NRRI 97-05

A CUSTOMER-BASED QUALITY-OF-SERVICE APPROACH FOR REGULATING WATER UTILITIES

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January 1997

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 author do not necessarily state or reflect the views, opinions, or policies of the NRRI, NARUC, or NARUC member commissions.

EXECUTIVE SUMMARY

The regulatory system provides a number of direct and indirect incentives to jurisdictional water utilities that are designed to produce desired outcomes that support important regulatory or social goals. State commissions have devoted a large portion of their oversight efforts to developing and enforcing quality-of-service standards in order to ensure that all customers receive pure water. Commissioners and their staff, however, have often worried

- Do the official service quality standards reflect the true preferences of a utility's customers?

- Are individual complaints received in hearings, or through 800 number consumer complaint lines, representative of all customers?

- Are commission surveillance and reporting procedures sufficient to detect quality-of-service problems?

This report presents a method--a quality-of-service telephone survey--that can be used to develop customer-based service quality standards. The survey approach allows commissioners and their staffs to identify the **preferences of customers**, track the representativeness of **complaints**, and to independently **monitor** compliance in a cost-efficient manner.

This report uses several surveys conducted by state commissions, investor-owned water utilities, and municipal water utilities to demonstrate the usefulness of the survey approach.

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ACKNOWLEDGMENTS

Todd Simpson of the NRRI staff contacted all state regulatory commissions and obtained the basic survey data. His assistance and insights are appreciated and significantly improved the usefulness of the report. I especially wish to thank Linda Schmidt, who typed the report and prepared the tables with her usual cheerful competence. John Borrows and Dr. Douglas Jones reviewed the report and provided helpful comments.

CHAPTER 1

DIFFERENT QUALITY-OF-SERVICE APPROACHES

Introduction

The regulatory environment in a state provides a complex set of direct and indirect incentives that in varying ways influence the structure, conduct, and performance of the investor-owned water utility sector. Pricing policies, cost recovery mechanisms, and environmental regulations all influence how investor-owned water utilities are able to deliver water to their customers. Traditionally, one important way that state regulatory commissions sought to affect utility behavior was through the use of commission-mandated quality-of-service (QOS) standards.[1] While there is a tendency to think of QOS standards as exclusively technical in nature, somewhat overwhelming, and perhaps even arcane, in actuality these standards can have as much impact on utility operation as price or environmental regulation.

This chapter briefly examines two different approaches to service quality and advances a customer-based QOS approach that can be used effectively by state commissions. Armed with the information produced by the customer-based approach, state commissions can design specific QOS incentives for its jurisdictional water utilities.

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[1] See Vivian Witkind Davis, Larry Blank, David Landsbergen, Nancy Zearfoss, Raymond W. Lawton, and John Hoag, *Telecommunications Service Quality* (Columbus, Ohio: The National Regulatory Research Institute, March 1996); Raymond W. Lawton, "Water Quality-of-Service Survey Approach" in *Biennial Regulatory Information Conference Proceedings,* Volume III (Columbus, Ohio: The National Regulatory Research Institute, 1996); and Raymond W. Lawton, "Network Utilization Principles and Pricing Strategies for Network Reliability" in *Quality and Reliability of Telecommunications Infrastructure,* ed. William Lehr (Mahwah, NJ: Lawrence Erlbaum Associates, 1995).

One way to understand QOS standards is to focus on the standards concept. Standards are effective and work when they have some authoritative force to enforce the standard. Otherwise, the standard would be ineffective, as it could be ignored, absent any enforcement mechanism. In the approaches briefly identified below the commission, the water utility industry, the individual water utility, and the customer are all examined as possible sources of QOS standards.

Authoritative Approaches

Because governmental agencies and commissions can compel compliance, they have often been seen as the most expedient way to institute standards.

The traditional approach to standard setting is to have a formal, recognized, entity establish and enforce QOS standards. Because governmental agencies and commissions can compel compliance, they have often been seen as the most expedient way to institute standards. State commissions, because they are regulatory agencies charged by their state legislatures (or state constitution) to advance state goals, have had little difficulty in becoming a standard-setting body. They can and have established QOS standards and required utilities to follow the standards.

The water utility industry has functioned as an authoritative source of water QOS standards.

In addition to state commissions, the water utility industry has functioned as an authoritative source of water QOS standards. The industry has developed engineering and operating standards that are effective for a number of reasons. The two most important reasons are, first, that the standards conform with the professional engineering certification and licensing processes that water industry engineers go through. The second is the commitment that the largest municipal and investor-owned water utilities have made to participate in and support an industry-wide set of water QOS standards. The water industry's deeply held belief that it is responsible, before

any other consideration, to deliver safe and pure drinking water to its customers is another reason why it typically adheres voluntarily to water quality standards, even though the industry may lack true enforcement capability.

An individual utility, if it is large enough, can establish standards that can prevail in its markets. In practice, this situation exists only for the largest water holding companies and certain large municipal utilities that, because of their size, can enforce standards through the strength of their purchasing power. Generally, the large water utilities follow industry standards, with only marginal differences.

These distinctions aside, state commissions have relied heavily upon the QOS standards developed by the American Water Works Association, as well as standards followed by the National Association of Regulatory Utility Commissioners. Further, the largest municipal and investor-owned utilities have not only followed industry QOS standards, but have also complied with the specific QOS standards in force in each state. The common feature, however, is the authoritative way the standards have been set; that is, the standard-setting body is widely recognized as legitimate, knowledgeable, and authoritative by all parties.

Market Approaches

In a perfectly competitive market consumers effectively set QOS standards through their purchase choices.

Fairly or not, authoritative approaches have been criticized as being "command-and-control" and "top-down" approaches that are inefficient, out-of-touch with contemporary advances in thinking about service quality, and likely to be increasingly out-of-sync with coming changes in the water sector. Further, many critics basically question the need for, or reliance on, authoritative QOS standards when market forces are available that can do a superior job with little or no regulatory oversight. In a perfectly competitive market, consumers effectively set QOS standards through their purchase choices and do not

need to rely on "arbitrary" standards set by governmental agencies or industry bodies. Suppliers are disciplined or rewarded by various market forces; firms only prosper when the services they offer are congruent with consumer quality of service and price preferences.

However, the less perfect the market, the less likely is it that market forces alone would be sufficient to ensure that the quality of service desires of customers would be met. To the extent that a monopoly exists in a given market, for example, the natural incentive structure would be such that the monopoly could unilaterally decide, in the absence of commission regulation, its own QOS standards. Only in markets with multiple providers would unorganized customers have sufficient market power to enforce their QOS preferences. However, for the foreseeable future, because of the cost/price dynamics of the water sector and the apparent need for (and efficiencies resulting from) centralized provisioning of water, it seems unlikely that a pure market approach would be in the public interest.

Customer-Based Quality-of-Service Standards Approach

Neither of the two above approaches necessarily demonstrates an overwhelmingly compelling or definitive way to establish the optimal set of QOS standards appropriate for the water industry. It is proposed here that the key features of both of these approaches can be recombined in a way that produces accurate and reliable information about the QOS needs of residential and business customers. This new approach uses survey research and expert opinion to develop QOS standards. Described briefly, a state commission would design a survey questionnaire that identified customer demographics, customer service characteristics, customer QOS experience, and customer QOS preferences. Using a scientifically drawn sample and a professional

The new approach uses survey research and expert opinion to develop quality-of-service standards.

survey research firm, the commission would administer a QOS survey. Depending upon the resources available, separate surveys could be done for residential and business customers.

To date state commission experience with surveys has generally been generally unsatisfactory.

Unfortunately, to date, state commission experience with surveys has generally been unsatisfactory. This has largely been because the surveys came from interested parties, thus causing the prudent regulator to have less confidence about the survey results than would have otherwise been the case if the survey had come from a more objective source. Further, when a commission is not involved in the design of a survey, it increases the odds that the survey will not focus on key pieces of information regulators feel they need to know in order to make a decision.

By using a scientific surveying approach, a state commission can effectively emulate many of the same processes that auditors follow, thus allowing regulators to produce near audit-quality data about the QOS preferences of consumers. Audits have achieved their widespread acceptance and legitimacy (in part) because of the consensus the auditing profession has achieved regarding both "generally accepted accounting practices" (GAAP) and the best methods to discover if these practices have been followed. Two key steps in the audit process are deciding what kind of a sample to use, and what questions (or standards) will be asked of (or applied to) each item in the sample. A scientifically conducted survey follows the same process and focuses on the representativeness of the sample and the questions to be asked of each survey respondent. The key difference between the two is the high credibility given to audits and the low credibility given to surveys.

A customer-based quality-of-service standard uses a survey to determine the QOS preferences and experiences of a utility's customers.

A customer-based QOS standard uses a survey to determine the QOS preferences and experiences of a utility's customers.

Data gathered in the QOS survey also include information on key customer characteristics and demographics thought to have an impact on a customer's QOS preferences or experience. For example, if it is thought that suburban homeowners have higher QOS expectations than all other users, and that the highest demand growth rate will occur in the suburbs, then a QOS survey would necessarily need to include customer characteristics and demographic items sufficient to identify suburban homeowners.

Expertise and judgement play an important role in selecting the items to include in the survey and in deciding what to do with the QOS information gathered. In the example above, a commission is apparently making a distinction between suburban and nonsuburban residential customers; yet, standards are meant to be applied uniformly. It may be, however, that because the commission's water staff know through inspection of utility expansion plans, that in five years suburban customers will grow from 40 percent to 60 percent of the customer base, that the commission has decided that the QOS preferences of suburban households will be the ones they should use as a baseline in developing the QOS standards that are to be applied to all customers.

It could also be the case that a survey would reveal that the water purity needs of large industrial customers are greater than the average purity needs for residential customers. It would be a judgment call on the part of the commission to determine whether to go with higher standards that "pull-up" the quality delivered to residential customers and increase the prices charged, or to go with the lower preferences of residential customers. In both of these examples the judgement and expertise of commission staff will be necessary in order to determine how to analyze the survey data.

No state commission would or should rely exclusively upon a survey to develop its quality-of-service standards.

No state commission would or should rely exclusively upon a survey to develop its QOS standards.

Rather, it is important to recognize a survey as one unique and legitimate source of input that generally has not been systematically used in the development of QOS standards or utility incentives.

Why are regulators better off using this new source of data? Do not commission hearings, consumer complaint 800-number hot lines, utility filings, engineering licensing procedures, industry standards, and environmental regulations more than indicate what the correct QOS standards should be?

These traditional sources of QOS data have several problems that can be overcome by a scientifically conducted survey. The first problem is that, however articulate and forceful QOS preferences are, when received in a hearing, or from an 800-number, or a utility filing, the preferences are not necessarily representative of *all* customers or a particular class of customers. A professionally conducted survey can reveal the preferences of residential or business customers within, say, plus or minus (±) 3 percent. That is, it can be shown that there is a 95 percent probability that the responses in the survey accurately reflect the opinions of all of the utility's customers within ± 3 percent.

Auditors rely on these same sampling principles when examining the financial records of a firm or agency. Auditors know it is inefficient to examine all of the financial transactions and accounting records of a firm and have developed rigorous and systematic sampling procedures that are accepted by all parties. Auditors sample based upon risk.[2] From a regulatory perspective, this means they look at what is important. In the previous example, the auditor or regulator have decided that suburban households are important enough to sample. The advantage of a scientifically drawn sample is that it avoids the

The advantage of a scientifically drawn sample is that it avoids the problem frequently encountered in hearings, hot lines, and utility filings where the loudest voices get the most attention.

[2] David Wirick, Raymond Lawton, Robert Burns, *Information Risk in Emerging Utility Markets: The Role of Commission-Sponsored Audits* (Columbus, Ohio: The National Regulatory Research Institute, 1996).

problem frequently encountered in hearings, hot lines, and utility filings where the loudest voices get the most attention. While it is reasonable to assume that some of the loud voices are early or bell-weather indicators of potential QOS problems, it can never be known how representative the QOS complaints are.

One way to gain perspective on the representativeness problem is to go back to the auditing approach. No firm has 100 percent of its financial transactions or accounting records in absolutely perfect order or compliance. If auditors used a nonsampling approach (analogous to listening to one complaint) and focused on one bad transaction, they could draw conclusions about a utility's entire financial system that were not valid. Scientific sampling has proven successful for auditors (and in other professions) and can be equally successful in obtaining representative QOS data from a water utility's customers.

The other problem that a QOS survey approach can help overcome is the relative inability of commission or industry QOS standards to certify that the standards definitely represent the wishes of consumers. The overwhelming majority of modern quality improvement literature has a good deal of unsubstantiated rhetoric about the need to get away from authoritative standards set by governmental agencies, or industry, and instead to rely upon customer preferences. The "quality-improvement" critique says the authoritative bodies move too slowly, impose "yesterdays" standards, and incorporate institutional constraints (such as the reliance on evidentiary hearings) that mute, hide, or distort consumer quality preferences.

By using a QOS survey a commission can certify that its QOS standards reflect the wishes of consumers.

Rhetoric aside, this critique does not seem entirely fair or descriptive of the actual processes, procedures, or intent of commissions or the industry in their development of water QOS standards. A middle ground (and one urged here) is that by using a QOS survey, a commission (or an industry standard-setting body) can certify that its QOS standards reflect the wishes of consumers.

A QOS survey can serve as quantitative input to a commission's standard-setting process.

There will always be a layer of expert judgment, applied to the QOS survey data as "data do not speak for themselves." For instance, a survey might indicate dissatisfaction with cloudy water, but this piece of information would be insufficient as a quantitative standard could not be directly derived. Equally, there may be standards that are transparent to consumers--say the need to file a capacity expansion plan. A QOS survey can only serve as quantitative input to a commission's standard-setting process. Commission water experts then can analyze the QOS survey data in terms of professional standards, their experience, and other available information. The improvement in the process is that the commission has direct access to scientifically reliable and representative information about the QOS needs of customers.

CHAPTER 2

SOME RECENT STATE COMMISSION EXPERIENCE WITH SURVEYS

Introduction

State commissions have conducted and received surveys on various aspects of water utility regulation and operation. The National Association of Water Companies (NAWC) has, for example, periodically conducted surveys of its member companies' customers and has shared this information with state commissions, federal agencies, its member companies, water industry's professional associations, consultants, and researchers. The NAWC surveys have been particularly well received and have focused on consumer expectations and preferences.

In winter 1996, NRRI researchers contacted all state commissions that regulate water utilities and asked them to submit any surveys conducted by or received by the commissions. This chapter briefly analyzes the information received from the perspective of showing commission familiarity with surveys. As appropriate, each survey is examined in terms of its suitability as a scientific QOS survey. Since these surveys were not intended to be formal QOS surveys, the critique is only intended to educate the reader about some of the characteristics of a scientifically valid QOS survey.

Arizona

The Willow Valley Water Company sent out a focused survey to its customers in spring of 1995. It was a one-page survey focusing on whether magnesium contaminant levels had visibly changed as a result of a new sequestering technique. 71.9 percent of the respondents reported no improvement. The survey was mailed to 999 customers, with 18.6 percent responding. This information supplemented data from water sampling conducted by commission staff. This survey focused on one QOS item and was mailed to its customers. One problem with this type of survey is that it is often difficult to know how representative a mail survey is, even when mailed to all customers, because the most educated, higher income, and most concerned households tend to complete and mail in surveys more than other types of households.

Alaska

The Anchorage Water and Wastewater Utility administered a one-page survey of its customers in 1993. Of the 40,016 customers surveyed, 21.4 percent of the survey questionnaires were returned. The six-question survey covered customer characteristics, experience, and satisfaction. As can be seen in Table 2-1, 98.4 percent feel they always or usually have good water service. 92.1 percent felt their water pressure to be adequate. Interestingly, when asked if their water is cloudy or discolored, 64.3 percent said, "never." 85.6 percent of the 2,352 responding to the question indicated that they had had a personal contact with utility personnel in the past year, with 78.8 percent reporting prompt action on their request.

This survey has a limitation due to the response rate, which is on the low side for mail surveys. A survey sent to a scientifically selected sample would be less costly as only 1,000 questionnaires might need to be mailed.

Customer satisfaction questions can be difficult to interpret.

TABLE 2-1

RESULTS OF ANCHORAGE WATER AND WASTEWATER 1993 SURVEY

		Count	Percent	Total Response
1.	What kind of service do you have?			
	Water only	203	2.4	
	Sewer only	550	6.4	
	Both	7820	91.2	8573
2.	Do you think you have good water service?			
	Always	5600	69.9	
	Usually	2285	28.5	
	Never	128	1.6	8013
3.	How is your water pressure?			
	Too high	65	.8	
	Too low	572	7.1	
	Adequate	7427	92.1	8064
4.	Is your water cloudy or discolored?			
	Always	88	1.1	
	Usually	158	2.0	
	Occasionally	2591	32.6	
	Never	5117	64.3	7954
5.	If you had personal contact with AWWU personnel during the past year, were you treated courteously and professionally by our utility personnel?	2014	85.6	
	Yes	117	5.0	
	No	221	9.4	2352
	Not sure			
	Did you receive prompt action on your request?	1702	78.8	
	Yes	190	8.8	
	No	269	12.4	2161
	Not sure			
6.	Do you feel the water sewer rates are reasonable for the service you receive?			
	Yes	3584	44.5	
	No	2211	27.5	
	Not sure	2251	28.0	8045

Source: Anchorage Water and Wastewater Utility Survey, 1993.

While overall satisfaction in this survey is 98.4 percent, somewhat lower numbers report positive experience with water pressure (92.1 percent), or with the cloudy or discolored water (64.3 percent). Mail surveys typically have a response pattern that may influence the interpretation of the survey. Response patterns are important because of the issues raised by having a representative or nonrepresentative sample. Because demographic questions such as sex, age, race, size of household, neighborhood, or income were not asked, it is not possible to objectively determine how representative the sample of returned questionnaires was of the 40,016 customers surveyed.

Reporting the number of responses for each question is important and one hallmark of a well-done survey. The Anchorage survey reports responses by each question, something that aids in the interpretation, for example, of the "personal contact" question.

The Anchorage questionnaire allowed respondents to make additional comments. Two thousand, six hundred and ninety-two made some kind of written comment.

Wisconsin

Three water quality surveys were received by the Wisconsin Public Service Commission: two for the City of Madison, and one from the Green Bay Water Department.

Madison Water Utility and Madison Sewer Utility Billing Survey

In the summer of 1995, Madison's water and sewer utilities developed a customer "preference of billing frequency" questionnaire, following the Wisconsin Public Service Commission's Order in Docket No. 3280-WR-103 (point No. 4). The five-question survey was sent to a random sample of 1,100 residential and business customers. The response rate was 72 percent, which is very good for a mailed survey.

As noted above, it is important to know how representative your survey sample is of all utility customers. In addition to asking customer-demographic questions that can subsequently be checked, say, against census data or utility records, the first step is to have the survey questionnaire sent to a randomly selected group of customers. A computer-generated random sample, as was done in Madison, is the best way to ensure that a representative sample has been drawn. In the Madison survey, statistical techniques indicate a 95 percent probability that the responses accurately reflect the population of utility customers within ± 4 percent. This rate is very good and means that 95 times out of a hundred survey answers given will be within ± 4 percent of the answers the entire population of utility customers would have given.

Three key focal points for water utility QOS surveys are hook-up or installation, repair or maintenance, and billing. The Madison survey focuses on billing, and as shown in Table 2-2, reveals a preference for six-month billing.

From a customer-based QOS perspective, it could be the case that monthly bills were the QOS standard enforced. The rationale could have been based on the need for timely billing, utility cash flow, and because of rate design/conservation considerations. This survey indicates that, based upon a random sample of the utility's customers, 70 percent of the customers prefer to receive a bill every six months. The Commission would need to weigh this information, for example, against its rate

TABLE 2-2
BILLING FREQUENCY PREFERENCES

Prefer to Receive a Bill Every	Residential Customers	Commercial Customers
6 months	70%	66%
3 months	21%	28%
2 months	3%	2%
1 month	5%	9%
Other preference	1%	0%

Source: City of Madison, *Survey Report*, 1995, 1.

design objectives. If the utility had a winter and summer rate, each being six months long, then the six-month billing cycle could be adopted as the new QOS billing standard. If, on the other hand, the utility had a poor cash flow, then the six-month cycle might not be preferred.

This survey also allowed for respondents to make written comments. A complete set of the responses was provided by the City of Madison in its analysis. Written, or "open-ended," comments give the analyst a good feel for the richness and complexity of the issues being examined, but typically resist easy categorization or quantitative analysis.

Madison Water Utility and Madison Sewer Utility Customer Satisfaction Survey

In 1995 the City of Madison mailed a 30-question survey to a random sample of its customers in order to determine overall levels of customer satisfaction. The response rate was 63 percent, indicating both a well-designed survey and a high level of consumer interest in the subject. The survey had ten water and sewer questions, eight water-only, six sewer-only, and six customer demographic questions. Some findings included[3]

- 98 percent thought utility 's employees courteous, knowledgeable (95 percent), and that the work was well done (95 percent).
- 87 percent found the billing statement easy to read, 79 percent preferred billing every six months, and 84 percent said they never used the rate insert to calculate the accuracy of their bill.
- 28 percent reported sewer backups, one fourth of these occurring in the previous year.
- 86 percent of those who used city services, as opposed to private contractors to resolve sewer backup problems, were satisfied with the work.

[3] City of Madison, *Quality and Improvement Project Report,* 1995, 1-2.

In the first Madison survey, 70 percent indicated they favored six-month billing. In the second satisfaction survey, 79 percent expressed a preference for six-month billing. Based on this information, the City of Madison concluded

> Our customers prefer 6 month billing regardless of their age or income, and we feel we should defer to that mandate until the economics and/or technology definitely dictate the need for change, at that time, customers should be informed of possible impacts on their bill.[4]

The City felt, based upon the survey results, that it had sufficient information to switch to a six-month billing cycle. While standards apply to all households, commissions may want to know if there are important differences by some demographic group. In the billing frequency question, the responses were cross-tabulated with the age of the respondent, as shown in Table 2-3. The results indicate uniformity across age groups, with the strongest support for six-month billing being in the 55 or older age group. Because of their fixed incomes, commissions often give special attention to the preferences of senior citizens. Because the downside of a six-month bill is the size of the bill, something typically of concern by senior citizens, finding that senior citizens support the six-month billing cycle is a useful piece of information. Alternately, a commission might conclude that because of bill delinquencies, levelized billing, the constraints of low-income assistance programs, or the financial impact on the utility, a change to a six-month billing schedule was not warranted.

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[4] Ibid., 2.

TABLE 2-3

BILLING FREQUENCY PREFERENCES BY AGE OF RESPONDENT

Billing Preference	Total Response	Age 18-34	Age 35-54	Age 55 or over
Every Month	4	6	4	4
Every Two Months	2	2	1	2
Every Three Months	14	14	18	7
Every Six Months	79	78	77	87
No Answer	1	-	-	-

Source: City of Madison, *Quality and Improvement Project Report,* 1995.

Green Bay Water Utility Customer Satisfaction Survey

In 1995 the City of Green Bay divided its customers into 18 specific types and designed questionnaires appropriate to each type of customer. Four of these questionnaires were available for the NRRI survey. The 18 customer types are shown below in Table 2-4 and reflect the "upstream-downstream" customer satisfaction concept extensively relied upon in contemporary service quality literature. The underlying notion is that customers or stakeholders are not one undifferentiated mass and that a utility has several types of customers that it deals with at different points in the production, distribution, and sale of water. Also it recognizes that the utility is a customer itself and has relationships with "upstream" vendors that are as important as its relationships with more traditional "downstream" residential and business customers.

TABLE 2-4
SURVEY USED FOR EACH CUSTOMER TYPE

Customer Type	Estimated Annual Customers or Contacts	Projected # of Surveys to be Sent Annually	Projected # of Surveys to be Sent Weekly	% Coverage Desired	# of Surveys Sent To-Date	# of Surveys Returned To-Date	% Returned To-Date
Vendors of services, materials, chemicals, etc.	214	214	As needed	100%	214	61	29%
Special project contractors	18	18	As needed	100%	18	4	22%
Engineering firms	6	6	As needed	100%	6	6	100%
Testing labs	7	7	As needed	100%	7	3	43%
Plumbers	17	17	As needed	100%	17	5	29%
Various government agencies or departments	20	20	As needed	100%	20	12	60%
Meter exchange customers	2,200	220	5/week	10%	220	93	42%
Inside meter reading customers	25,000	125	3/week	0.5%	126	48	38%
Leak investigation customers	400	40	1/week	10%	59	28	47%
Neighbors of utility property	76	76	As needed	100%	76	22	29%
Monthly water sampling customers	14	14	As needed	100%	14	4	29%
Water complaint sampling customers	20	20	As needed	100%	19	9	47%
Drive-up customers	13,000	130	3/week	1%	98	42	43%
Walk-in customers	7,000	100	2/week	1.4%	81	22	27%
Landlords	Unknown	Unknown	As needed	100%	306	87	28%
Job sheet customers--actual contact	4,500	135	3/week	3%	115	49	43%
Tour groups	7	7	As needed	100%	7	5	71%
Surrounding utilities	6	6	As needed	100%	6	4	67%
TOTAL	–	1,155	–	–	1,409	504	36%

Source: *City of Green Bay Water Utility Customer Satisfaction Survey,* 1993.

This type of surveying is very ambitious and may not be sustainable unless stable, and known resources are made available. Said another way, it is likely to be very difficult to send out questionnaires, analyze the results, and use information for decision-making purposes when crises, staff turnovers, and normal workload interfere. An annual survey is more likely to receive the attention of analysts and decision makers, and be more statistically valid than this approach.

Although the four questionnaires examined exhibited some variety, the core focus of each was on the customer's recent experience with the utility and their relative satisfaction with the encounter. The main advantage of the Green Bay approach is that if a commitment is made to keep the survey/analysis/decision-making processes ongoing, then it can provide a unique "real-time" source of information on customer satisfaction with the quality of service being provided.

New Hampshire

Consumers Water Company Survey

In 1993 and 1995 Consumers Water Company hired a survey research firm to survey its customers. The report was provided to the New Hampshire Public Service Commission and includes data from Consumer's service territories in New Hampshire, Ohio, Pennsylvania, New Jersey, Illinois, and Maine. This data set allows comparisons to be made about (1) New Hampshire and other states, (2) specific service territories in New Hampshire in relation to the average for the state, and (3) changes in the 1993 and 1995 surveys in order to ascertain where improvements have been made and areas where additional work may be needed.

The advantage of this data set is that one state can be compared against three benchmarks: other states, intrastate, and intertemporal. To the extent that one survey result is uniform across all states, or for all service territories within a state, or over time, greater confidence may be had in the validity of the data. However, data still need to

be analyzed carefully when comparing service territories. It could be that one territory with naturally crystal clear water scores higher in customer satisfaction than a territory that is rich in magnesium and iron deposits.

The Consumers survey was conducted by a professional survey research firm. While it is always tempting to conduct a survey using commission or utility staff in order to save money, this approach has a lot of risk. These risks could include poor questionnaire design, improper sampling procedures, analytical problems, and sometimes a lack of trust in the final product because it is seen as a "staff project." Additionally, it is difficult to keep staff on a survey when other demands for their time arise.

A scientifically valid 20-minute telephone survey of 1,200 customers in a state or service territory can be done for $35,000 to $50,000 (in 1996 dollars). This would include design, preliminary analysis, and would provide the commission with a data set. A survey firm, like any other consulting firm a commission may hire, needs strong guidance in order to ensure that the survey meets the decision-making needs of the commission.

In the 1995 New Hampshire survey, frequency counts were presented for all questions. In order to compare service territories, a percent change was calculated for all territories and New Hampshire (see Table 2-5). Between 1993 and 1995, New Hampshire as a whole had a 6.19 percent improvement in how quickly problems are perceived to be resolved. However, the range in individual service territories went from a 24.3 percent improvement to a 44.36 percent decrease. Comparative data help pinpoint problem areas and give more meaning to the data. Without this detail it would be easy to imagine one consultant arguing that New Hampshire's 6.19 percent improvement is "outstanding," while an opposing consultant paints it as "horrible." Armed with the service territory data, we can see that a fairer appraisal would be that New Hampshire's aggregate score shows a better than average improvement in the speed problems are resolved.

TABLE 2-5

CHANGES IN CUSTOMER PERCEPTIONS OF HOW QUICKLY UTILITY RESOLVES PROBLEMS

Service Territory	1995	1993	% change
Interstate	7.06	5.68	24.30%
Mentor	6.27	5.22	20.11%
Sharon	7.83	7.20	8.75%
Geneva	4.86	4.47	8.72%
New Hampshire	4.80	4.52	6.19%
Blackwood	5.54	6.00	-7.67%
Struthers	5.38	6.38	-15.67%
Massillion	7.00	8.31	-15.76%
Shamokin	5.36	6.73	-20.36%
Hamilton	6.13	8.29	-26.06%
Phillipsburg	5.64	7.79	-27.60%
Cons. Illinois	4.71	7.36	-36.01%
Maine	5.30	8.38	-36.75%
Savre	4.29	7.71	-44.36%

Source: Consumers Water Company, *Consumers New Hampshire Water Company Docket No. DR 95-124 Date Requests,* November 15, 1995, 1.

In response to a Commission data request, the Company identified five programs that had been undertaken to address problems found in the 1993 and 1995 surveys (see Table 2-6). Here, rather than have the commission develop a QOS standard, the company is being asked to specify steps it has taken. The Commission still retains the option of taking further action if needed.

Table 2-7 has some interesting numbers for trend lines and in understanding QOS survey data. First, note that on average satisfaction declined (using only the top satisfaction category) from 32.7 percent in 1993 to 30.5 percent. This suggests a trend line that a commission would want to monitor. Second, note the 13 percentage point increase in New Hampshire from 1993 to 1995 in the top category. Even with this increase, this is the lowest score of all states and is 12 percentage points below the average top-score percentage. Third, while a survey having 1,400 valid responses probably has a ± 3 percent margin of error, this only refers to the entire sample. In New Hampshire the 100-person sample may have an error margin in excess of ± 30 percent, making it extremely difficult to draw valid conclusions about preferences. The point of these three observations is simply that a comparative survey produces a lot of valuable QOS information.

TABLE 2-6

PROGRAMS INITIATED BY UTILITY TO ADDRESS CONCERNS FOUND IN 1993 AND 1995 SURVEYS

1.	KASET Customer Service Training Program. All employees have received training in Customer Skills and interaction with Customers during 1994 and 1995. The company intends to do refresher courses with employees in 1996 so the employees do not loose their Customer Service skills.
2.	Total Quality Management Program. Total Quality has been taught through two programs, Quality Management Skills and The Quality Advantage courses. All employees have received at least one of these programs. It is believed that by implementing Quality programs the Customers will be better served.
3.	Cross Company Quality Teams have been organized to address such items as, Customer Information, Employee Information, Billing Adjustments, Customers Contacts, Transmission & Distribution and others. All of these teams worked to improve Customer service by improving on the area they worked on.
4.	A Customer Advisory Council has been formed with input from the NHPUC and Town officials in which we operate. The Advisory Council is able to bring Customer input and concerns directly to the company management. The Advisory Council provides a mechanism to interact directly with our Customers and develop programs to better serve them.
5.	A Customer Communication Program has been developed to communicate information to our Customers about the company and about the water industry in general. A better informed Customer will be a more satisfied Customer.

Source: Consumers Water Company, *Consumers New Hampshire Water Company, Inc. Docket No. DR 95-124 Data Requests* (CA-1-1), November 15, 1995, 1-2.

TABLE 2-7

A SIX-STATE COMPARISON OF SATISFACTION SCORES FROM 1993 TO 1995

(expressed in percents)

Satisfaction		Average		Ohio		Pennsylvania		New Jersey		Illinois		New Hampshire		Maine	
		1995	1993	1995	1993	1995	1993	1995	1993	1995	1993	1995	1993	1995	1993
Extremely satisfied	10	30.5%	32.7%	33.1%	34.2%	34.0%	38.4%	32.6%	36.5%	26.3%	28.1%	18.0%	5.0%	24.0%	34.0%
	9	9.2	12.9	10.3	13.2	8.0	10.2	13.5	15.3	6.0	14.4	13.0	6.0	7.0	10.0
	8	21.5	22.3	23.0	25.8	20.3	19.3	23.7	21.9	20.7	19.5	19.0	16.0	17.0	28.0
	7	10.1	9.9	10.8	7.9	10.3	8.9	7.2	10.0	9.3	11.5	14.0	16.0	13.0	13.0
	6	6.0	3.9	3.8	3.6	5.7	5.0	4.9	3.4	10.3	3.1	5.0	6.0	7.0	5.0
	5	11.5	9.7	9.9	9.0	9.4	9.8	10.3	8.1	15.1	10.6	16.0	20.0	14.0	7.0
	4	3.1	2.2	2.5	2.1	3.8	1.9	1.5	1.0	3.7	3.0	5.0	7.0	5.0	0.0
	3	2.5	2.0	2.8	1.9	2.8	1.8	1.3	0.3	2.3	3.8	3.0	1.0	3.0	0.0
	2	1.8	1.4	1.9	0.7	1.8	0.0	2.2	1.0	1.3	2.5	1.0	6.0	2.0	2.0
Extremely dissatisfied	1	0.9	1.0	0.4	0.5	1.4	1.9	1.1	0.8	1.0	0.7	4.0	3.0	0.0	1.0
	0	2.1	1.5	1.0	0.8	2.3	2.2	1.3	0.4	2.7	1.5	2.0	14.0	8.0	0.0
(unweighted)		1,400	1,500	400	500	300	300	300	300	200	200	100	100	100	100

Source: Consumers Water Company, *Consumers New Hampshire Water Company, Inc. Docket No. DR 95-124 Data Requests* (CA-1-1), November 15, 1995, 3.

New Hampshire Public Utilities Commission Interlakes Survey

In 1995 the New Hampshire Commission sent a mail survey to all customers of the Interlakes Water and Sewer Company as a part of the Commission's investigation of Interlakes intent to become a public utility. The survey included 22 questions, primarily dealing with water quality problems. The intent of the survey was to determine the ability of Interlakes to manage and operate its system. Another purpose of the survey was to identify the willingness of Interlakes (based on their customer's perception of past performance) to address customer water and sewer complaints.

New Hampshire Public Utilities Commission Hampton Water Works Survey

In 1991 the New Hampshire Commission sent a survey to randomly selected customers of Hampton Water Works to identify customer service concerns, overall customer satisfaction, and consumer awareness of the New Hampshire Commission. The ten-question survey was mailed although respondents were given the choice of telephoning their responses directly to the Commission 800-line or responding by mail.

Schanda Farms Survey

As a part of Docket No. DR-94-185, Schanda Farms Water Company submitted a 13-item survey focusing on service quality. Fifty-three surveys were returned.

Table 2-8 summarizes some of the major results of the survey. These survey findings focus on the experience of the customers, rather than their preferences or satisfaction. Based upon customer-reported experiences, water quality appears to be a problem. The survey furnishes no direct information about customer preferences--it is up to the Commission to decide what "low pressure" is, for example. Engineering standards exist, in this instance, that a commission can use for its low-pressure quality standard.

TABLE 2-8

SUMMARY OF MAJOR RESULTS FROM SCHANDA FARMS SURVEY

	Number of Occurrences Within 12 Months Preceding Survey							
	0*	1-5**	6-10	11-20	> 20	Frequent/ Numerous	A	B
Dirty water	5	20	13	6	6	3	91	53
Milky water	44	6	1	1	-	1	17	6
Laundry staining	26	20	3	-	-	4	51	13
Bad taste	39	4	2	3	5	-	26	19
Bad odor	42	4	3	2	-	2	21	13
Low pressure	13	7	2	-	30	1	75	62
Water outages	14	36	3	-	-	-	74	6
Calls to Company	27	20	4	2	-	-	49	11

* Includes no response, "unsure."

** Includes responses of "off and on," "yes," "too many."

A - Percent of respondents experiencing at least one occurrence in previous 12 months.

B - Percent of respondents experiencing multiple (6 or more) occurrences in previous 12 months.

Source: Schanda Farms Water Company, DR-94-185, DWB-3.

Nevada

The Nevada Commission has developed a standard water quality questionnaire that they use for small water utilities. Nevada Administration Code 704.627 says that utilities applying for rate increases or when being reviewed periodically must be in compliance with commission QOS standards. The ten-item questionnaire is designed to be a cost-effective way to obtain direct information from customers regarding the quality of the water they receive. The utility is required to provide the Commission with mailing labels which the Commission then uses to mail the questionnaire to all customers of the utility. The responses come directly to the Commission and are used by staff in their analysis of compliance and/or a rate increase request.

This mode of decision-making, in effect, relies at least partially upon the direct service quality experiences of customers. Demographic questions are not asked and the responses are not necessarily representative of all of a utility's customers. However, in the case of very small utilities having 100 or fewer customers, sampling considerations may not ultimately be important.

South Carolina

Blue Ribbon Survey

In 1995 the Blue Ribbon Water Corporation surveyed Blue Ribbon Water Company and Crest Water Company customers. The survey was mailed to 75 randomly selected Blue Ribbon and 25 Crest customers. Forty-three responses were received; a respectable response rate. It was interesting to see that six respondents said they had registered a complaint with the Company and five of these said they did not receive an appropriate response to their complaint. The results of the survey were submitted by Blue Ribbon to the Commission in Docket No. 93-836-W/S.

Both Blue Ribbon and Crest serve a number of subdivisions. Because of the small sample size and the random selection process, several subdivisions had either one or no questionnaires sent. This means that while the 43 respondents may be representative of all of Blue Ribbon or Crest customers, no valid conclusions can necessarily be drawn about specific subdivisions. If there are significant differences between the subdivisions in terms of income, home size or age, type of distribution or treatment system, or purity of the original untreated water supply, then a simple random sample may not be adequately representative of individual subdivisions. When significant differences exist for sizeable subpopulations, a random sampling scheme must be modified to ensure that the sample is sufficiently representative (but not necessarily identical) to the population of all Blue Ribbon and Crest customers. For example, 19 of the 43 responding said water quality was poor or very poor, and 15 of these said it was because of low pressure. If an adequate sampling frame had been used, it might have been possible through the survey alone to determine if the problem was specific to a particular subdivision or to the entire water system.

Pennsylvania

Pennsylvania Public Utility Commission Survey

While not a typical QOS survey, the Pennsylvania Commission prepared a survey focusing on how well the Commission responded to complaints. The survey was an eleven-question customer-response type survey administered by the Bureau of Consumer Services. Two lessons can be extracted from the survey. The first is that the questions asked about the Commission apply equally to jurisdictional water utilities. The second is that if a commission develops QOS standards that cover courtesy, promptness of response, or ease of making a complaint, then it may be prudent to ensure that these same customer-oriented QOS standards are also being met by the Commission.

Chilton Water Customer Satisfaction Measurement Survey

In 1993 a survey was conducted and a report prepared by Chilton Research Services about customer satisfaction with a jurisdictional water utility. The survey was preceded by two focus group sessions that allow a preliminary identification of the QOS issues of concern to customers. In the Chilton survey, the intent was to determine what factors were important to the utility's customers. The survey questionnaire subsequently incorporated questions about these factors.

A pretest of the questionnaire was undertaken. This is one of the most important parts of the survey process and generally is one indicator of a good survey. Unfortunately most surveys skip the pretest stage in the interest of saving money or getting into the field faster with the survey. A pretest offers a unique opportunity to see if the wording, logic, flow, and response options in a questionnaire work properly. Without a pretest, the analyst is invariably in the position of wishing that some of the survey questions had been worded differently.

The Chilton survey was a telephone survey administered to a stratified sample of 400 customers. One hundred customers were interviewed in each of the four regions served. This method of sampling does not allow a calculation of a response rate, as the goal is to keep interviewing until 100 surveys are completed for each region. The results were then weighted statistically to reflect the actual proportion of customers in each region. Some findings regarding customers satisfaction included

- 93 percent reported they were "extremely," "very," or "somewhat" satisfied, although a significant variation existing in the four regions. If satisfaction is limited to the "extremely" or "very" satisfied, then the average level of satisfaction drops to 73 percent.
- Customer satisfaction scores increased with the length of time customers had been served by the utility. The survey firm concluded this improvement had to do with the familiarity of customers with the utility, but it may also be a function of the age of the subdivision and the quality of service existing in that subdivision.
- 43 percent cited some difficulty in scheduling home repair or meter reading visits.

CHAPTER 3

SERVICE QUALITY BENCHMARK SURVEY

Survey Results As Inputs

The surveys analyzed in Chapter 2 provided commissions with service quality information. Each had various methodological or focus limitations that might keep a commission from using it to directly develop customer-based QOS standards for water utilities. However, they do illustrate that some commissions and utilities have begun to use surveys as a direct means of gathering information about the service quality preferences and experiences of water customers.

Fortunately, established methods exist through which scientifically valid surveys can be conducted that may serve as benchmarks for commissions seeking to establish customer-based quality of service.[5] Equally important, professional survey research firms are available in nearly all metropolitan areas and many national (and regional) survey firms exist that can gather data from rural areas.

A telephone survey of water customers can be used to provide benchmark information about service quality needs.

It is proposed here that a telephone survey of water customers be used to provide benchmark information about service quality needs. A mail survey often has a response rate of 20 percent, although techniques exist to improve this response rate. A well-designed telephone survey, on the other hand, can consistently get a response rate in excess of 70 percent. Telephone surveys also offer

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[5] Raymond W. Lawton, *Survey and Analysis of the Telecommunications Quality-of-Service Preferences and Experiences of the Customers of Ohio Local Telephone Companies* (Columbus, Ohio: The National Regulatory Research Institute, 1996).

the important advantage of being able to explain portions of the questionnaire to the respondent and to modify the questionnaire if early field experience with the survey indicates a problem.

QOS survey information will be best used as reliable confirmation that a problem exists.

No commission would or should uncritically accept survey results as the definitive and complete word on the service quality needs of utility customers. In most instances QOS survey information will be best used as reliable confirmation that a problem exists. A commission can then use this information as a benchmark from which to develop new, or modify existing, QOS standards regarding pressure, clarity, taste, billing, and repair.

Depending upon its own interests, resources, and procedures, a commission can use a survey to document or discover problems, or to derive standards. Most of the surveys in Chapter Two have been used to provide independent information about what customers thought. A rate case or other proceeding or process could then be used to decide how to best use the information gathered. A survey may reveal that 5, or 25, or 55 percent of the customers had billing complaints (or cloudy water). It is up to commissions to decide whether remedial action is needed, if 5 percent of the customers complain about billing. It could be that a 25 or 55 percent complaint level would be necessary for an official commission response.

A survey initiated solely by a commission, or cooperatively with a utility, necessarily has more credibility then other surveys. A commission can easily develop minimum survey research standards or criteria that can assist utilities or consumer groups that wish to submit a survey. These criteria could cover how the sample was obtained, response rate, question bias, data analysis procedures, and availability of the survey data for independent analyses by commission staff. Developing these standards is relatively straightforward and will be helpful to utilities, consumer groups, and the commission.

Survey-Driven Incentive Regulation

Five illustrative ways are identified below that directly use benchmark QOS information obtained from customer surveys. Each requires different levels of commission resources and may be more or less appropriate depending upon the circumstances and need of the commission.

1. Knowing that **independent QOS information** will be gathered about the QOS needs and experiences of customers can be an important incentive to a utility. 800-number complaint lines, commission staff expertise, customer testimony, and utility testimony and reports are typical sources of QOS information, but each can be criticized as being unrepresentative of actual customer experience. Once benchmark QOS surveys are accepted as valid, reliable, and independent sources of information, a utility will have a clear incentive to monitor, anticipate, and respond to revealed QOS concerns. Importantly, because the survey data base is accepted as being scientifically representative, the focus of any debate or action automatically shifts from determining whether a problem exists to what can (or has) the utility done to resolve the problem.

2. A number of states do not have official written water QOS standards. These states, however, are concerned about and do monitor quality of service, but do so with a **complaint-driven process**. Here consumers, consumer groups, or commission staff can initiate a complaint. The commission then decides whether an investigation or inquiry is warranted. A benchmark QOS survey can be especially helpful in determining the extent of an alleged QOS problem.

3. Once routinized, a benchmark QOS survey can be invaluable for **monitoring** service quality. Surveys are fairly inexpensive, even when professional survey firms are used. The main exception, of course, is with small and very small water utilities, where the unit cost of the survey may be high because of the small size of the customer base. The existence of an ongoing quarterly, semiannual, annual, or biannual benchmark QOS survey should fairly quickly become an important set of information that will guide utility behavior and commission policy. The incentive structure is natural and stems from the laudable intent of jurisdictional water utilities to be seen in the best possible light by a regulatory commission. Solving QOS problems identified in a reliable and accepted benchmark survey is one very positive incentive structure possible when a commission or utility are able to directly monitor customer QOS concerns.

4. As noted earlier, information in a benchmark QOS survey can be used to begin to **develop, or modify, quality-of-service standards and enforcement procedures**. It could be that a benchmark survey reveals that no complaints exist regarding low water pressure and that no water pressure complaints had been made for a decade. Several commission actions are possible based upon this information, one of which may be to stop monitoring that utility's water pressure. Equally, it could be that a benchmark QOS survey reveals that low water pressure is a common complaint. The commission could, in responding to this information, order a pressure testing program to be done by an engineering firm or by commission staff. As noted in the Wisconsin survey, a six-month billing cycle standard may be adopted based upon customer preferences revealed in a survey.

5. A formal **incentive system** incorporating economic rewards can also be developed using a benchmark QOS survey. Professor Sanford Berg, for example, has developed a weighted quality-of-service index that has been used by the Florida Public Service Commission for telephone utilities. [6] The basic underlying concept, however, is readily applicable to designing an incentive system for jurisdictional water utilities. In Professor Berg's approach, the utility, its vendors, customers, and commission staff develop a list of key quality attributes. Each attribute is weighted in terms of importance and placed in an index. Subsequently, based upon benchmark survey results, a utility could be rewarded or punished depending upon its performance. The Berg approach is not necessarily automatic as it recognizes that a commission may need to judge whether an apparent increase (or decrease) in the overall QOS index for a utility was sufficient in and of itself to merit an increase or decrease of some kind in a rate case setting.

Conclusion

To date, commissions have had limited experience with water QOS surveys. On the other hand, commissions have had extensive experience with quality of service. A QOS benchmark survey offers an economical, efficient, and scientifically valid way to determine directly the service quality preferences and needs of water consumers. All other surrogate customer service measures have systematic biases that may limit the usefulness and validity of any service quality information produced.

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[6] Sanford V. Berg, "A New Index of Telephone Service Quality: An Academic and Regulatory Review" in *Quality and Reliability of Telecommunications Infrastructure,* ed. William Lehr (Mahwah, New Jersey: Lawrence Erlbaum Associates, 1995).

An incentive system directly based upon customer preferences is intuitively appealing, especially when monopoly provisioning of water is likely to be an enduring and pervasive feature of the water sector for the foreseeable future. The large investor-owned water utilities have historically been regarded as being well-run, efficiently managed, and as reliable providers of high-quality service. Many medium-sized and small water utilities are not so well-positioned. An incentive system, based on customer quality demands, should improve the efficiency and effectiveness of investor-owned water utilities to the advantage of all residential and business customers.