, and qualifications of person/company who will be responsible for the budget preparation and administration;

(8) Describe the controls that will be in place to keep operations within budget and the sanctions or consequences that there will be for budget overruns;

(9) Indicate the name and address of person responsible for filing tax returns and annual audit reports;

(10) Indicate the name and address of person(s)/company(s) who will be responsible for routine operations including maintenance, customers billing and collections, repairs, emergency service and daily management;

(11) Describe the planning process to be implemented and assignment of responsibilities to provide for future needs of the customers including a program for routine system maintenance and the increase of future supplies as may be necessary;

(12) Describe the technical background and experience of the proposed operator including any membership in professional water industry organizations;

(13) Furnish a signed agreement or contract under which the proposed operator will serve, including guarantee of continuous long-term operation;

(14) Indicate the name and address of person/company who will manage the water system if different from operator;

(15) If there will be a business manager, in addition to the operator, describe his or her qualifications;

(16) Describe the governing board, its background in utility business governance and the decision making process of the management entity;

(17) List items which the operator will be responsible for and those which the manager will be responsible for;

(18) A plan for conducting cross-connection investigations including identification of the personnel capable of conducting cross-connection inspections;

(19) A plan (including the procedures, methods, schedule and location) for conducting required sampling, testing and reporting regarding: (A) water quality testing; (B) pressure testing; (C) production metering; (D) customer meter testing; (E) ground water monitoring pursuant to Section 19-13-B102(n) of the Regulation of Connecticut State Agencies;

(20) A plan for maintenance of the system;

(21) A plan for the maintenance of required records including at least:

(A) service area maps; (B) water quality, pressure, metering and other tests; (C) emergency procedures; (D) metering; (E) energy use; (F) chemical use; (G) water levels; (H) production and consumption; (I) customer complaints; (J) non-revenue water; (K) all financial records;

(22) A plan for operator safety;

(23) A plan for leak detection;

(24) A plan for long range conservation including supply and demand management practices;

(25) A plan for action and proper notification of authorities in the event of an emergency;

(A) As used above, "emergency" means any hurricane, tornado, storm, flood, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, drought or fire, explosion, electrical outage, toxic spill or attack or series of attacks by enemy of the United States causing, or which may cause, substantial damage or injury to civilian property or persons in the United States in any manner by sabotage or by the use of bombs, shellfire or atomic, radiological, chemical, bacteriological or biological means or other weapons or processes.

(26) Estimated itemized cost of water facilities to be constructed or expanded.

(b) In addition to the above requirements, the Department of Public Utility Control shall be furnished the proposed owner's plans for the following:

(1) Preparation of adequate rules and regulations for providing water service, including termination of customers for non-payment of bills;

(2) Preparation and administration of a proper metered rate schedule and the rates themselves;

(3) A procedure for handling customer complaints;

(4) A procedure for meter reading and accurate billing of customers;

(5) A listing in the local telephone directory of an emergency and general inquiry telephone number for the customers.

<u>Purpose:</u> The purpose of these regulations is to allow the Department of Public Utility Control and the Department of Health Services to implement jointly the provisions of General Statutes of Connecticut 16-262m, which was enacted to address the difficulties associated with the construction or expansion of small water systems, such as inadequate construction and financing, which ultimately leads to inadequate levels of service provided by such water companies.

These Regulations are intended to restrict the proliferation of new small water systems, to promote good public utility practices, to encourage efficiency and economy, to deliver potable water in accordance with applicable health standards, and to establish minimum standards to be hereafter observed in the design, construction and operation of waterworks facilities of new small water systems and on which existing community water systems should base their future plans should they choose to expand. The Certificate of Public Convenience and Necessity assures town governments that community water systems will operate in accordance with the general requirements and applicable minimum standards of Sections 16-11-50 through 16-11-97, inclusive and Sections 19-13-B32, 19-13-B51, 19-13-B46, 19-13-B47 and 19-13-B102 of the Regulations of Connecticut State Agencies.

FLORIDA

Rules of the Florida Public Service Commission
Water and Sewer Provisions

25-30.033 Application for Original Certificate of Authorization and Initial Rates and Charges.

(1) Each application for an original certificate of authorization and initial rates and charges shall provide the following information:

(a) the applicant's name and address;

(b) the nature of the applicant's business organization, i.e., corporation, partnership, limited partnership, sole proprietorship, association, etc.;

(c) the name(s) and address(es) of all corporate officers, directors, partners, or any other person(s) owning an interest in the applicant's business organization;

(d) whether the applicant has made an election under Internal Revenue Code 1362 to be an S corporation;

(e) a statement showing the financial and technical ability of the applicant to provide service, and the need for service in the proposed area. The statement shall identify any other utilities within a 4-mile radius that could potentially provide service, and the steps the applicant took to ascertain whether such other service is available;

(f) a statement that the provision of service will be consistent with the water and wastewater sections of the local comprehensive plan, as approved by the Department of Community Affairs, or, if not, a statement demonstrating why granting the certificate of authorization would be in the public interest.

(g) the date applicant plans to begin serving customers;

(h) the number of equivalent residential connections (ERCs) proposed to be served, by meter size and customer class. If development will be in phases, separate this information by phase;

(i) a description of the types of customers anticipated, i.e., single family homes, mobile homes, duplexes, golf course clubhouse, commercial, etc.;

(j) evidence, in the form of a warranty deed, that the utility owns the land upon which the utility treatment facilities are or will be located, or a copy of an agreement which provides for the continued use of the land, such as a 99-year lease. The applicant may submit a contract for the purchase and sale of land with an unexecuted copy of the warranty deed, provided the applicant files an executed and recorded copy of the deed, or executed copy of the lease, within thirty days after the order granting the certificate;

(k) one original and two copies of a sample tariff, containing all rates, classifications, charges, rules, and regulation, which shall be consistent with Chapter 25-9, Florida Administrative Code. Model tariffs are available from the Division of Water and Wastewater, 101 East Gaines Street, Tallahassee, Florida 32399-0870;

(l) a description of the territory to be served, using township, range and section references;

(m) one copy of a detailed system map showing the proposed lines, treatment facilities and the territory proposed to be served. The map shall be of sufficient scale and detail to enable correlation with the description of the territory proposed to be served;

(n) one copy of the official county tax assessment map, or other map showing township, range, and section with a scale such as 1"=200' or 1"=400', with the proposed territory plotted thereon by use of metes and bounds or quarter sections, and with a defined reference point of beginning.

(o) a statement regarding the separate capacities of the proposed lines and treatment facilities in terms of ERCs and gallons per day. If development will be in phases, separate this information by phase;

(p) a written description of the type of water treatment, wastewater treatment, and method of effluent disposal;

(q) if (p) above does not include effluent disposal by means of spray irrigation, a statement that describes with particularity the reasons for not using spray irrigation;

(r) a detailed statement (balance sheet), certified if available, of the financial condition of the applicant, that shows all assets and liabilities of every kind and character. The statement shall be prepared in accordance with Rule 25-30.115, Florida Administrative Code;

(s) a statement of profit and loss (operating statement), certified if available, of the applicant for the preceding calendar or fiscal year. If an applicant has not operated for a full year, then for the lesser period;

(t) a list of all entities which have provided, or will provide funding to the utility, their financial statements or copies of any financial agreements;

(u) a cost study including customer growth projections supporting the proposed rates, charges and service availability charges. A sample cost study, and assistance in preparing initial rates and charges, are available from the Division of Water and Wastewater;

(v) a schedule showing the projected cost of the proposed system(s) by NARUC account numbers and the related capacity of each system in ERCs and gallons per day. If the utility will be built in phases, this shall apply to the first phase;

(w) a schedule showing the projected operating expenses of the proposed system by NARUC account numbers, when 80 percent of the designed capacity of the system is being utilized. If the utility will be built in phases, this shall apply to the first phase; and

(x) a schedule showing the projected capital structure including the methods of financing the construction and operation of the utility until the utility reaches 80% of the design capacity of the system.

Specific Authority: 367.031, 367.045, F.S.
History: New 1/27/91.

OHIO

Ohio Administrative Code Chapter 4901
Sewage Disposal System Companies and Water Works System Companies

4901:1-15-02 Application for certificate of public convenience and necessity

(A) Any person, firm or corporation desiring to obtain a certificate of public convenience and necessity authorizing such person, firm, or corporation to construct and/or operate a sewage disposal system and/or a water supply system, or to expand the area in which such a system is operated, shall file an application in the form and with the content specified in this rule. Exhibits as described and enumerated in rule 4901:1-15-01 of the Administrative Code shall be attached to and made a part of each application.

(B) All applications and exhibits shall be typewritten, printed or reproduced by some other equally legible and permanent process on good quality paper, eight and one-half inches by eleven inches, nominal size. Maps and plans may be reproduced by any reasonably permanent process and shall be of such size that they can be folded to match the other documents presented.

(C) Fourteen copies of applications and exhibits (one original and thirteen conformed copies) shall be filed and must be signed in ink by the applicant or his attorney and shall show the complete post office address of the person whose signature is affixed. If the applicant is a partnership, one partner may sign for all; if a corporation, the president, a vice president, secretary or other duly authorized officer shall sign. The applicant shall serve a copy of the application, the exhibits and all other filings upon the Ohio environmental protection agency (OEPA) at Columbus, Ohio. Any of the exhibits which are otherwise required to be filed with OEPA may be omitted from such filing.

(D) The following exhibits shall be filed with each applicant and presented as evidence at the hearing.

(1) As exhibit (1)

(a) If applicant is a corporation:

(i) A list of the officers, directors and the ten largest shareholders of the corporation, the address of each and the number of shares held by each. If there are not as many as ten shareholders, a statement to that effect shall be part of the exhibit.

(ii) The nature, character and extent of the interest, if any, of any of the said officers, directors, or shareholders in any other sewage disposal system and/or shareholders in any other sewage disposal system and/or waterworks company, or in any other firm or corporation that holds an interest in any other sewage disposal system and/or waterworks system company; or

(b) If applicant is a partnership:

(i) Name and address of each partner:

(ii) The nature, character and extent of the interest, if any, of any partner in any other sewage disposal system and/or waterworks company, or in any other partnership or corporation that holds any interest in any other sewage disposal system and/or waterworks company; or disposal system and/or waterworks company, or

(c) If the applicant is an individual: The same information for an individual owner of a sewage disposal system or a waterworks system required by paragraphs (D)(1)(b)(i) and (D)(1)(b)(ii) of this rule for a partnership application.

(d) If any person, firm or corporation purports to guarantee the obligations of the applicant, a disclosure including:

(i) Identification of such person, firm or corporation by name and complete post office address:

(ii) A detailed balance sheet (net worth statement) for such person, firm or corporation.

(e) Further, if any developer of all or part of the area for which applicant requests a certificate of public convenience and necessity has any interest in, or control over, the applicant, a disclosure including:

(i) Identification of such developer by name and complete post office address:

(ii) A detailed balance sheet (net worth statement) of such developer.

(iii) The nature and extent of such developer's interest in applicant and/or the means by which control is exercised over applicant.

(2) As exhibit (2)
A certified copy of the articles of incorporation and amendments thereto if applicant is a corporation, or a copy of the partnership agreement if applicant is a partnership.

(3) As exhibit (3)
A financial statement (balance sheet) showing in detail applicant's assets, liabilities and net worth as of the date no more than one month previous to the date the application was filed. At the hearing, applicant shall tender an amended financial statement showing in detail applicant's assets, liabilities and net worth as of the date the application was filed.

(4) As exhibit (3a)
A similar financial statement (balance sheet) showing applicant's assets, liabilities and net worth projected to exist at the date upon which construction will be completed and the system or systems will be ready for operation.

(5) As exhibits (4) and (4a)
Pro forma income statements for applicant's first (exhibit 4) and fifth (exhibit 4a) contemplated full years of operation, showing in reasonable detail for each of those years applicant's anticipated operating revenues, expenses and net income available for fixed charges.

(6) As exhibit (5)
A multi-page document (tariff) setting forth all of applicant's proposed rates, charges, and rules and regulations. This document shall be considered by the commission in its determination of applicant's ability to operate the proposed sewage disposal and/or waterworks system(s) at rates and charges that will produce from such operations a fair and reasonable rate of return on the statutory rate base value of the property dedicated to the service of the public. Such tariff documents tendered to the commission as exhibits to an application shall bear no issued nor effective dates and their form and content shall be subject to approval by the commission.

(7) As exhibit (6)
A map of the area in which service is to be rendered pursuant to the authority sought. Such map shall be prepared by an engineer registered to practice in Ohio and shall show all mains and laterals to be incorporated into applicant's sewage disposal system and/or waterworks system and their relation to the lots or plots of ground to be served; the size (diameter) of pipe to be used for each segment of such system; the proposed location of any sewage treatment plant and any lift station; the proposed location of waterworks pumping stations and any booster pumps needed to maintain proper pressure in the system. A map offered as exhibit (6) to any application shall be drawn or reproduced to scale, and must be sufficiently large to be readable. The scale shall be shown in a written statement or by a legend on the map. The map shall also bear a title block indicating the name of the owner of the system or systems shown thereon, the type or types of system(s) shown, the date of preparation of the map and the name and Ohio registry number of the engineer responsible for its accuracy and completeness.

(8) As exhibit (7)

(a) A written description of the proposed sewage disposal system and/or waterworks system and the component parts thereof prepared by a registered engineer licensed to practice in Ohio. The description shall include, but not be limited to, statements of the maximum hourly and continuous load ratings of the components of the sewage disposal facilities and of the maximum hourly and average inflows to the facilities which are anticipated. The description shall show the engineer's estimate of the maximum hour requirements. The description shall compare such requirement estimates with the corresponding capabilities of all the component parts of the proposed waterworks system.

(b) A description of the type of pipe to be used in the sewage collection and transmission system and/or in the water distribution system. This description shall include the type of material from which the pipe is to be fabricated and the type or types of joints to be used.

(9) As exhibit (8)
An estimate(s) in full detail of the cost of construction of the water and/or sewer system shown and described in exhibits (6) and (7) above. This estimate shall be prepared and signed by the registered engineer who prepared and presented exhibits (6) and (7).

(10) As exhibit (9)
A statement of the financing plan by which applicant proposed to fund the construction and/or acquisition of its proposed sewage disposal and/or waterworks system and to secure working capital. Such statement shall show the amount of equity capital applicant expects to have or secure by the issuance of equity securities; the amount of capital it expects to secure by the issuance of notes or bonds; the source and terms of such equity funds and the terms of said notes or bonds and any sums that applicant expects will be voluntarily contributed.

(11) As exhibit (10)
A written statement to the commission from an official of OEPA, stating that OEPA has approved preliminary plans for the proposed sewage disposal system and/or waterworks system and that it would approve final plans upon notification that the commission has granted to the applicant a certificate of public convenience and necessity for the construction and operation of such a system or systems. In the event that approval of final plans is not readily available or cannot by obtained from OEPA, the commission may grant a certificate of public convenience and necessity contingent upon approval by OEPA of final plans.

(12) As exhibit (11)

(a) A proposed construction and installation schedule stated in number of days of expected elapsed time:

(i) Between the issuance of the certificate as applied for and the start of active and continued construction of the facilities; and

(ii) Between the date upon which construction is started and the date of its completion in condition to render the proposed service.

(b) The construction schedule shall contain a statement that the applicant will complete all sewage disposal system facilities and/or water supply system facilities required to adequately serve the entire area for which the certificate of public convenience and necessity is sought and that the completion date will be as stated in paragraph (D)(12)(a)(ii) of this rule, unless work is interrupted by weather or by other conditions beyond applicant's control.

(c) A statement shall be included in the application describing the public convenience to be served by means of granting a certificate of public convenience and necessity to applicant.

(d) One copy of any previously unfiled exhibit offered at the hearing, or subsequent to the hearing, must be made available for the record: one copy for the attorney examiner, one copy for each counsel, and one copy for the attorney general appearing in the case.

HISTORY: Eff. 4-24-87 (1988-87 OMR 1183) 2-3-77

Note: Effective 2-3-77, 4901:1-15-02 contains provisions of former 4901:1-15-01 (prior rule 29.01); see 4901:1-15-05 for provisions of former 4901:1-15-02 (prior rule 29:02).

4901:1-15-03 Public hearing; notice.

[text continues]

(C) Every applicant shall appear in person, or by a corporate officer if applicant is a corporation, at the place and time and on the date set for hearing. Failure of applicant to appear at the hearing is cause for dismissal of the application. The commission may, upon its own motion or upon satisfactory showing of cause, grant a continuance of any hearing. At the hearing on the application for authority or amended authority to operate a sewage disposal and/or waterworks company, the applicant shall show the following:

(1) That there is a present and continuing need by the public in the area encompassed by the applicant for facilities and services of the type which applicant proposes to provide.

(2) That no existing agency, publicly or privately owned or operated, would or could economically and efficiently provide the facilities and services needed by the public in the area which is the subject of the application.

(3) That applicant has in its treasury sufficient unobligated paid in capital funds and has commitments from a responsible financial organization, satisfactory to the commission, which will enable it to secure through the issuance of securities approved by the commission all additional financing necesary [sic] to complete construction of and place into operation its proposed utility system. Sufficient unobligated paid in capital funds is presumed to be that equal to at least forty per cent of the estimated cost of construction of the utility plant. To overcome such presumption, the applicant must show by competent evidence that it otherwise has sufficient unobligated paid in capital funds and satisfactory financial

commitments to complete construction of and place into operation its proposed system.

(4) That, at the rates proposed in applicant's tariff as filed with the application and based upon a pro forma income statement also filed with the application, applicant will have sufficient revenues to enable it to meet its operating and maintenance expenses, to begin establishing a depreciation reserve, to pay all taxes, to establish an adequate reserve for contingencies and to pay interest on any outstanding debt.

(5) That, in the case of water-works systems, the proposed facilities are designed to operate at normal pressure of sixty pounds per square inch and to provide a minimum pressure of twenty-five pounds per square inch at any point in the system under maximum system loading conditions without creating, simultaneously, at any other point on the system a pressure condition in excess of one-hundred and twenty-five pounds per square inch.

(6) That the company's system of mains shall be of adequate size to permit the installation and proper operation of public fire hydrants. (Such public fire hydrants need be installed only if they are paid for by the proper public authority ordering the installation for both the capital cost and the cost of maintaining and operating said hydrants.)

(7) That, if authority to construct and operate a sewage disposal system is the subject, or is one subject, of the application, it shall be shown that the mains and laterals proposed are of adequate size and are to be laid with such flow lines as to permit an expeditious flow from the point of the origin at the customer's premises to the point of treatment or disposal. If land contours are not such as to permit transport of the outflow by gravity, adequate lift stations shall be provided as a part of the applicant's system. If, in lieu of or as an adjunct to such lift stations, force pumps are proposed to be installed to move sewage discharge away from a customer's premises, a full description of the equipment and of the manner and means of its operation shall be included as a part of applicant's evidence.

HISTORY: Eff. 2-3-77

Note: See 4901:1-15-06 for provisions of former 4901:1-15-03 (prior rule 29:03).

APPENDIX C

STATE STATUTES CONCERNING WATER SYSTEM VIABILITY

CONNECTICUT

Takeover Statutes, 476 Public Service Companies

Sec. 16-262k. Interconnection of public water supply systems to relieve site-specific water shortages. The department of public utility control may require any water company as defined in section 16-1 to connect its public water supply system with that of another water company or municipal utility if it finds that such a connection would be an effective means of relieving site-specific water shortages.

(P.A. 81-358. S. 3.)

Sec. 16-262l. Receivership of water companies for failure to provide adequate service. Personal liability of directors, officers and managers. (a) As used in this section, "water company" includes every corporation, company, association, joint stock association, partnership or person, or lessee thereof, except an association providing water only to its members, owning, leasing, maintaining, operating, managing or controlling any pond, lake, reservoir, stream, well or distributing plant or system employed for the purpose of supplying water to twenty-five or more consumers on a regular basis, provided if any corporation, company, association, joint stock association, partnership or person, or lessee thereof, owns or controls eight per cent of the equity value of more than one such water supply system, the number of consumers shall, for the purpose of this definition, be the total number of consumers of all such systems so controlled by that corporation, company, association, joint stock association, partnership or person, or lessee thereof.

(b) If the department of public utility control determines, after notice and hearing, that any water company is unable or unwilling to provide adequate service to its consumers, the department may petition the superior court for any judicial district wherein the company conducts its business for an order attaching the assets of the company and placing it under the sole control and responsibility of a receiver.

(c) Notwithstanding the provisions of subsection (b) of this section, the department, the municipality served by a water company or an organization representing twenty per cent of the consumers of the company may, upon notice to the company, petition the superior court for an order attaching the assets of the water company and placing it under the sole control and responsibility of a receiver, if (1) the company has failed to supply water to consumers for at least five days during the preceding three months, (2) the department of health services determines that the company has not met the standards adopted under section 25-32 for the quality of public drinking water or (3) the petitioner has reasonable cause to believe the consumers of the company have not received and are unlikely to receive adequate service due to gross mismanagement of the company. Upon the filing of such a petition, the court shall order the company to show cause why such an order of attachment and receivership should not issue ten days from the date of service of the order to show cause upon the company at its last known address.

(d) Any receiver appointed by the court shall file a bond in accordance with section 52-506 unless the court finds it unnecessary. The receiver shall operate the company to preserve its assets and to serve the best interests of its consumers. If the receiver determines that the water company's actions which caused it to be placed under the control and responsibility of the receiver under subsection (b) or (c) of this section is due to misappropriation or wrongful diversion of the assets or income of such company or to other wilful misconduct by any director, officer or manager of the company, the receiver shall file a petition, with the superior court that issued the order of attachment and receivership, for an order that such director, officer or manager be ordered to pay compensatory damages to the company by reason of such misappropriation, diversion or misconduct.

(e) The department of public utility control shall determine the value of the assets of a water company at the time of appointment of a receiver and immediately prior to return of the assets to the owner. The claim of the owner of the company shall be limited to the value determined at the time of the appointment of the receiver. The assets shall be returned to the owner after full restitution has been made to the receiver for the value of any improvements to the system and after payment has been made for any appraisal pursuant to this subsection.

(P.A. 81-358. S. 4; P.A. 82-472. S. 51. 183; P.A. 83-542; P.A. 84-330, S. 7.)

History: P.A. 82-472 made technical correction in Subsec. (a); P.A. 83-542 added Subsec. (c), allowing, in addition to department, municipalities and organizations representing water company consumers to petition superior court for receivership in certain situations and providing for expedited judicial proceedings in such situations and added provisions in Subsec. (d) allowing receiver to petition superior court in certain situations for order that director, officer or manager pay compensatory damages to company; P.A. 84-330 added Subsec. (c) re valuation of assets of water company.

Sec. 16-262m. Construction specifications for water companies. (a) As used in this section, sections 16-262n to 16-262q, inclusive, and section 8-25a, "water company" includes every corporation, company, association, joint stock association, partnership, municipality, other entity or person, or lessee thereof, owning, leasing, maintaining, operating, managing or controlling any pond, lake, reservoir, stream, well or distributing plant or system employed for the purpose of supplying water to not less than fifteen service connections or twenty-five persons not more than two hundred fifty service connections or one thousand persons on a regular basis.

(b) No water company may begin the construction or expansion of a community water supply system on or after October 1, 1984, without having first obtained a certificate of public convenience and necessity for the construction or expansion from the department of public utility control and the department of health services. An application for a certificate shall be on a form prescribed by the department of public utility control in consultation with the department of health services and accompanied by a copy of the water company's construction or expansion plans and a fee of one hundred dollars. The departments shall issue a certificate to an applicant upon determining, to their satisfaction, that (1) no feasible interconnection with an existing system is available to the applicant, (2) the applicant will complete the construction or expansion in accordance with engineering standards established by regulation by the department of public utility control for community water supply systems, (3) the applicant has the financial, managerial and technical resources to operate the proposed water supply system in a reliable and efficient manner and to provide continuous adequate service to consumers served by the system, (4) the proposed construction or expansion will not result in a duplication of water service in the applicable service area and (5) the applicant meets all federal and state standards for community water supply. Any construction or expansion with respect to which a certificate is required shall thereafter by built, maintained and operated in conformity with the certificate and any terms, limitations or conditions contained therein.

(c) The department of public utility control, in consultation with the department of health services, shall adopt regulations in accordance with the provisions of chapter 54 to carry out the purposes of this section.

(P.A. 81-427. S. 1. 3; P.A. 84-330. S. 1.)

History: P.A. 84-330 amended Subsec. (a) to apply definition of water company "to sections 16-262n to 16-262q, inclusive, and section 8-25a" to include municipalities in such definition and to expand the definitions by including companies supplying water to not less than fifteen service connections or twenty-five persons nor more than two hundred fifty service connections or one thousand persons, amended Subsec. (b) to require, as a condition for issuing a certificate that determination be made that no feasible interconnection with an existing system is available and that applicant meets all federal and state standards for community water supply and amended Subsecs. (b) and (c) to require departments of public utility control and health services to jointly carry out purposes of the section.

Sec. 16-262n. Failure of water company to comply with orders. Hearing. Whenever any water company fails to comply with an order issued pursuant to section 16-11, 25-32, 25-33, or 25-34 concerning the availability or potability of water or the provision of water at adequate volume and pressure, the department of public utility control and the department of health services may, after notice to public and private water companies, municipal utilities furnishing water service, municipalities or other appropriate governmental agencies in the service area of the water company, conduct a hearing in accordance with the provisions of section 4-177 to determine the actions that may be taken and the expenditures that may be required, including the acquisition of the water company by the most suitable public or private entity, to assure the availability and potability of water and the provision of water at adequate volume and pressure to the persons served by the water company.

(P.A. 84-330. S. 2.)

Sec. 16-262o. Acquisition of water company. Rates and charges. (a) The department of public utility control, in consultation with the department of health services, upon a determination that the costs of improvements to and the acquisition of the water company are necessary and reasonable, shall order the acquisition of the water company by the most suitable public or private entity. In making such determination, the department shall consider: (1) The geographical proximity of the acquiring entity to the water company, (2) whether the acquiring entity has the financial, managerial and technical resources to operate the water company in a reliable and efficient manner and to provide continuous, adequate service to the persons served by the company and (3) any other factors the department deems relevant. Such order shall authorize the recovery through rates of all reasonable costs of acquisition and necessary improvements. A public entity acquiring a water company beyond the boundaries of such entity may charge customers served by the acquired company for water service and may, to the extent appropriate, recover through rates all reasonable costs of acquisition and necessary improvements.

(b) Notwithstanding the provisions of any special act, the department of public utility control shall extend the franchise areas of the acquiring water company to the service area of the water company acquired pursuant to this section.

(c) In the case of a public entity acquiring a water company beyond its boundaries, the rates charged the customers of the acquired water company shall be subject to the approval of the department of public utility control, upon petition by such customers.

(P.A. 84-330. S. 3.)

Sec. 16-262p. Improvements by acquiring entity. Any recipient of an order pursuant to section 16-262o shall make the necessary improvements to assure the availability and potability of water and the provision of water at adequate volume and pressure to the persons served by the water company. The water company shall immediately take the steps necessary for the transfer of the company to the acquiring company, municipal water authority, municipality or other public or private entity.

(P.A. 84-330. S. 4.)

Sec. 16-262q. Compensation for acquisition of water company. Compensation for the acquisition of a water company pursuant to section 16-262o shall be determined by the procedures for determining compensation under section 25-42 or by agreement between the parties, provided the department of public utility control in consultation with the department of health services, after a hearing, approves such agreement.

(P.A. 84-330. S. 5.)

NEVADA

Water Controls

445.381 State board of health: Adoption of regulations. [Effective until January 1, 1992.]

The state board of health:

1. Shall adopt regulations establishing procedures for a system of permits to operate water systems which are constructed on or after July 1, 1991.

2. May adopt such other regulations as may be necessary to govern the construction, operation and maintenance of public water systems if those activities affect the quality of water, but the regulations do not supersede any regulation of the public service commission of Nevada.

3. May establish by regulation a system for the issuance of operating permits for suppliers of water and set a reasonable date after which a person shall not operate a public water system constructed before July 1, 1991, without possessing a permit issued by a health authority.

History: 1977, p. 443; 1985, p. 336; 1991, ch. 220, @ 11, p. 403.

445.3851 Systems constructed after June 30, 1991: Assumption of control by local governing body.

1. If the state board of health has found that any of the conditions of a permit to operate such a water system issued pursuant to NRS 445.3841 are being violated and has notified the holder of the permit that he must bring the water system into compliance, but the holder of the permit has failed to comply within a reasonable time after the date of the notice, the local governing body, if requested to do so in writing by the state board of health, may take the following actions independently of any further action by the state board of health:

(a) Give written notice, by certified mail, to the owner of the water system and the owners of the property served by the system that if the violation is not corrected within 30 days after the date of the notice, the local governing body will seek a court order authorizing it to assume control; and

(b) After the 30-day period has expired, if the water system has not been brought into compliance, apply to the district court for an order authorizing the local governing body to assume control of the system and assess the property for the continued operation and maintenance of the system as provided in subsection 5 of NRS 445.3845.

2. If the local governing body determines at any time that immediate action is necessary to protect the public health and welfare, it may assume physical control and operation of a water system without complying with any of the requirements set forth in subsection 1. The local governing body may not maintain control of a

water system pursuant to this subsection for a period greater than 30 days unless it obtains an order from the district court authorizing an extension.

(Added to NRS by 1991, 403)

445.3853 Systems constructed after June 30, 1991: Effect of Provisions. No provision of NRS 445.3841, inclusive, prevents:

1. A local governing body or a health district from imposing its own conditions for approval of the operation of any water system located within its jurisdiction, which may be more stringent than those authorized by NRS 445.3841 to 445.3853, inclusive.

2. A local governing body from requiring the prior approval of a proposed water system by a local committee created for that purpose.

3. A local governing body from converting connections to water systems into connections to water systems provided by a public utility or a municipality or other public entity.

(Added to NRS by 1991, 403)

445.3843 Systems constructed after June 30, 1991: Preliminary request for comments. Before making the finding specified in NRS 445.3851 and before making the determinations specified in NRS 244.3655, 268.4102 and 445.3845, the state board of health shall request comments from the:

1. Public service commission of Nevada;

2. State engineer;

3. Local government within whose jurisdiction the water system is located; and

4. Owner of the water system.

(Added to NRS by 1991, 401)

NEW JERSEY

Article 9. Facilities and Services of Small Water Companies

58:11-59. Failure to comply with order to provide adequate service; finding; notice to capable water utilities or government entities in service area; joint public hearing; determination

Whenever any small water company is found, after notice and public hearing, to have failed to comply, within a specified time, with any order of the Department of Environmental Protection concerning the availability of water, the potability of water and the provision of water at adequate volume and pressure, which the department is authorized to enforce pursuant to Title 58 of the Revised Statutes, the department and the Board of Public Utilities shall, after notice to capable proximate public or private water companies, municipal utilities authorities established pursuant to P.L.1957, c. 183 (C. 40:14B-1 et seq.), municipalities or any other suitable governmental entities wherein the small water company provides service, and the Department of Public Advocate, conduct a joint public hearing to determine: the actions that may be taken and the expenditures that may be required, including acquisition costs, to make all improvements necessary to assure the availability of water. the potability of water and the provision thereof at adequate volume and pressure, including, but not necessarily limited to, the acquisition of the small water company by the most suitable public or private entity. As used in this act, "small water company" means any company, purveyor or entity, other than a governmental agency, that provides water for human consumption and which regularly services less than 1,000 customer connections.

L.1981, c. 347, s1, eff. Dec. 22, 1981.

Title of Act:
An Act concerning improvements to the facilities and services of small water companies and supplementing title 58 of the Revised Statutes. L. 1981, c. 347.

58:11-60 Compensation for acquisition; determination

Compensation for the acquisition of a small water company shall be determined:

(a) By agreement between parties, subject to the approval of the Board of Public Utilities, in consultation with the Department of Environmental Protection, and after the holding of a joint public hearing by the board and the department; or

(b) Through the use of the power of eminent domain.

L.1981, c. 347, s2, eff. Dec. 22, 1981.

58:11-61 Order for acquisition; extension of franchise area of acquiring public or private entity

a. The Department of Environmental Protection and the Board of Public Utilities, upon a determination that the costs of improvements to and the acquisition of the small water company are necessary and reasonable, shall order the acquisition of the small water company by the most suitable public or private entity. This order shall provide for the immediate inclusion in the rates of the acquiring company the anticipated costs of necessary improvements, or, if the determination of acquisition costs has been deferred, as soon as possible thereafter as may be practicable and feasible.

b. The Board of Public Utilities shall extend the franchise area of the acquiring public or private water company to the extent necessary to cover the service area of the small water company taken over pursuant to this act.

L.1981, c. 347, s3, eff. Dec 22, 1981.

58:11-62 Compliance with order

Any water company, municipal utilities authority, municipality or other suitable governmental entity which receives an order pursuant to section 3 of this act shall acquire the small water company and shall make the necessary improvements to assure the availability of water, the potability of the water and the provision of water at adequate volume and pressure. The small water company shall immediately comply with the order and shall facilitate its sale to the water company, municipal utilities authority, municipality or other suitable governmental entity ordered to acquire the small water company.

L.1981, c. 347, s 4, eff. Dec. 22, 1981.

58:11-63 Differential rate for customers of small water company for use or service of acquiring company's system or facilities

Whenever the Department of Environmental Protection and the Board of Public Utilities order the acquisition of a small water company by the most suitable public or private entity pursuant to law, the board may, in its discretion, allow the acquiring company to charge and collect a differential rate from the customers of the small water company for the use or service of the small water company for the use or service of the acquiring company's water supply system or facilities.

L.1981, c. 389, s1.

Historical Note

Section 2 of L.1981, c. 389, approved Jan. 6, 1982, provides:

"This act shall take effect upon enactment of P.L.1981, c. [347] (now pending before the General Assembly as Senate Committee Substitute for Senate Bill No. 1614 [approved Dec. 22, 1981]."

Title of Act:

An Act concerning the acquisition of small water companies and supplementing Title 58 of the Revised Statutes. L.1981,c. 389.

PENNSYLVANIA

House Bill No. 24, Session of 1990

An Act Amending Title 66 (Public Utilities) of the Pennsylvania Consolidated Statutes, further providing for rates.

The General Assembly of the Commonwealth of Pennsylvania hereby enacts as follows:

Section 1. Title 66 of the Pennsylvania Consolidated Statutes is amended by adding a section to read:

Sec. 1327. Acquisition of water and sewer utilities.

(a) Acquisition cost greater than depreciated original cost.--If a public utility acquires property from another public utility, a municipal corporation or a person at a cost which is in excess of the original cost of the property when first devoted to the public service less the applicable accrued depreciation, that excess, or any portion thereof found by the commission to be reasonable, may be included in the rate base of the acquiring public utility, provided that the acquiring public utility proves that:

(1) the property is used and useful in providing water or sewer service;

(2) the public utility acquired the property from another public utility, a municipal corporation or a person which had 1,200 or fewer customer connections;

(3) the public utility, municipal corporation or person from which the property was acquired was not, at the time of acquisition, furnishing and maintaining adequate, efficient, safe and reasonable service and facilities, evidence of which shall include, but not be limited to, the following:

(i) violation of statutory or regulatory requirements of the Department of Environmental Resources or the commission concerning the safety, adequacy, efficiency or reasonableness of service and facilities;

(ii) a finding by the commission of inadequate financial, managerial or technical ability of the small water or sewer utility;

(iii) a finding by the commission that there is a present deficiency concerning the availability of water, the palatability of water or the provision of water at adequate volume and pressure; or

(iv) a finding by the commission that the small water or sewer utility, because of necessary improvements to its plant or distribution system, cannot reasonably be expected to furnish and maintain adequate service to its customers in the future at rates equal to or less than those of the acquiring public utility;

(4) reasonable and prudent investments will be made to assure that the customers served by the property will receive adequate, efficient, safe and reasonable service;

(5) the public utility, municipal corporation or person whose property is being acquired is in agreement with the acquisition and the negotiations which led to the acquisition were conducted at arm's length;

(6) the actual purchase price is reasonable;

(7) neither the acquiring nor the selling public utility, municipal corporation or person is an affiliated interest of the other;

(8) the rates charges by the acquiring public utility to its preacquisition customers will not increase "unreasonably" because of the acquisition; and

(9) the excess of the acquisition cost over the depreciated original cost will be added to the rate base to be amortized as an addition to expense over a reasonable period of time with corresponding reductions in the rate base.

(b) Procedure.--The commission, upon application by a public utility, person or corporation which has agreed to acquire property from another public utility, municipal corporation or person, may approve an inclusion in rate base in accordance with subsection (a) prior to the acquisition and prior to a proceeding under this chapter to determine just and reasonable rates if:

(1) the applicant has provided notice of the proposed acquisition and any proposed increase in rates to the customers served by the property to be acquired, in such form and manner as the commission, by regulation, shall require;

(2) the applicant has provided notice to its customers, in such form and manner as the commission, by regulation, shall require, if the proposed acquisition would increase rates to the acquiring public utility's customers;

(3) the applicant has provided notice of the application to the Director of Trial Staff and the Consumer Advocate; and

(4) in addition to any other information required by the commission, the application includes a full description of the proposed acquisition and a plan for reasonable and prudent investments to assure that the customers served by the property to be acquired will receive adequate, efficient, safe and reasonable service.

(c) Hearings.--The commission may hold such hearings on the application as it deems necessary.

(d) Forfeiture.--Notwithstanding section 1309 (relating to rates fixed on complaint; investigation of costs of production), the commission, by regulation, shall provide for a utility to remove the costs of acquisition from its rates and to refund any revenues collected as a result of this section, plus interest, which shall be the average rate of interest specified for residential mortgage lending by the Secretary of Banking in accordance with the act of January 30, 1974 (P.L.13, No.6), referred to as the Loan Interest and Protection Law, during the period or periods for which the commission orders refunds, if the commission, after notice and hearings, determines that the reasonable and prudent investments to be made in accordance with this section have not been completed within a reasonable time.

(e) Acquisition cost lower than depreciated original cost.--If a public utility acquires property from another public utility, a municipal corporation or a person at a cost which is lower than the original cost of the property when first devoted to the public service less the applicable accrued depreciation and the property is used and useful in providing water or sewer service, that difference shall, absent matters of a substantial public interest, be amortized as an addition to income over a reasonable period of time or be passed through to the ratepayers by such other methodology as the commission may direct. Notice of the proposed treatment of an acquisition cost lower than depreciated original cost shall be given to the Director of Trial Staff and the Consumer Advocate.

(f) Reports.--The commission shall annually transmit to the Governor and to the General Assembly and shall make available to the public a report on the acquisition activity under this title. Such report shall include, but not be limited to, the number of small water or sewer public utilities, municipal corporations or persons acquired by public utilities, and the amounts of any rate increases or decreases sought and granted due to the acquisition.

(g) Expiration.--This section shall expire in five years unless extended by statute.

Section 2. This act shall take effect in 60 days.

House Bill No. 36, Session of 1991

An Act Amending Title 66 (Public Utilities) of the Pennsylvania Consolidated Statutes, providing for the commission to order the acquisition of small water and sewer utilities.

The General Assembly of the Commonwealth of Pennsylvania hereby enacts as follows:

Section 1. Title 66 of the Pennsylvania Consolidated Statutes is amended by adding a section to read:

S. 529. Power of commission to order acquisition of small water and sewer utilities.

(a) General rule.--The commission may order a capable public utility to acquire a small water or sewer utility if the commission, after notice and an opportunity to be heard, determines:

(1) that the small water or sewer utility is in violation of statutory or regulatory standards, including, but not limited to, the act of June 22, 1937 (P.L.1987, No.394), known as The Clean Streams Law, the act of January 24, 1966 (1965 P.L.1535, No.537), known as the Pennsylvania Sewage Facilities Act, and the act of May 1, 1984 (P.L.206, No.43), known as the Pennsylvania Safe Drinking Water Act, and the regulations adopted thereunder, which affect the safety, adequacy, efficiency or reasonableness of the service provided by the small water or sewer utility;

(2) that the small water or sewer utility has failed to comply, within a reasonable period of time, with any order of the Department of Environmental Resources or the commission concerning the safety, adequacy, efficiency or reasonableness of service, including, but not limited to, the availability of water, the potability of water, the palatability of water or the provision of water at adequate volume and pressure;

(3) that the small water or sewer utility cannot reasonably be expected to furnish and maintain adequate, efficient, safe and reasonable service and facilities in the future;

(4) that alternatives to acquisition have been considered in accordance with subsection (b) and have been determined by the commission to be impractical or not economically feasible;

(5) that the acquiring capable public utility is financially, managerially and technically capable of acquiring and operating the small water or sewer utility in compliance with applicable statutory and regulatory standards; and

(6) that the rates charged by the acquiring capable public utility to its preacquisition customers will not increase unreasonably because of the acquisition.

(b) Alternatives to acquisition.--Before the commission may order the acquisition of a small water or sewer utility in accordance with subsection (a), the commission shall discuss with the small water or sewer utility, and shall give such utility a reasonable opportunity to investigate, alternatives to acquisition, including, but not limited to:

(1) The reorganization of the small water or sewer utility under new management.

(2) The entering of a contract with another public utility or a management or service company to operate the small water or sewer utility.

(3) The appointment of a receiver to assure the provision of adequate, efficient, safe and reasonable service and facilities to the public.

(4) The merger of the small water or sewer utility with one or more other public utilities.

(5) The acquisition of the small water or sewer utility by a municipality, a municipal authority or a cooperative.

(c) Factors to be considered.--In making a determination pursuant to subsection (a), the commission shall consider:

(1) The financial, managerial and technical ability of the small water or sewer utility.

(2) The financial, managerial and technical ability of all proximate public utilities providing the same type of service.

(3) The expenditures which may be necessary to make improvements to the small water or sewer utility to assure compliance with applicable statutory and regulatory standards concerning the adequacy, efficiency, safety or reasonableness of utility service.

(4) The expansion of the franchise area of the acquiring capable public utility so as to include the service area of the small water of sewer utility to be acquired.

(5) The opinion and advice, if any, of the Department of Environmental Resources as to what steps may be necessary to assure compliance with applicable statutory or regulatory standards concerning the adequacy, efficiency, safety or reasonableness of utility service.

(6) Any other matters which may be relevant.

(d) Order of the commission.--Subsequent to the determinations required by subsection (a), the commission shall issue an order for the acquisition of the small water or sewer utility by a capable public utility. Such order shall provide for the extension of the service area of the acquiring capable public utility.

(e) Acquisition price.--The price for the acquisition of the small water or sewer utility shall be determined by agreement between the small water or sewer utility and the acquiring capable public utility, subject to a determination by the commission that the price is reasonable. If the small water or sewer utility and the acquiring capable public utility are unable to agree on the acquisition price or the commission disapproves the acquisition price on which the utilities have agreed, the commission shall issue an order directing the acquiring capable public utility to acquire the small water or sewer utility by following the procedure prescribed for exercising the power of eminent domain pursuant to the act of June 22, 1964 (Sp.Sess., P.L.84, No.6), known as the Eminent Domain Code.

(f) Separate tariffs.--The commission may, in its discretion and for a reasonable period of time after the date of acquisition, allow the acquiring capable public utility to charge and collect rates from the customers of the acquired small water or sewer utility pursuant to a separate tariff.

(g) Appointment of receiver.--The commission may, in its discretion, appoint a receiver to protect the interests of the customers of the small water or sewer utility. Any such appointment shall by order of the commission, which order shall specify the duties and responsibilities of the receiver.

(h) Notice.--The notice required by subsection (a) or any other provision of this section shall be served upon the small water or sewer utility affected, the Office of Consumer Advocate, the Office of Trial Staff, the Department of Environmental Resources, all proximate public utilities providing the same type of service as the small water or sewer utility, all proximate municipalities and municipal authorities providing the same type of service as the small water or sewer utility, and the municipalities served by the small water or sewer utility. The commission shall order the affected small water or sewer utility to provide notice to its customers of the initiation of proceedings under this section in the same manner in which the utility is required to notify its customers of proposed general rate increases.

(i) Burden of proof.--The Law Bureau shall have the burden of establishing a prima facie case that the acquisition of the small water or sewer utility would be in the public interest and in compliance with the provisions of this section. Once the commission determines that a prima facie case has been established:

(1) the small water or sewer utility shall have the burden of proving its ability to render adequate, efficient, safe and reasonable service at just and reasonable rates; and

(2) a proximate public utility providing the same type of service as the small water or sewer utility shall have the opportunity and burden of proving its financial, managerial or technical inability to acquire and operate the small water or sewer utility.

(j) Plan for improvements.--Any capable public utility ordered by the commission to acquire a small water or sewer utility shall, prior to acquisition, submit to the commission for approval a plan, including a timetable, for bringing the small water or sewer utility into compliance with applicable statutory and regulatory standards. The capable public utility shall also provide a copy of the plan to the Department of Environmental Resources and such other State or local agency as the commission may direct. The commission shall give the Department of Environmental Resources adequate opportunity to comment on the plan and shall consider any comments submitted by the department in deciding whether or not to approve the plan. The reasonably and prudently incurred costs of each improvement shall be recoverable in rates only after that improvement becomes used and useful in the public service.

(k) Limitations on liability.--Upon approval by the commission of a plan for improvements submitted pursuant to subsection (j) and the acquisition of a small water or sewer utility by a capable public utility, the acquiring capable public utility shall not be liable for any damages beyond the aggregate amount of $50,000, including a maximum amount of $5,000 per incident, if the cause of those damages is proximately related to identified violations of applicable statutes or regulations by the small water or sewer utility. This subsection shall not apply:

(1) beyond the end of the timetable in the plan for improvements;

(2) whenever the acquiring capable public utility is not in compliance with the plan for improvements; or

(3) if, within 60 days of having received notice of the proposed plan for improvements, the Department of Environmental Resources submitted written objections to the commission and those objections have not subsequently been withdrawn.

(l) Limitations on enforcement actions.--Upon approval by the commission of a plan for improvements submitted pursuant to subsection (j) and the acquisition of a small water or sewer utility by a capable public utility, the acquiring capable public utility shall not be subject to any enforcement actions by State or local agencies which had notice of the plan if the basis of such enforcement action is proximately related to identified violations of applicable statutes of regulations by the small water or sewer utility. This subsection shall not apply:

(1) beyond the end of the timetable in the plan for improvements;

(2) whenever the acquiring capable public utility is not in compliance with the plan for improvements;

(3) if, within 60 days of having received notice of the proposed plan for improvements, the Department of Environmental Resources submitted written objections to the commission and those objections have not subsequently been withdrawn; or

(4) to emergency interim actions of the commission or the Department of Environmental Resources, including, but not limited to, the ordering of boil-water advisories or other water supply warnings, of emergency treatment or of temporary, alternate supplies of water.

(m) Definitions.--As used in this section, the following words and phrases shall have the meanings given to them in this subsection:

"Capable public utility." A public utility which regularly provides the same type of service as the small water utility or the small sewer utility to 4,000 or more customer connections, which is not an affiliated interest of the small water utility or the small sewer utility, and which provides adequate, efficient, safe and reasonable service. A public utility which would otherwise be a capable public utility except for the fact that it has fewer than 4,000 customer connections may elect to be a capable public utility for the purposes of this section regardless of the number of its customer connections and regardless of whether or not it is proximate to the small sewer utility or small water utility to be acquired.

"Small sewer utility." A public utility which regularly provides sewer service to 1,200 or fewer customer connections.

"Small water utility." A public utility which regularly provides water service to 1,200 or fewer customer connections.

Section 2. This act shall take effect in 60 days.

TEXAS

Subchapter G. Certificates of Convenience and Necessity

Sec. 13.242. Certificate Required

(a) Unless otherwise specified, a utility or water supply or sewer service corporation many not in any way render retail water or sewer utility service directly or indirectly to the public without first having obtained from the commission a certificate that the present or future public convenience and necessity require or will require that installation, operation, or extension, and except as otherwise provided by this subchapter, a retail public utility may no furnish, make available, render, or extend retail water or sewer service to any area to which retail water or sewer utility service is being lawfully furnished by another retail public utility without first having obtained a certificate of public convenience and necessity that includes the area in which the consuming facility is located.

[text continues]

Sec. 13.246. Notice and Hearing; Issuance or Refusal; Factors Considered

[text continues]

(c) Certificates of convenience and necessity shall be granted on a nondiscriminatory basis after consideration by the commission of the adequacy of service currently provided to the requested area, the need for additional service in the requested area, the effect of the granting of a certificate on the recipient of the certificate and on any retail public utility of the same kind already serving the proximate area, the ability of the applicant to provide adequate service, the feasibility of obtaining service from an adjacent retail public utility, the financial stability of the applicant, including, if applicable, the adequacy of the applicant's debt-equity ratio, environmental integrity, and the probable improvement of service or lowering of cost to consumers in that area resulting from the granting of the certificate.

Sec. 13.251. Sale, Assignment, or Lease of Certificate

Except as provided in Section 13.255 or this code, a utility or a water supply or sewer service corporation may no sell, assign, or lease a certificate or public convenience and necessity or any right obtained under a certificate unless the commission has determined that the purchaser, assignee or lessee is capable or rendering adequate and continuous service to every consumer within the certified area, after considering the factors under Section 13.246(c) of this code. The sale, assignment or lease shall be on the conditions prescribed by the commission.

[text continues]

Sec. 13.253. Improvements in Service; Interconnecting Service

After notice and hearing , the commission may:

(1) order any retail public utility that is required by law to possess a certificate of public convenience and necessity to provide specified improvements in its service in a defined area if service in that area is inadequate or is substantially inferior to service in a comparable area and it is reasonable to require the retail public utility to provide the improved service;

(2) order two or more public utilities or water supply or sewer service corporations to establish specified facilities for the interconnecting service; or

(3) issue an emergency order, with or without a hearing, under Section 13.401 of this code.

Sec. 13.254. Revocation or Amendment of Certificate.

(a) The commission at any time after notice and hearing may revoke or amend any certificate of public convenience and necessity with the written consent of the certificate holder or if it finds that the certificate holder has never provided, is not longer providing, or has failed to provide continuous and adequate service in the area, or part of the area, covered by the certificate.

Sec. 13.255. Single Certification in Incorporated or Annexed Areas

[text continues]

(j) This section shall apply only in a case where:

(1) the retail public utility that is authorized to serve in the certificated area that is annexed or incorporated by the municipality is a nonprofit water supply or sewer service corporation; or

(2) the retail public utility that is authorized to serve in the certificated area that is annexed or incorporated by the municipality is a retail public utility, other than a nonprofit water supply or sewer service corporation, and whose service area is located entirely within the boundaries of a municipality with a population of 1.7 million or more according to the most recent federal census.

(k) The following conditions apply when a municipality or franchised utility makes an application to acquire the service area of facilities of a retail public utility described in Subsection (j)(2):

(1) the commission or court must determine that the service provided by the retail public utility is substandard or its rates are unreasonable in view of the reasonable expenses of the utility;

(2) if the municipality abandons its application, the court or the commission is authorized to award to the retail public utility its reasonable expense related to the proceeding hereunder, including attorney fees; and

(3) unless otherwise agreed by the retail public utility, the municipality must take the entire utility property of the retail public utility in a proceeding hereunder.

Sec. 13.301. Report of Sale, Merger, Etc.; Investigation; Disallowance of Transaction

(a) A utility or a water supply or sewer service corporation shall notify the commission and give pubic notice unless public notice is waived by the executive director for good cause shown at least 120 days before the effective date of any sale, acquisition, lease, or rental of any water or sewer system required by law to possess a certificate of public convenience and necessity or if any merger or consolidation with such a utility or water supply or sewer service corporation.

[text continues]

Sec. 13.411. Action to Enjoin or Require Compliance

If it appears to the commission that any retail public utility or any other person or corporation is engaged in or is about to engage in any act in violation of this chapter or of any order or rule of the commission entered or adopted under this chapter or that any retail public utility or any other person or corporation is failing to comply with this chapter or with any rule or order, the attorney general on request of the commission, in addition to any other remedies provided in this chapter, shall bring an action in a court of competent jurisdiction in the name of and on behalf of the commission against the retail public utility o other person or corporation to enjoin the commencement of continuation of any act or to require compliance with this chapter or the rule or order.

Sec. 13.412. Receivership

(a) At the request of the commission, the attorney general shall bring suit for the appointment of a receiver to collect the assets and carry on the business of a water or sewer utility that has abandoned operation of its facilities or violates a final order of the commission or allows any property owned or controlled by it to be used in violation of a final order of the commission.

[text continues]

Sec. 13.4131. Supervision of Certain Utilities

(a) The commission, after providing to the utility notice and an opportunity for a hearing, may place a utility under supervision for gross or continuing mismanagement, gross or continuing noncompliance with this chapter or commission rules, or noncompliance with commission orders.

(b) While supervising a utility, the commission may require the utility to abide by conditions and requirements prescribed by the commission, including:

(1) management requirements;
(2) additional reporting requirements;
(3) restrictions on hiring, salary or benefit increases, capital investment, borrowing, stock issuance or dividend declarations, and liquidation of assets; and

(4) a requirement that the utility place the utility's funds into an account in a financial institution approved by the commission and use of those funds shall be restricted to reasonable and necessary utility expenses.

(c) While supervising a utility, the commission may require that the utility obtain commission approval before taking any action that may be restricted under Subsection (b) of this section. Any action or transaction which occurs without commission approval may be voided by the commission.

Sec. 13.4132. Operation of Utility That Discontinues Operation or is Referred for Appointment of Receiver

(a) The commission, after providing to the utility notice and an opportunity for a hearing, may authorize a willing person to temporarily manage and operate a utility that has discontinued or abandoned operations or the provision of services or is being referred to the attorney general for the appointment of a receiver under Section 13.412 of this code.

(b) The commission may appoint a person under this section by emergency order, and notice of the action is adequate if the notice is mailed or hand-known address of the utility's headquarters.

(c) A person appointed under this section has the powers and duties necessary to ensure the continued operation of the utility and the provision of continuous and adequate services to customers, including the power and duty to:

(1) read meters;
(2) bill for utility services;
(3) collect revenues;
(4) disburse funds; and
(5) request rate increase;

(d) This section does not affect the authority of the commission to pursue an enforcement claim against a utility or an affiliated interest.

Amendments and additions of Acts 1991, 72nd Leg., ch. 678, Sec. 13, eff. Sept. 1, 1991.

WASHINGTON

Chapter 133, Substitute Senate Bill No. 6447, 1990, Failing Public Water Systems

AN ACT Relating to failing public water systems; amending RCW 36.94.140, 43.70.190, 43.70.200, 43.155.070, 43.155.065, 70.199A.040, and 70.05.070; adding a new section to chapter 8.25 RCW; adding a new section to chapter 43.70 RCW; creating new sections; prescribing penalties; and declaring an emergency.

Be it enacted by the Legislature of the State of Washington:

Sec. 1. The legislature finds the best interests of the citizens of the state are served if:

(1) Customers served by public water systems are assured of an adequate quantity and quality of water supply at reasonable rates;

(2) There is improved coordination between state agencies engaged in water system planning and public health regulation and local governments responsible for land use regulation and public health and safety;

(3) Public water systems in violation of health and safety standards adopted under RCW 43.20.050 remain in operation and continue providing water service providing that public health is not compromised, assuming a suitable replacement purveyor is found and deficiencies are corrected in an expeditious manner consistent with public health and safety; and

(4) The state address, in a systematic and comprehensive fashion, new operating requirements which will be imposed on public water systems under the federal Safe Drinking Water Act.

Sec. 2. Section 14, chapter 72, Laws of 1967 as amended by section 2, chapter 188, Laws of 1975 1st ex. sess. and RCW 36.94.140 are each amended to read as follows:

Every county, in the operation of a system of sewerage and/or water, shall have full jurisdiction and authority to manage, regulate and control it and to fix, alter, regulate and control the rates and charges for the service to those to whom such county service is available, and to levy charges for connection to such system. The rates for availability of service and connection charges so charged must be uniform for the same class of customers or service.

In classifying customers served, service furnished or made available by such system of sewerage and/or water, or the connection charges, the board may consider any or all of the following factors:

(1) The difference in cost of service to the various customers within or without the area;

(2) The difference in cost of maintenance, operation, repair and replacement of the various parts of the systems;

(3) The different character of the service furnished various customers;

(4) The quantity and quality of the sewage and/or water delivered and the time of its delivery;

(5) Capital contributions made to the system or systems, including, but not limited to, assessments; (and)

(6) The cost of acquiring the system or portions of the system in making system improvements necessary for the public health and safety; and

(7) Any other matters which present a reasonable difference as a ground for distinction.

Such rates shall produce revenues sufficient to take care of the costs of maintenance and operation, revenue bond and warrant interest and principal amortization requirements, and all other charges necessary for the efficient and proper operation of the system.

Sec. 3. Section 5, chapter 102, Laws of 1967 ex. sess. as last amended by section 258, chapter 9, Laws of 1989 1st ex. sess. and RCW 43.70.190 are each amended to read as follows:

The secretary of health or local health officer may bring an action to enjoin a violation or the threatened violation of any of the provisions of the public health laws of this state or any rules or regulation made by the state board of health or the department of health pursuant to said laws, or may bring any legal proceeding authorized by law, including but not limited to the special proceedings authorized in Title 7 RCW, in the superior court in the county in which such violation occurs or is about to occur, or in the superior court of Thurston county. Upon the filing of any action, the court may, upon a showing of an immediate and serious danger to residents constituting an emergency, issue a temporary injunctive order ex parte.

Sec 4. A new section is added to chapter 43.70 RCW to read as follows:

(1) In any action brought by the secretary of health or by a local health officer pursuant to chapter 7.60 RCW to place a public water system in receivership, the petition shall include the names of one or more suitable candidates for receiver who have consented to assume operation of the water system. The department shall maintain a list of interested and qualified individuals, municipal entities, special purpose district, and investor-owned water companies with experience in the provision of water service and a history of satisfactory operation of a water system. If there is no other person willing and able to be named as receiver, the court shall appoint the county in which the water system is located as receiver. The county may designate a county agency to operate the system, or it may contract with another individual or public water system to provide management for the system. If the county is appointed as receiver, the secretary of health and the county health officer

shall provide regulatory oversight for the agency or other person responsible for managing the water system.

(2) In any petition for receivership under subsection (1) of this section, the department shall recommend that the court grant to the receiver full authority to act in the best interests of the customers served by the public water system. The receiver shall assess the capability, in conjunction with the department and local government, for the system to operate in compliance with health and safety standards, and shall report to the court its recommendations for the system's future operation, including the formation of a water district or other public entity, or ownership by another existing water system capable or providing service.

(3) If a petition for receivership and verifying affidavit executed by an appropriate departmental official allege an immediate and serious danger to residents constituting an emergency, the court shall set the matter for hearing within three days and may appoint a temporary receiver ex parte upon the strength of such petition and affidavit pending a full evidentiary hearing, which shall be held within fourteen days after receipt of the petition.

(4) A bond, if any is imposed upon a receiver, shall be minimal and shall reasonably relate to the level of operating revenue generated by the system. Any receiver appointed pursuant to this section shall not be held personally liable for any good faith, reasonable effort to assume possession of, and to operate, the system in compliance with the court's orders.

(5) The court shall authorize the receiver to impose reasonable assessments on a water system's customers to recover expenditures for improvements necessary for the public health and safety.

Sec. 5. Section 6, chapter 102, Laws of 1967 ex. sess. as last amended by section 259, chapter 9, Laws of 1989 1st ex. sess. and RCW 43.70.200 are each amended to read as follows:

Upon the request of a local health officer, the secretary of health is hereby authorized and empowered to take legal action to enforce the public health laws and rules and regulations of the state board of health or local rules and regulations within the jurisdiction served by the local health department, and may institute any civil legal proceeding authorized by the laws of the state of Washington, including a proceeding under Title 7 RCW.

Sec. 6. Section 12, chapter 446, Laws of 1985 as last amended by section 3, chapter 93, Laws of 1988 and RCW 43.155.070 are each amended to read as follows:

(1) To qualify for loans or pledges under this chapter the board must determine that a local government meets all of the following conditions:

(a) The city or county must be imposing a tax under chapter 82.46 RCW at a rate of at least one-quarter of one percent;

(b) The local government must have developed a long-term plan for financing public works needs; and

(c) The local government must be using all local revenue sources which are reasonably available for funding public works, taking into consideration local employment and economic factors.

(2) The board shall develop a priority process works projects as provided in this section. The intent of the priority process is to maximize the value of public works projects accomplished with assistance under this chapter. The board shall attempt to assure a geographical balance in assigning priorities to projects. The board shall consider at least the following factors in assigning a priority to a project:

(a) Whether the local government receiving assistance has experienced severe fiscal distress resulting from natural disaster or emergency public works needs;

(b) Whether the project is critical in nature and would affect the health and safety of a great number of citizens;

(c) The cost of the project compared to the size of the local government and amount of loan money available;

(d) The number of communities served by or funding the project;

(e) Whether the project is located in an area of high unemployment, compared to the average state unemployment; (and)

(f) Whether the project is the acquisition, expansion, improvement, or renovation by a local government of a public water system that is in violation of health and safety standards, including the cost of extending existing service to such a system, and

(g) Other criteria that the board considers advisable.

(3) Existing debt or financial obligations of local governments shall not be refinanced under this chapter. Each local government applicant shall provide documentation of attempts to secure additional local or other sources of funding for each public works project for which financial assistance is sought under this chapter.

(4) Before November 1 of each year, the board shall develop and submit to the chairs of the ways and means committees of the senate and house of representatives a description of the emergency loans made under RCW 43.155.065 during the preceding fiscal year and a prioritized list of projects which are recommended for funding by the legislature, including one copy to the staff of each of the committees. The list shall include, but not be limited to, a description of each project and recommended financing, the terms and conditions of the loan or financial guarantee, the local government jurisdiction and unemployment rate, demonstration of the jurisdiction's critical need for the project and documentation of local funds being used to finance

the public works project. The list shall also include measures of fiscal capacity for each jurisdiction recommended for financial assistance, compared to authorized limits and state averages, including local government sales taxes; real estate excise taxes; property taxes; and charges for or taxes or sewerage, water, garbage, and other utilities.

(5) The board shall not sign contracts or otherwise financially obligate funds from the public works assistance account before the legislature has appropriated funds for a specific list of public works projects. The legislature may remove projects from the list recommended by the board. The legislature shall not change the order of the priorities recommended for funding by the board.

(6) Subsections (4) and (5) of this section do not apply to loans made for emergency public works projects under RCW 43.155.065.

Sec. 7. Section 1. chapter 93, Laws of 1988 and RCW 43.155.065 are each amended to read as follows:

The board may make low-interest or interest-free loans to local governments for emergency public works projects. Emergency public works projects shall include the construction, repair, reconstruction, replacement, rehabilitation, or improvement of a public water system that is in violation of health and safety standards and is being operated by a local government on a temporary basis. The loans may be used to help fund all or part of an emergency public works project less any reimbursement from any of the following sources: (1) Federal disaster or emergency funds, including funds from the federal emergency management agency; (2) state disaster or emergency funds; (3) insurance settlements; or (4) litigation. Emergency loans may be made only from those funds specifically appropriated from the public works assistance account for such purpose by the legislature. The amount appropriated from the public works assistance account for emergency loan purposes shall not exceed five percent of the total amount appropriated from this account in any biennium.

Sec. 8, Section 4, chapter 271, Laws of 1986 as amended by section 135, chapter 175, Laws of 1989 and RCW 70.119A.040 are each amended to read as follows:

(1) In addition to or as an alternative to any other penalty provided by law, every person who commits any of the acts or omissions in RCW 70.119A.030 shall be subjected to a penalty in an amount of not less than five hundred dollars. The maximum penalty shall be not more that five thousand dollars per day for every such violation. Every such violation shall be a separate and distinct offense. The amount of fine shall reflect the health significance of the violation and the previous record of compliance on the part of the public water supplier. In case of continuing violation, every day's continuance shall be a separate and distinct violation. Every person who, through an act of commission or omission, procures, aids, or abets in the violation shall be considered to have violated the provisions of this section and shall be subject to the penalty provided in this section.

(2) The penalty provided for in this section shall be imposed by a notice in writing to the person against whom the civil fine is assessed and shall describe the violation. The notice shall be personally served in the manner of service of a summons in a civil action or in a manner that shows proof of receipt. A penalty imposed by this section is due twenty-eight days after receipt of notice unless application for remission or mitigation is made as provided in subsection (3) of this section or unless application for an adjudicative proceeding is filed as provided in subsection (4) of this section.

(3) Within fourteen days after the notice is received, the person incurring the penalty may apply in writing to the department for the remission or mitigation of such penalty. Upon receipt of the application, the department may remit or mitigate the penalty upon whatever terms the department in its discretion deems proper, giving consideration to the degree of hazard associated with the violation, provided the department deems such remission or mitigation to be in the best interests of carrying out the purposes of this chapter. The department shall not mitigate the fines below the minimum penalty prescribed in subsection (1) of this section. The department shall have the authority to ascertain the facts regarding all such applications in such reasonable manner as it may deem proper. When an application for remission on mitigation is made, a penalty incurred under this section is due twenty-eight days after receipt of the notice setting forth the disposition of the application, unless an application for an adjudicative proceeding to contest the disposition is filed as provided in subsection (4) of this section.

(4) Within twenty-eight days after notice is received, the person incurring the penalty may file an application for an adjudicative proceeding and may pursue subsequent review as provided in chapter 34.05 RCW and applicable rules of the department or board of health.

(5) A penalty imposed by a final order after an adjudicative proceeding is due upon service of the final order.

(6) The attorney general may bring an action in the name of the department in the superior court of Thurston county, or of any county in which such violator may do business, to collect a penalty.

(7) All penalties imposed under this section shall be payable to the state treasury and credited to the general fund.

Sec. 9. A new section is added to chapter 8.25 RCW to read as follows:

Consistent with standard appraisal practices, the valuation of a public water system as defined in RCW 70.229A.020 shall reflect the cost of system improvements necessary to comply with health and safety rules of the state board of health and applicable regulations developed under chapter 43.20, 43.20A, or 70.116 RCW.

Sec. 10. Section 12, chapter 51, Laws of 1967 ex. sess. as last amended by section 7, chapter 25, Laws of 1984 and RCW 70.05.070 are each amended to read as follows:

The local health officer, acting under the direction of the local board of health or under direction of the administrative officer appointed under RCW 70.05.040, if any, shall:

(1) Enforce the public health statutes of the state, rules and regulations of the state board of health and the secretary of social and health services, and all local health rules, regulations and ordinances within his or her jurisdiction including imposition of penalties authorized under RCW 70.119A.030 and filing of actions authorized by RCW 43.70.190;

(2) Take such action as is necessary to maintain health and sanitation supervision over the territory within his or her jurisdiction;

(3) Control and prevent the spread of any dangerous, contagious or infectious diseases that may occur within his or her jurisdiction;

(4) Inform the public as to the causes, nature, and prevention of disease and disability and the preservation, promotion and improvement of health within his or her jurisdiction;

(5) Prevent, control or abate nuisances which are detrimental to the public health;

(6) Attend all conferences called by the secretary of social and health services or his or her authorized representative;

(7) Collect such fees as are established by the state board of health or the local board of health for the issuance or renewal of licenses or permits or such other fees as may be authorized by law or by the rules and regulations of the state board of health((.));

(8) Inspect, as necessary, expansion or modification of existing public water systems, and the construction of new public water systems, to assure that the expansion, modification, or construction conforms to system design and plans;

(9) Take such measures as he or she deems necessary in order to promote the public health, to participate in the establishment of health educational or training activities, and to authorize the attendance of employees of the local health department or individuals engaged in community health programs related to or part of the programs of the local health department.

Sec. 11. The department shall prepare a report for the legislature no later than December 1, 1990, with regard to the problems of small water systems and proposed solutions. Such a report shall be prepared in consultation with the utilities and transportation commission, the department of community development, department of ecology, public works assistance board, and associations of cities, counties, public and private utilities, water districts, local health directors, and other interested groups. The report shall address, at a minimum, the following topics, with alternative approaches or solutions:

(1) The number and locations of existing public systems that do not meet public health and safety standards;

(2) Costs associated with state enforcement of new federal standards under the 1986 amendments to the Safe Drinking Water Act, including expenses and potential financing mechanisms for the operating costs of receivers of water systems when the system revenue is otherwise inadequate to cover the costs;

(3) Available financing for capital improvements for both publicly owned and privately owned water systems;

(4) Legal and regulatory barriers to improved delivery of safe and reliable drinking water supplies to the state's residents and in particular regulating and enforcement overlap between the department and the utilities and transportation commission;

(5) The effect of failing or inadequate water supplies on the ability of an owner to sell, or a buyer to obtain financing to buy, residential real estate in this state;

(6) Staffing levels for both state and local agencies responsible for enforcing the state's drinking water laws, including mechanisms for funding such staff;

(7) Revisions to requirements relating to certification of operators for public water systems, including the utilization state-wide of a system of satellite operators; and

(8) Such other topics as are significant and relevant.

Sec. 12. If any provision of this act or its application to any person or circumstance is held invalid, the remainder of the act of the application of the provision to other persons or circumstances is not affected.

Sec. 13. This act is necessary for the immediate preservation of the public peace, health, or safety, or support of the state government and its existing public institutions, and shall take effect immediately.

Passed the Senate March 3, 1990.
Passed the House March 1, 1990.
Approved by the Governor March 21, 1990.
Filed in Office of Secretary of State March 21, 1990.

APPENDIX D

REGIONALIZATION OPTIONS: DEFINITIONS, ADVANTAGES, AND DISADVANTAGES

Informal Agreement

<u>Definition</u>
A voluntary cooperative arrangement between water systems or between a water system and another service entity to provide a needed function or share a common facility.

<u>Advantages</u>
Easy to create or implement
Adjustable to duration of need
Forerunner of more binding relationship
Easy to terminate

<u>Disadvantages</u>
Not legally enforceable
Easy to terminate
No formal continuity from administrator to administrator

Regional Council of Local Officials

<u>Definition</u>
A nonbinding forum for identifying problems common to a given area (usually one affected by more than one jurisdiction) and promoting agreement on mutual courses of action.

<u>Advantages</u>
Easy to create
Provides centralized planning and coordination
Provides a forum for community and individual input to decisionmaking
No restrictions on local autonomy or policy control

<u>Disadvantages</u>
Decisions not legally enforceable
No power to raise funds
Relation to other governmental units is strictly advisory

Basic Service Contract

<u>Definition</u>
A legal agreement between water systems or between a water system and a water service company to provide a service.

<u>Advantages</u>
Easy to create
No restrictions on local autonomy or policy control
No governmental reorganization
Adjustable to meet changing service needs and demands
Realization of unit cost savings via larger quantity purchases (economies of scale)
Able to provide specialized services not otherwise available
No voter approval required

Basic Service Contract (continued)

<u>Disadvantages</u>
Easy to terminate; back to original status if terminated
Temporary (possibly)
Too expensive (sometimes)
May provide only part of needed services

Joint Service Agreement

<u>Definition</u>
The sharing or exchange of activities among two or more water systems or other service entities, typically more complex than a basic service contract.

<u>Advantages</u>
Easy to create
Realization of unit cost savings via larger quantity purchases (economies of scale)
Minimal disruption of existing organizational and administrative structures
More permanent than basic service contracts
More uniform coordination and administration of services
More efficient use of personnel, equipment, and facilities
Able to provide specialized services not otherwise available
Elimination of duplication of facilities
Increase in overall efficiency of service
No voter approval required

<u>Disadvantages</u>
Impact on local autonomy and policy control
More difficult to terminate than basic service contracts
Benefits to outside jurisdictions that do not compensate participants
Sometimes difficult to distribute costs equally
Difficult to compute and equally distribute some overhead costs
Difficult for participants to provide service themselves if the agreement fails

Satellite Management

<u>Definition</u>
The process by which a larger or central water utility assists a small system by (1) providing varying levels of technical, operational, or managerial assistance on a contract basis, (2) providing wholesale treated water with or without additional services, or (3) assuming ownership, operation, and maintenance responsibility when the small system is physically separate from another source of supply. A system is not considered a satellite when it is physically connected to and owned by the larger utility.

Satellite Management (continued)

Advantages
Improved economy of scale for satellites
Expands revenue base of parent utility
Provides needed resources to satellites
Satellite can retain local autonomy
Improved water quality management of satellite
Improves use of public funds when satellites are publicly owned

Disadvantages
Less independence for satellite
Fear of satellite being absorbed by the larger utility

Annexation

Definition
Occurs when a water system extends its service area to include neighboring territory through a change in service boundaries or a change in corporate limits.

Advantages
Immediate increase in service area population
Makes use of the existing water supplier's infrastructure
Provision of service to areas outside jurisdictional boundaries
Annexed area acquires same rights and obligations as rest of service area
Realization of economies of scale
Power of eminent domain
Applicable to municipal services in addition to water supply

Disadvantages
Not easy to implement
Susceptible to public opposition from those not wishing to be annexed
Voter approval may be required
Can be politically motivated
Not applicable to noncontiguous areas
Capital expense required to service new customers

Association/ Nonprofit Water Supply Corporation

Definition
Usually created under the authority of a state charter, these entities commonly exist in unincorporated and largely rural areas.

Advantages
Easy to create
Authorized to acquire water sources and construct and operate a water distribution system
Power of eminent domain
Authorized to issue bonds secured by assets and revenues
Not-for-profit operation
Authorized to seek federal financing

Association/ Nonprofit Water Supply Corporation (continued)

Disadvantages

No power to tax
Not authorized to issue general obligation bonds
Limited power in relation to other governmental units

Local Special-Purpose District

Definition

Generally units of local government that provide a specific service to a defined geographic area.

Advantages

Often provides the only method to provide a much needed service
Power of eminent domain
Authorized to levy special assessments
Can match service areas with service needs
More efficient than local government
Greater financial flexibility than local government
Less restrictive than local government on cooperative agreements
Convenient and inexpensive way to provide service in local areas

Disadvantages

General obligation bonds not backed by full faith and credit of parent government
Restricted to revenue bonds, which can be repaid only by user revenues
Powers limited directly to those required to provide service
Quasi-governmental entity
Susceptible to public opposition because of its permanence

Areawide Special District/ Authority

Definition

Similar but distinguished from local special districts by the larger service area affected, the wider range of service provided (such as water and sewerage service), and a higher degree of autonomy.

Advantages

No state-imposed debt ceilings
Timely access to major sources of capital
Higher salaries to attract more technical and skilled personnel
A "quasi-business"
Provision of service to areas that cross jurisdictional boundaries
Realization of economies of scale

Disadvantages

Potential lack of accessibility and accountability
Activities uncoordinated with those of other local governments
Potentially less cost-effective

Water Districts

Definition

Utilities formed by county officials, most often upon petition of citizens, under state enabling laws to provide one or more water systems in a designated geographical or franchise area.

Advantages

Eligible for public grants and loans
Can issue tax-free securities
Has potential economy of size
Facilitates takeover or contract services with publicly owned noncommunity systems and small privately owned systems
Can be a major tool in controlling proliferation of small systems
Right of eminent domain
A decided tax advantage
Retains local autonomy

Disadvantages

Can be subject to politics
Can be another small system unless there is a good local planning effort
Competes with private enterprise
Distance factors may eliminate ability to serve needy systems

County Utilities

Definition

Utilities owned and operated by the county (or township) commissions or by county public works departments (excluding water districts).

Advantages

Provides central management
Can enable economy of scale
Easy to establish
Not easy to terminate
Decided tax advantages
Facilitates takeover of troubled systems
Eligible for public grants and loans

Disadvantages

Can be subject to politics
Competes with private enterprise
Requires enabling law

State Utilities

Definition

Utilities owned and operated by an agency of state government or a stat agent that operates and maintains water utilities on a contractual basis.

State Utilities (continued)	<u>Advantages</u> Savings through centralized purchasing, management, consultation, planning and technical assistance State owned systems provide a substantial base Bonding advantages of the state Broad geographical base Close ties with regulatory agencies A trained network of skilled operators Allows cost sharing of major equipment Facilities takeover of state owned utilities Provides means to operate abandoned or troubled small systems Can be a tool in controlling proliferation of small systems <u>Disadvantages</u> Slow response (bureaucracy) Perceived as "The State" Competes with private contractors Can be subject to politics Requires enabling law Geographical distribution may eliminate ability to serve some needy systems

Source: Adapted from SMC Martin, Inc., *Regionalization Options for Small Water Systems* (Washington, DC: Environmental Protection Agency, 1983) and Robert G. McCall, *Institutional Alternatives for Small Water Systems* (Denver, CO: American Water Works Association Research Foundation, 1986).

APPENDIX E

DUN & BRADSTREET BUSINESS RATIOS

I. Solvency

Quick Ratio is computed by dividing cash plus accounts receivable by total current liabilities. Current liabilities are all the liabilities that fall due within one year. This ratio reveals the protection afforded short-term creditors in cash or near-cash assets. It shows the number of dollars of liquid assets available to cover each dollar of current debt. Any time this ratio is as much as 1 to 1 (1.0) the business is said to be in a liquid condition. The larger the ratio the greater the liquidity.

Current Ratio. Total current assets are divided by total current liabilities. Current assets include cash, accounts and notes receivable (less reserves for bad debts), advances on inventories, merchandise inventories, and marketable securities. This ratio measures the degree to which current assets cover current liabilities. The higher the ratio the more assurance exists that the retirement of current liabilities can be made. The current ratio measures the margin of safety available to cover any possible shrinkage in the value of current assets. Normally a ratio of 2 to 1 (2.0) or better is considered good.

Current Liabilities to Net Worth is derived by dividing current liabilities by net worth. This contrasts the funds that creditors temporarily are risking with the funds permanently invested by the owners. The smaller the net worth and the larger the liabilities, the less security for the creditors. Care should be exercised when selling any firm with current liabilities exceeding two-thirds (66.6 percent) of net worth.

Current Liabilities to Inventory. Dividing current liabilities by inventory yields another indication of the extent to which the business relies on funds from disposal of unsold inventories to meet its debts. This ratio combines with Net Sales to inventory to indicate how management controls inventory. It is possible to have decreasing liquidity while maintaining consistent sales-to-inventory ratios. Large increases in sales with corresponding increases in inventory levels can cause an inappropriate rise in current liabilities if growth isn't made wisely.

Total Liabilities to Net Worth. Obtained by dividing total current plus long-term and deferred liabilities by net worth. The effect of long-term (funded) debt on a business can be determined by comparing this ratio with Current Liabilities to Net Worth. The difference will pinpoint the relative size of long-term debt, which, if sizable, can burden a firm with substantial interest charges. In general, total liabilities shouldn't exceed net worth (100 percent) since in such cases creditors have more at stake than owners.

Fixed Assets to Net Worth. Fixed assets are divided by net worth. The proportion of net worth that consists of fixed assets will vary greatly from industry to industry but generally a smaller proportion is desirable. A high ratio is unfavorable because heavy investment in fixed assets indicates that either the concern has a low net working capital and is overtrading or has utilized large funded debt to supplement working capital. Also, the larger the fixed assets, the bigger the annual depreciation charge that must be deducted from the income statement. Normally, fixed assets above 75 percent of net worth indicate possible over-investment and should be examined with care.

II. Efficiency

Collection Period. Accounts receivable are divided by sales and then multiplied by 365 days to obtain this figure. The quality of the receivables of a company can be determined by this relationship when compared with selling terms and industry norms. In some industries where credit sales are not the normal way of doing business, the percentage of cash sales should be taken into consideration. Generally, where most sales are for credit, any collection period more than one-third over normal selling terms (40.0 for 30-day terms) is indicative of some slow-turning receivables. When comparing the collection period of one concern with that of another, allowances should be made for possible variations in selling terms.

Net Sales to Inventory. Obtained by dividing annual net sales by inventory. Inventory control is a prime management objective since poor controls allow inventory to become costly to store, obsolete or insufficient to meet demands. The sales-to-inventory relationship is a guide to the rapidity at which merchandise is being moved and the effect on the flow of funds into the business. This ratio varies widely between different lines of business and a company's figure is only meaningful when compared with industry norms. Individual figures that are outside either the upper or lower quartiles for a given industry should be examined with care. Although low figures are usually the biggest problem, as they indicate excessively high inventories, extremely high turnovers might reflect insufficient merchandise to meet customer demand and result in lost sales.

Assets to Sales is calculated by dividing total assets by annual net sales. This ratio ties in sales and the total investment that is used to generate those sales. While figures vary greatly from industry to industry, by comparing a company's ratio with industry norms it can be determined whether a firm is overtrading (handling an excessive volume of sales in relation to investment) or undertrading (not generating sufficient sales to warrant the assets invested). Abnormally low percentages (above the upper quartile) can indicate overtrading which may lead to financial difficulties if not corrected. Extremely high percentages (below the lower quartile) can be the result of overly conservative or poor sales management, indicating a more aggressive sales policy may need to be followed.

Sales to Net Working Capital. Net sales are divided by net working capital. (Net working capital is current assets minus current liabilities.) This relationship indicates whether a company is overtrading or conversely carrying more liquid assets than needed for its volume. Each industry can vary substantially and it is necessary to compare a company with its peers to see if it is either overtrading on its available funds or being overly conservative. Companies with substantial sales gains often reach a level where their working capital becomes strained. Even if they maintain an adequate total investment for the volume being generated (Assets to Sales), that investment may be so centered in fixed assets or other noncurrent items that it will be difficult to continue meeting all current obligations without additional investment or reducing sales.

Accounts Payable to Sales. Computed by dividing accounts payable by annual net sales. This ratio measures how the company is paying its suppliers in relation to the volume being transacted. An increasing percentage, or one larger than the industry norm, indicates the firm may be using suppliers to help finance operations. This ratio is especially important to short-term creditors since a high percentage could indicate potential problems in paying vendors.

III. Profitability

Return on Sales (Profit Margin) is obtained by dividing net profit after taxes by annual net sales. This reveals the profits earned per dollar of sales and therefore measures the efficiency of the operation. Return must be adequate for the firm to be able to achieve satisfactory profits for its owners. This ratio is an indicator of the firm's ability to withstand adverse conditions such as falling prices, rising costs and declining sales.

Return on Assets. Net profit after taxes divided by total assets. This ratio is the key indicator of profitability for a firm. It matches operating profits with the assets available to earn a return. Companies efficiently using their assets will have a relatively high return while less well-run businesses will be relatively low.

Return on Net Worth (Return on Equity) is obtained by dividing net profit after tax by net worth. This ratio is used to analyze the ability of the firm's management to realize an adequate return on the capital invested by the owners of the firm. Tendency is to look increasingly to this ratio as a final criterion of profitability. Generally, a relationship of at least 10 percent is regarded as a desirable objective for providing dividends plus funds for future growth.

Source: Dun & Bradstreet Credit Services, *Industry Norms & Key Business Ratios, One Year Edition 1988-89* (New York: Dun & Bradstreet, 1989), v-vi.

APPENDIX F

COMPONENTS OF A BUSINESS PLAN FOR SMALL WATER SYSTEMS

1. **Assess compliance status with Pennsylvania Department of Environmental Resources (PADER) Design Standards, Part II, Community System Design Standards, PADER Public Water Supply Manual**

2. **Define Service Area(s)**
   - current
   - projected
     - short-term (5-10 years)
     - long-term (30-40 years)
     - ultimate

3. **Estimate Demands**
   - population and population served
   - per capita
   - unaccounted-for
   - conservation impacts
   - historical record analysis
   - projections
     - short-term
     - long-term
     - ultimate
   - average daily demands
   - maximum daily demands
   - special considerations

4. **Document Existing Facilities**
   - location
   - capacity
   - permits
   - condition and service life

5. **Document Adjoining Systems**
   - service areas
   - primary facilities
   - system capabilities
   - hydraulic profile

6. **Source of Supply**
   - establish drought yield
   - compare with demands
   - identify source capacity needs
   - identify new source options
   - evaluate yield, treatment, etc. requirements
   - evaluate source and potential sources

7. **Water Resource Protection Programs**
   - wellhead protection
   - watershed protection

8. **Treatment**
   - cover existing and potential sources
   - evaluate raw and finished water quality
   - assess current treatment requirements and SDWA compliance
   - monitor for unregulated contaminants to forecast future treatment needs
   - assess vulnerability to other contaminants, not detected in monitoring
   - evaluate treatment adequacy
   - evaluate improvement alternatives
   - identify treatment options
   - waste disposal systems

9. **Transmission**
   - piping
   - pumping
   - special requirements

10. **Distribution Storage**
    - operating storage
    - emergency reserve
    - fire service
    - service level hydraulics

11. **Distribution Network**
    - service pressures
    - sizing
    - looping
    - condition

12. **Metering System**
    - master metering
    - customer metering

13. **Operation Facilities**
    - office facilities and equipment
    - garage and equipment storage
    - materials storage
    - SCADA system
    - chemical storage

14. **Property Requirements**
    - lands
    - easements
    - records

15. **Quality Testing Capabilities**
    - field testing
    - laboratory
        - in-house
        - outside services

16. **Emergency Service Capabilities**
    - failure evaluations
    - auxiliary power

17. **Alternative Facility Projects**
    - alternative system makeups
    - estimation of full costs of alternatives (perhaps using expanded version of PAWATER cost model)
    - life cycle cost analyses
    - other evaluations
    - selection of optimum capital improvements program

18. **Capital Improvements Program**

    - documentation
    - implementation
    - monitoring
    - regular updating

1. **Plan of Organization and Control**
   - chain of command
   - clear duties, responsibilities, etc.

2. **Staffing and Personnel Management**
   - size adequacy
   - qualifications, experience, certification, etc.

3. **Policies and Standards**
   - general rules and regulations
   - main extension policies
   - standard specifications

4. **Budgeting, Planning and Rate Analysis**
   - capital improvements planning and capital budgeting
   - annual budget process
   - rate review and adequacy of operating revenues

5. **Accounting Practices and Tracking Systems**
   - accounting conventions and standards
   - departmental and special project tracking systems
   - budget performance tracking and reporting
   - fixed asset recordkeeping
   - taxes and other filings

6. **Expenditure Controls and Purchasing Procedures**

7. **Billing and Collection**

8. **Records Management**
   - mapping
   - facility records
   - customer records
   - O&M records
   - operations reporting
   - regulatory reporting
   - priority records (permits, deeds, etc.)
   - records security

9. **Regulatory Compliance Program**
   - quantity
   - quality
   - other

10. **Emergency and Drought Response Plans**
    - emergency protocols
    - system interconnections and interactions
    - drought contingency plan

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11. **External Relations**
    - customers and the general public
    - media
    - local and state government agencies

12. **Engineering, Legal and Other Outside Services**

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1. **Detailed Facility Descriptions**
   - listings
   - drawings
   - specifications
   - performance data
   - facility and/or equipment manuals

2. **Start-up and Shut-down Procedures**
   - detailed instructions
   - potential alarm conditions
   - records and logs

3. **Normal Operating Procedures**
   - personnel responsibilities, interactions, etc.
   - communications data
   - monitoring and recordkeeping (SCADA, other)
   - records and logs
   - system performance (pressure monitoring, etc.)

4. **Facility and Equipment Inspections**
   - regular/routine scheduling
   - periodic/special scheduling
   - check lists
   - records and logs
   - by internal staff
   - with outside assistance

5. **Planned Maintenance and Replacement Programs**
   - routine/preventive activities
   - potential special activities
   - scheduling
   - material requirements
   - equipment requirements
   - staffing requirements
   - detailed instructions

6. **Emergency and Drought Operating Procedures**

7. **Water Quality Monitoring**
   - identify quality monitoring program
     - regulatory imposed
     - supplemental
   - procedures (parameters, locations, frequency, etc.)
   - responsibilities (staff, labs)
   - reporting
   - response procedures
   - sanitary surveys

8. **Unaccounted-for Water Program**
   - leakage detection program
   - meter accuracy program

9. **Cross-Connection Control (Backflow Prevention) Program**
   - defined policies
   - policy enforcement

10. **Operations Records and Reporting**
    - comprehensive information
    - information recovery (filing)
    - operations records
    - management reporting
    - timeliness of reporting systems
    - complaint/response records
    - failure records and analysis
    - staff responsibilities
    - regulatory reporting

11. **Operations Staffing and Training**
    - training and certification
    - continuing education

12. **Safety Programs**
    - manual or documentation
    - policies, procedures, etc.
    - training (routine or special)
    - hazardous material emphasis
    - SARA Title III obligations
    - accident records

1. **Establishing financial planning models to provide framework for assessing water system costs, past and projected, and to generate customer rate estimates; suggest utilization of PAWATER for facility cost estimates and AWWA "Financial Planning Model for Water Utilities" or equivalent for capital budgeting and rate analysis.**

2. **Document historical cost experiences**
   - capital cost records
   - debt related costs
   - operating expenses - comprehensive
     - operations
     - maintenance
     - administrative

3. **Establish Financing Parameters**
   - current and projected
   - customer mix
   - consumption and peaking factors
   - financial control parameters (interest rates, borrowing terms, etc.)

4. **Capital Program Costs**
   - documents CIP from facilities plan
   - analyze funding requirements
   - identify revenue requirements

5. **Operating and Maintenance Costs**
   - analyze historical costs
   - projected costs

6. **Establish Total Revenue Requirements**
   - following accepted practices (e.g., AWWA M35 Manual)
   - merge capital and O&M annual payments
   - provide for adequate reserves

7. **Analyze and Establish Rates and Charges**
   - follow accepted practices (e.g., AWWA M1 and M26 Manuals)
   - evaluate alternatives
   - test at alternative growth rates
   - devise adequate rates

8. **Monitor Performance**
   - process to monitor financial performance
   - budget comparisons and provisions for adjustments

Source: Wade Miller Associates, Inc., *State Initiatives to Address Non-Viable Small Water Systems in Pennsylvania* (Arlington, VA: Wade Miller Associates, Inc., 1991), appendix C.

APPENDIX G

APPLICATION OF THE ALTMAN AND PLATT AND PLATT MODELS TO WATER UTILITIES

The Altman Model

Because of structural and operating differences, the Altman's Z-Score model is not expected to perform well for water companies. The 1968 model has five independent predictor variables and assumes the following mathematical form:

$$Z = 1.2*X1 + 1.4*X2 + 3.3*X3 + .6*X4 + 1.0*X5.$$

The independent predictor variables X1 to X5 are defined as follows:

X1 = working capital/total assets
X2 = retained earnings/total assets
X3 = operating income/total assets
X4 = market value of equity/book value of debt
X5 = sales/total assets.

When the Altman model is applied to individual firms the Z Score predicts whether the firm will file for bankruptcy within one year (indeed, Altman's sample of firms actually did file for Chapter 7 or 11 bankruptcy protection). The predictive accuracy for two or three years previous to filing is less accurate. The accuracy of most models falls off considerably two, three, or four years prior to bankruptcy. The Z Score can be interpreted as follows:

$\leq$ 1.81	Bankruptcy very probable within one year
$\geq$ 2.99	Bankruptcy very unlikely within one year
1.81 to 2.99	Uncertain area
$\geq$ 3.00	Strong
$\geq$ 4.00	Very strong

Typically the Z Score is estimated annually for client firms. Deterioration in the Z Score is apparent as it approaches the critical level of 1.81. The model is not universally accurate and needs to be applied on a regular basis to get a clear view of a firm's bankruptcy possibility under a variety of economic circumstances. The applications shown below are for one time period only, which tends to lessen the usefulness of the model.

The Z-Score model first was applied to a number of nonregulated firms that were known to be financially distressed in 1988-89 (based on bankruptcy or near bankruptcy). Second, it was applied to five water utilities for 1989 whose stock is actively traded on major stock exchanges--the well known water utilities. Finally, it was tested on some water companies that are less well known, identified from the 1989 NAWC annual financial report for member companies. The latter firms are divided into the five "best" and the five "worst" in 1989 based on their return on equity (net income/total common equity). Since the market value of stocks is not available for all firms it was necessary to use the alternate form of Altman's model, referred to as the Z' Score model. This form was designed for small firms or privately held firms whose market prices are difficult to find. All of the results are shown in table G-1.

The Z scores for the financially weak and nonregulated companies (Group A) are higher than for the three groups of water utilities and, except for Financial News Network, are close to the "uncertain" range of the Altman scale. Strong companies generally would have very high Z scores of 4.0 or higher and they tend to deteriorate each year if the company's financial position weakens.[1]

Of the water utilities the weakest ones (Group C) show very low Z' scores compared with the last two groups of strong water companies even though all of the water utilities in Groups B, C, and D are predicted to enter bankruptcy according the Altman scale. The model, though lacking, indicates that weak water companies can be predicted to have lower Z or Z' scores as the theory suggests. That the model predicts bankruptcy for all water companies is due to structural and operating differences between regulated water utilities and other nonutility firms. Different independent predictor variables could be used for water companies if a water-industry-specific model was desired. The increasing acceptance of such models is indicated by Altman's claim that about thirty-six major clients have subscribed to his service.

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[1] Altman, *Corporate Financial Distress.*

TABLE G-1
APPLICATION OF ALTMAN'S Z-SCORE MODEL

Group A: Five Financially Weak Nonregulated Firms (a)

1.	Goody Products	Z = 3.21	ROE = -7.6% (b)
2.	Child World	Z = 3.23	ROE = 2.8
3.	Financial News Network(c)	Z = 6.66	ROE = 11.4
4.	Tonka	Z = 1.80	ROE = 3.0
5.	Ames Department Stores(d)	Z = 2.40	ROE = 7.2

Group B: Five Strongest and Widely Traded Water Utilities Based on ROE(b)

1.	The York Water Company	Z = .657	ROE = 12.70%
2.	California Water Service	Z = 1.380	ROE = 12.50
3.	Connecticut Water Service	Z = .752	ROE = 11.30
4.	Indianapolis Water (IWC)	Z = .591	ROE = 10.80
5.	American Water Works	Z = 4.450	ROE = 9.90

Group C: Five Strongest NAWC Water Utilities Based on ROE(b)

1.	Suburban Water Supply	Z' = 1.260	ROE = 18.34%
2.	Wilmington Suburban (GN)	Z' = .510	ROE = 18.16
3.	Bloomsburg Water Company (GN)	Z' = .948	ROE = 17.85
4.	Metropolitan	Z' = 1.042	ROE = 16.80
5.	Wakefield	Z' = .610	ROE = 15.84

Group D: Five Weakest NAWC Water Utilities Based on ROE(b)

1.	Rolling Oaks	Z' = .234	ROE = -34.65%
2.	West Lafayette	Z' = .725	ROE = -14.93
3.	Lackland City	Z' = .795	ROE = -12.84
4.	Gordon's Corners	Z' = .308	ROE = -11.54
5.	Unionville	Z' = .187	ROE = -2.37

Source: Annual reports and *NAWC Annual Financial Reports.* Data are for 1989.

(a) Selected on the basis of bankruptcy or near bankruptcy.
(b) ROE indicates return on equity.
(c) Filed for bankruptcy in March 1991.
(d) Filed for bankruptcy in April 1990.

The Platt and Platt Model

Another recently published bankruptcy prediction model is the one developed by Platt and Platt.[2] It is commercially available also and is different from earlier models in that while it uses similar predictor ratios it uses the individual firm's ratio relative to the same ratio for the industry. Thus the firm's financial position is looked at vis-a-vis the industry. This was done mostly because it minimizes data instability over time and incorporates the effect of industry factors on individual companies both being serious problems with other models.[3] That is why it is referred to as an industry-relative model.

The Platt and Platt model has the following form:

$$P_i = 1/[\,1 + \exp. -(B_o + B_1X_{i1} + B_2X_{i2} + \ldots .B_nX_{in})],$$

where: P_i = probability of failure of the ith firm, and
X_{ij} = jth industry-relative ratio of the ith firm.

The final estimated form of the Platt and Platt model includes the following independent predictor variables:

X1 = sales growth (percent change)
X2 = cash flow/sales
X3 = net fixes assets/total assets
X4 = total debt/total assets
X5 = current liabilities/total debt
X6 = industry output change * X2
X7 = industry output change * X4.

An illustration of the model appears in table G-2. It is difficult to replicate the model without access to a complete industry data base and the estimated coefficients. Clients must contract to use the model and obtain the necessary information. The estimated probability formula for the sample company is:

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2 Platt and Platt, "Development of a Class of Stable Predictive Variables: The Case of Bankruptcy Prediction," 31-51.

3 Ibid.

Probability = exp.**[(2*P) - 10]
= 2.718**(-1.51) - 10
= 2.718 **(-13.02)
= 0.0000022.

The estimated failure probability of 0.0000022 is infinitely small for the illustrated company. If the firm was financially distressed the probability value would approach 1. When failure is unlikely it approaches zero as the illustration shows. The ratios used in the Platt and Platt model are similar to those of Pinches, Hamer, Zavgren, Altman, and others.

The Platt and Platt model was tested on two water companies taken from the 1989 NAWC *Operating and Financial Data.* The two companies include the water utility with the lowest return on equity (ROE) in 1989, Rolling Oaks (ROE= -34.64 percent); and the water utility with the highest return on equity in 1989, Suburban Water Supply Company (ROE= 18.34 percent). The Platt and Platt probabilities of failure for both companies were in the range of .0000089, which is extremely low even though one of utilities is in serious financial distress.

TABLE G-2

APPLICATION OF THE PLATT AND PLATT INDUSTRY-RELATIVE MODEL

Step 1: Calculate Ratio Values

Ratio 1 = $\frac{\text{Sales (new) - Sales (old)}}{\text{Sales (old)}} = \frac{100}{1900} = 0.052$

Ratio 2 $\frac{\text{Cash flow}}{\text{Sales}} = \frac{75 + 100}{2000} = 0.088$

Ratio 3 = $\frac{\text{Net fixed assets}}{\text{Total assets}} = \frac{125}{575} = 0.217$

Ratio 4 = $\frac{\text{Total debt}}{\text{Total assets}} = \frac{150 + 275}{575} = 0.739$

Ratio 5 = $\frac{\text{Short-term debt}}{\text{Total debt}} = \frac{150}{150 + 275} = 0.353$

Ratio 6 = $\frac{\text{Industry output (old) - Industry output (new)}}{\text{Industry output (new)}} = 0.027$

Step 2: Calculate Industry-Relative Ratio Values

Ratio 1 = $\frac{\text{Company ratio}}{\text{Industry ratio}} = \frac{.052}{.027} = 1.93$

Ratio 2 = $\frac{\text{Company ratio}}{\text{Industry ratio}} = \frac{.088}{.088} = 1.00$

Ratio 3 = $\frac{\text{Company ratio}}{\text{Industry ratio}} = \frac{.217}{.434} = 0.50$

Ratio 4 = $\frac{\text{Company ratio}}{\text{Industry ratio}} = \frac{.739}{.600} = 1.23$

Ratio 5 = $\frac{\text{Company ratio}}{\text{Industry ratio}} = \frac{.353}{.400} = 0.88$

TABLE G-2 (continued)

Step 3: Enter Industry-Relative Ratios into Formula

P = -3.98	+	(-.007	*	Ratio 1)		
	-	(1.23	*	Ratio 2)		
	+	(0.43	*	Ratio 3)		
	+	(2.36	*	Ratio 4)		
	+	(0.58	*	Ratio 5)		
	+	(-6.11	*	Ratio 6	*	Ratio 2)
	+	(7.61	*	Ratio 6	*	Ratio 4)

P = -3.98	+	(-.007	*	1.93)		
	-	(1.23	*	1.00)		
	+	(0.43	*	0.50)		
	+	(2.36	*	1.23)		
	+	(0.58	*	0.88)		
	+	(-6.11	*	0.027	*	1.00)
	+	(7.61	*	0.027	*	1.23)

P = -1.51

Step 4: Solve for Probability of Bankruptcy

Probability = EXP** [(2 * P) - 10]

= 2.718** [(2 * -1.51) - 10]

= 2.718** [-13.02]

Probability = 0.0000022

Source: Used with permission of Dr. Harlan D. Platt.

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American Water Works Association (AWWA)
6666 West Quincy Avenue
Denver, Colorado 80235
(303) 794-7111

National Association of Water Companies (NAWC)
1725 K Street NW, Suite 1212
Washington, DC 20006
(202) 833-8383

National Rural Water Association (NRWA)
Post Office Box 1428
Duncan, Oklahoma 73534
(405) 252-0629

National Small Flows Clearinghouse
West Virginia University
P.O. Box 6064
Morgantown, West Virginia 26506-6064
(800) 624-8301

Rural Community Assistance Program (RCAP)
602 South King Street #402
Leesburg, Virginia 22075
(703) 771-8636

U.S. Environmental Protection Agency (USEPA)
Office of Ground Water and Drinking Water
401 M Street, SW (WH550)
Washington, DC 20460

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