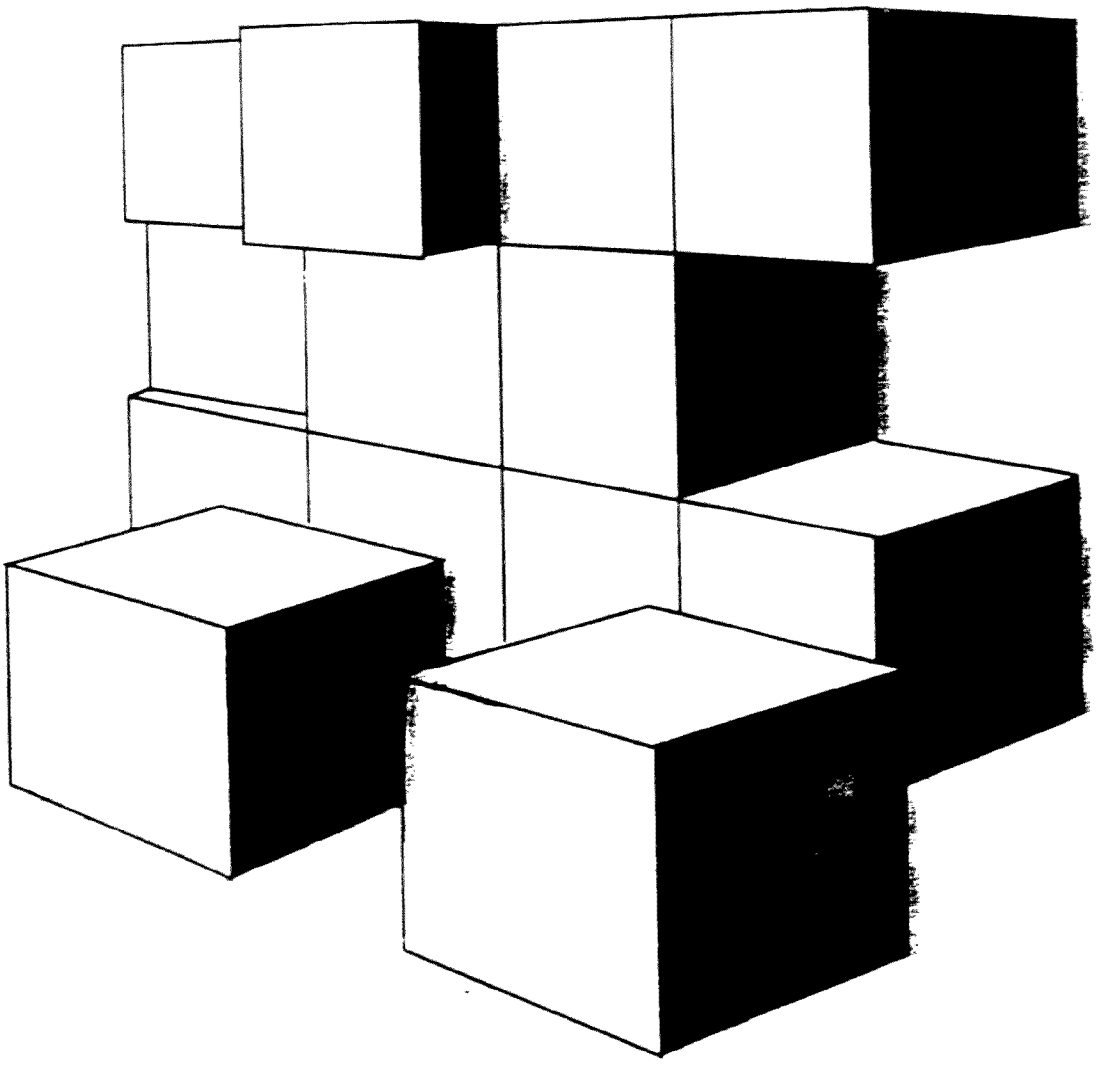
July 1989

Rhode Island User Charge Study



Introduction

Purpose of the Survey

Part of the state's ongoing responsibility is to acquire financial and technical information about its communities. The information acquired from this user charge survey allows the state to monitor the ability of its communities to achieve financial self-sufficiency for wastewater treatment operations. There is an especially strong need for the state to look even more closely at user charges since local municipalities will be financing their future wastewater construction without the assistance of federal grants. The future success of wastewater pollution control in the state will depend on the ability of local communities to maintain financially self-sufficient wastewater treatment operations.

Do communities have healthy user charge systems that provide adequate revenues to support operations and debt repayment? To answer this question and plan for the future, state and local officials must know where communities stand in running self-sufficient wastewater systems.

To obtain information on the financial solvency of its communities, Rhode Island undertook a survey of user charges following the procedures given in the United States Environmental Protection Agency's publication Looking at User Charges: A State Survey and Report (EPA 430/09-87-0008). The survey's 11 questions, although deceptively simple, generate a wealth of information on residential unit costs. A copy of the survey form is provided in Appendix A. This survey was mailed to municipal wastewater treatment systems during May 1989. All municipalities responded to the questionnaire.

Responses on demographic and utility characteristics were used to calculate unit costs and flows, examine economic impact and ensure valid comparisons between communities. Costs data provided the basis for comparing user charge systems and carefully segregated the costs of operation, maintenance, replacement and capitalization. Revenue questions tested whether the systems were recovering enough money to operate in the black. All graphs show percents and numbers of communities (about the bar) for each data range.

Organization of Report

This report is divided into eight sections to evaluate the financial self-sufficiency of municipal wastewater treatment operations:

I. Covering the Costs of Operation
II. Unit Costs by Treatment Level
III. Average Annual Total Residential Costs and Sewer Service Charges per Household
IV. Equitability of Residential User Charges
V. Ability of Residential Sector to Cover Residential Costs
VI. Planning for Equipment Replacement
VII. Debt Burden Without Grant Contribution
VIII. Summary Findings

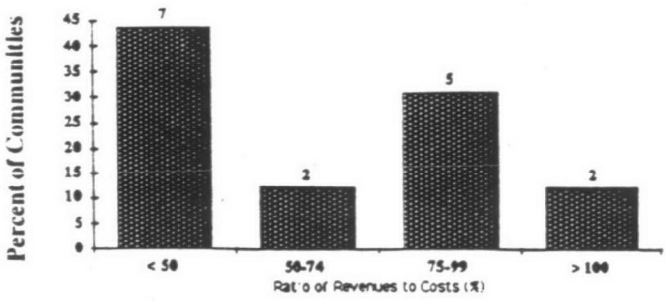
A summary table of each community's responses to the survey is presented in Appendix B.

I. Covering Costs of Operation

The most basic question is "Are sewer service charges adequate to cover the costs of operation and to achieve clean water goals?" This analysis shows the ratio of revenues to costs. For communities where revenues are not adequate to cover costs, i.e., the ratio is below 100%, the communities should reassess their user charge systems and other sources of revenues to ensure proper funding.

In this analysis, 87% of the communities showed revenues below their costs. These communities had an average overall revenue shortfall of 43%.

RATIO OF REVENUES TO COSTS



RATIO OF TOTAL REVENUES
TO TOTAL COSTS

TREATMENT LEVEL	NO. OF COMMUN	ABOVE 100%	BELOW 100%
PRIMARY	2	0%	100%
SECONDARY	13	15%	85%
ADVANCED	1	0%	100%
OVERALL	16	13%	87%

II. Unit Cost by Treatment Level

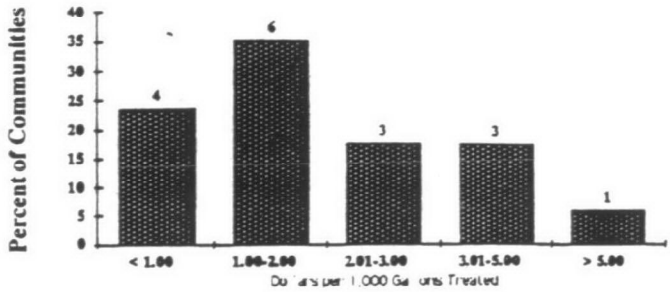
Analysis of unit costs (cost of treatment per 1000 gallons) helps identify communities where costs are usually high or low. Unit costs for individual communities vary dramatically and the analysis reflects this fact.

Communities with secondary treatment averaged $2.07 per 1000 gallons, and advanced treatment systems averaged $5.51 per 1000 gallons.

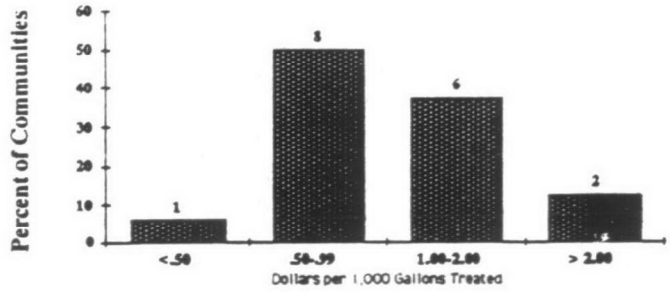
AVERAGE UNIT COSTS BY TREATMENT LEVEL

TREATMENT LEVEL	NO. OF COMMUN	AVER. OM&R COSTS	AVER. CAPITAL COST	TOTAL UNIT COSTS AVER.	MEDIAN	STD. DEV.
PRIMARY	2	$0.79	$0.87	$1.65	$1.65	$0.24
SECONDARY	14	$1.05	$1.02	$2.07	$1.60	$1.32
ADVANCED	1	$2.05	$3.46	$5.51	$5.51	$0.00
OVERALL	17	$1.08	$1.14	$2.22	$1.61	$1.46

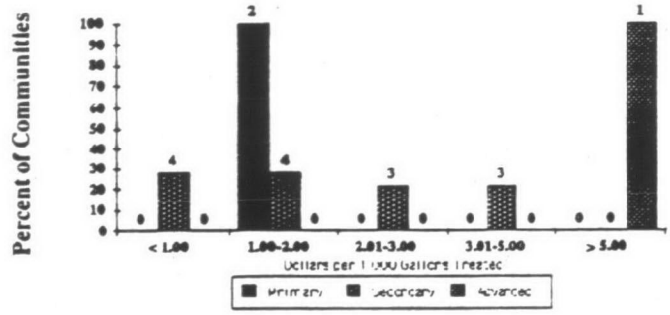
TOTAL COSTS



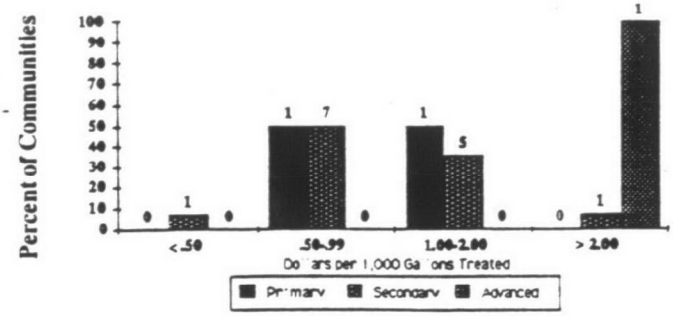
OM&R COSTS



TOTAL COSTS BY TREATMENT LEVEL



OM&R COSTS BY TREATMENT LEVEL



III. Average Annual Total Residential Costs and Sewer Service Charges per Household

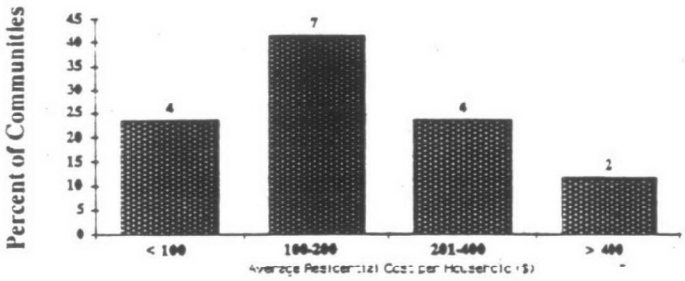
The average annual total residential treatment costs and sewer service charge per household serves as a basis for later analyses such as (1) the percentage these represent of median household income, and (2) whether user charges are covering residential costs. Here, the data have been arrayed to show the distribution by treatment levels. The results of this survey showed a steady user charge increase as one goes from primary to secondary to advanced treatment.

The secondary treatment residential user charges were generally less than $200, while the advanced treatment costs were all in the $100 to $200 range. The user charges for primary treatment systems were less than $100 and in the $201 to $400 ranges.

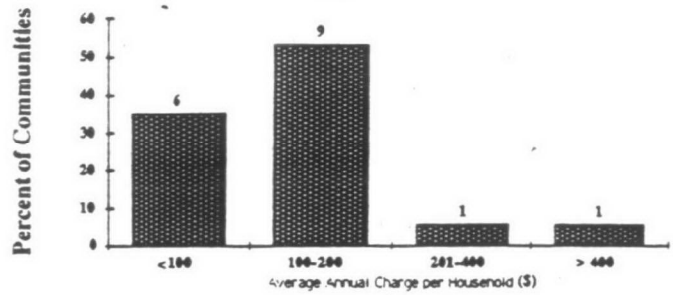
DISTRIBUTION OF RESIDENTIAL COSTS AND USER CHARGES

TREATMENT LEVEL	NO. OF COMMUN.	AVE. TOTAL RESID. COST/HH	AVERAGE USER CHARGES PER HOUSEHOLD AVERAGE	MEDIAN	STD. DEV.
PRIMARY	2	$152.54	$212.00	$212.00	$152.00
SECONDARY	14	$186.17	$149.69	$120.02	$183.07
ADVANCED	1	$568.60	$150.00	$150.00	$000.00
OVERALL	17	$204.71	$157.04	$123.04	$175.28

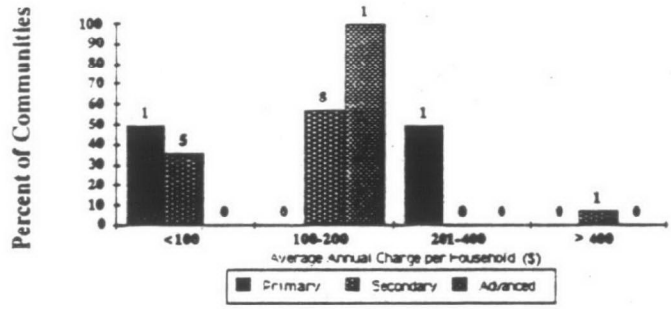
AVERAGE RESIDENTIAL COST PER HOUSEHOLD



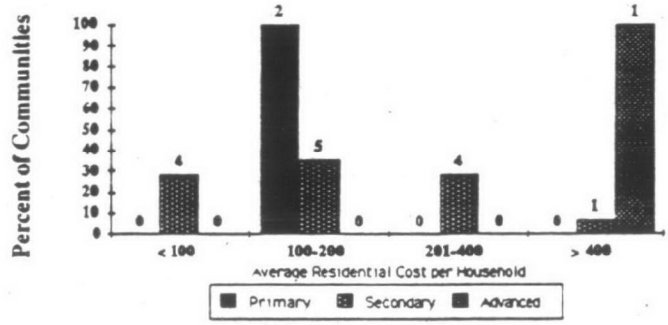
AVERAGE ANNUAL CHARGE PER HOUSEHOLD



AVERAGE ANNUAL CHARGE PER HOUSEHOLD



AVERAGE RESIDENTIAL COST PER HOUSEHOLD



IV. Equitability of Residential User Charges

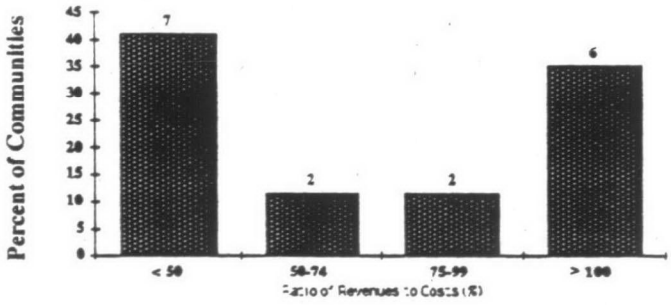
Are residential customers paying their fair share of the costs? Or is one class of users subsidizing another? Analysis of data on the portion of the flow, costs, and revenues attributable to residential users allows answers to these questions. Based on the analysis, communities may restructure their user charge systems to distribute costs more equitably.

This analysis shows that in many communities residential users may be paying less than their share of treatment costs. This is true for primary treatment, where one-half of the communities appear to be charging their residential customers more than their "share." About two-thirds of secondary treatment communities and all advanced treatment communities charge residential customers less than their estimated share of treatment costs.

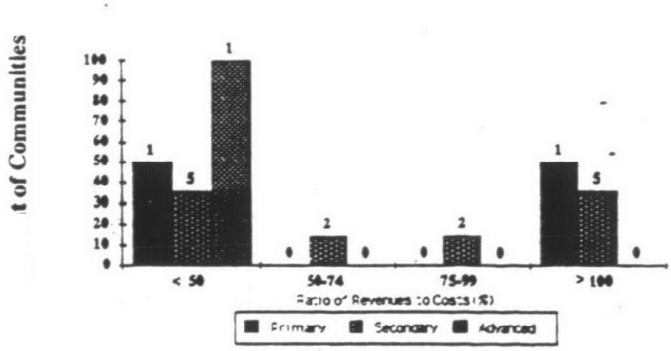
DISTRIBUTION OF
TOTAL REVENUE VS. TOTAL COSTS
FOR RESIDENTIAL SECTOR

TREATMENT LEVELS	NO. OF COMMUN	ABOVE 100%	BELOW 100%
PRIMARY	2	50%	50%
SECONDARY	14	36%	64%
ADVANCED	1	0%	100%
TOTAL	17	35%	65%

RATIO OF REVENUES TO COSTS: RESIDENTIAL



RATIO OF REVENUES TO COSTS: RESIDENTIAL

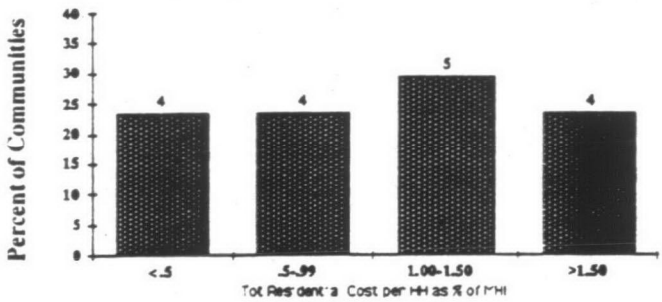


V. Ability of Residential Sector to Cover Residential Costs

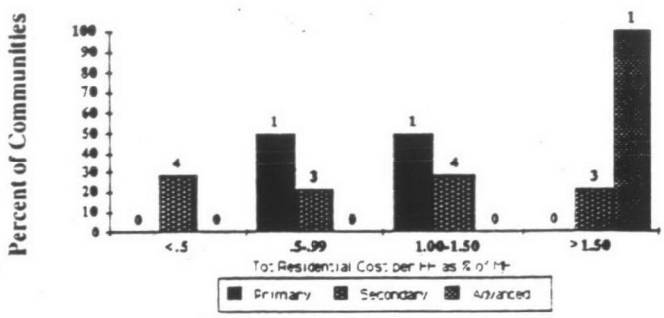
Average cost per household as a percentage of median household income can be used to indicate whether the cost of wastewater treatment is becoming burdensome for community residents. These data can also be used to predict the ability of the community to generate more revenue by increasing its sewer service charges.

In this analysis, communities had an average total residential cost which was 1.2% of the MHI, but their average sewer service charge was about 80% of that value.

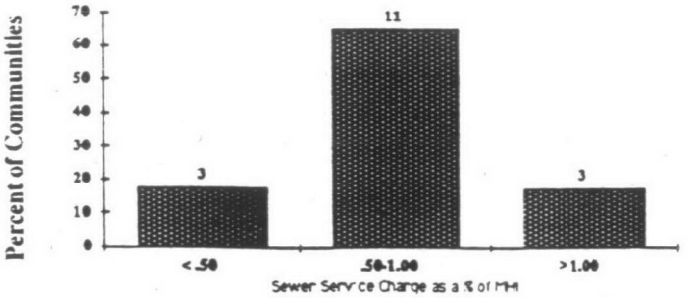
TOT. RESIDENTIAL COST PER HH AS % OF MHI



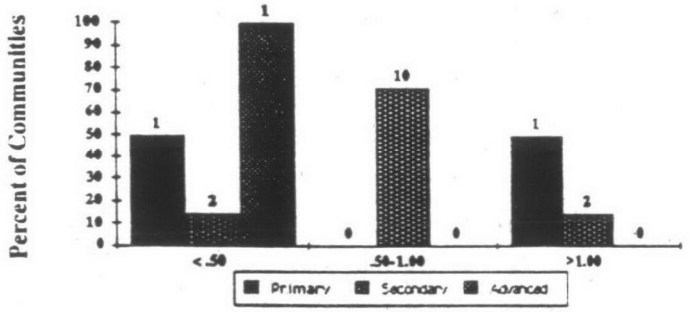
TOT. RESIDENTIAL COSTS PER HH AS % OF MHI



SEWER SERVICE CHARGE AS % OF MHI



SEWER SERVICE CHARGE AS % OF MHI



ABILITY OF RESIDENTIAL SECTOR
TO COVER RESIDENTIAL COSTS

TREATMENT LEVEL	NO. OF COMMUN	COST PER HOUSEHOLD AS % OF MHI AVER	MEDIAN	STD DEV
PRIMARY	2	1.0	1.0	0.2
SECONDARY	14	1.0	1.0	0.6
ADVANCED	1	3.4	3.4	0.0
OVERALL	17	1.2	0.9	0.8

ABILITY OF RESIDENTIAL SECTOR
TO COVER RESIDENTIAL COSTS

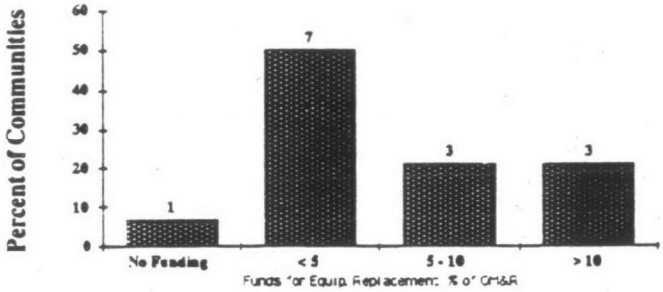
TREATMENT LEVEL	NO. OF COMMUN	SEWER SERVICE CHARGE AS % OF MHI AVER	MEDIAN	STD DEV
PRIMARY	2	1.5	1.5	1.1
SECONDARY	14	0.9	0.6	1.1
ADVANCED	1	0.9	0.9	0.0
OVERALL	17	1.0	0.6	1.1

VI. Planning For Equipment Replacement

Examination of how communities are planning for future equipment replacement identifies those communities that may need to reassess their user charge systems. Communities may be shortening the life expectancy of their facilities and possibly causing future compliance problems by not providing adequate funds for equipment replacement.

This analysis shows communities with equipment funds set aside 8% of their operating costs for equipment replacement.

FUNDS FOR EQUIPMENT REPLACEMENT



EQUIPMENT REPLACEMENT FUNDS

TOTAL NO. OF COMMUNITIES	14
PERCENT OF COMMUNITIES WITH EQUIPMENT REPLACEMENT FUNDS	93%
AVERAGE PERCENT VALUE OF REPLACEMENT FUNDS	8%
MEDIAN VALUE	4%

VII. Debt Burden Without Grant Contribution

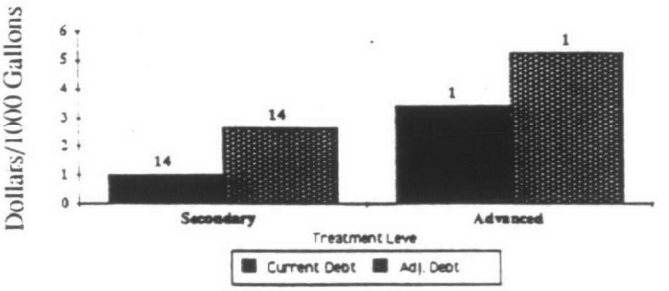
The effects of grant funding on capital costs are examined by making adjustments to the debt financing cost figure (as reported in the surveys) to reflect "total" costs of capital without Federal or State grant assistance. This roughly determines the impact of grant assistance on community treatment costs.

This analysis showed that the average debt financing costs for advanced treatment would have increased from $3.46 to $5.30 per 1000 gallons, while it would have increased from $1.02 to $2.60 for secondary treatment. In this analysis, grants reduced the average treatment costs from $3.95 per 1000 gallons to $2.30 or 42% for secondary and advanced treatment systems.

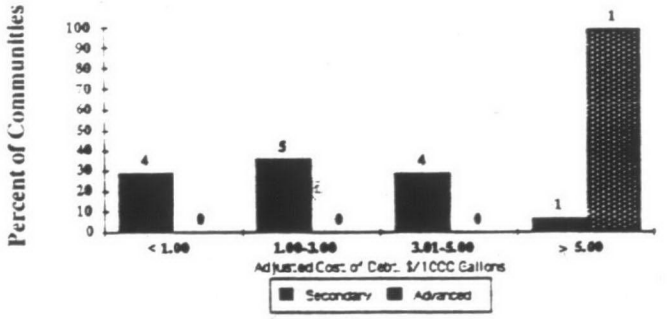
AVERAGE ADJUSTED COSTS FOR GRANT CONTRIBUTION BY TREATMENT LEVEL

TREATMENT LEVEL	NO. OF COMMUN	AVG. OM&R COSTS PER 1000 GALLONS	AVG. ADJ. DEBT COST PER 1000 GALLONS	AVG. ADJ. TOT COST PER 1000 GALLONS	MEDIAN	STD. DEV.
SECONDARY	14	$1.05	$2.66	$3.71	$2.63	$3.39
ADVANCED	1	$2.05	$5.30	$7.35	$7.35	$0.00
OVERALL	15	$1.12	$2.84	$3.95	$2.06	$3.39

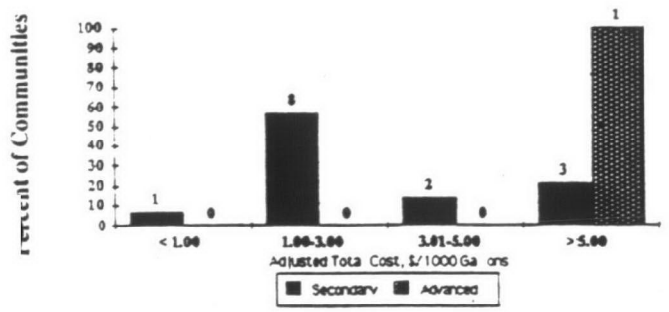
AVG ADJUSTED DEBT BY TREATMENT LEVEL



ADJUSTED COST OF DEBT



ADJUSTED TOTAL COST



VIII. Summary Findings

Some of the more interesting findings from this survey were:

1. About 87% of the communities are not collecting enough revenues to meet their expenses.

2. A significant portion of residential users (65%) appear to be paying less than their fair share for wastewater treatment.

3. Most communities (93%) have equipment replacement funds with a median value of 8% of operating costs.

4. Average residential cost of treatment was 1.2% of the median household income. But, the average sewer service charge was only 1% of the median household income.

5. Federal and State grants have reduced the average total cost of wastewater treatment by 42% for secondary and advanced treatment systems.

Appendix A

Model Survey Form

SAMPLE

Dear (State Name) Community Official,

The budget problems you've faced in paying for community services will probably increase in the future. This means your local residents and industry must pay more for wastewater treatment. Your challenge will be how to raise money to meet your current and future wastewater treatment needs. The information requested in the attached survey can help you meet this challenge.

STRIKING A BALANCE

As you know, every community needs to continuously examine its wastewater costs and revenues to make certain they balance. The results of this survey will help you decide if your current service charges are adequate for operating, maintaining, and improving your wastewater treatment facilities.

HOW DO YOU COMPARE?

The information you and others provide will be analyzed to show how much communities in the state pay for wastewater service. You'll be able to compare your community's costs with others. If you return this survey to us, we'll send you a copy of the survey analysis report.

DO YOU HAVE QUESTIONS?

Instructions are attached to help you answer the survey questions. To answer some of the questions, you may need to involve various people in your organization who know about the special aspects of your wastewater system. Even if you or others don't know the exact answers to all the questions, please use your best estimates and return the survey to us by (date). Please feel free to call (name of contact) at (telephone number) if you have any questions. The survey should be returned to (name of contact and address).

Thank you or your help.

Sincerely,

(Name of Official)

Attachment

Community Name _____

Wastewater Service District (if your community does not treat its wastewater) _____

Contact Person(s) _____

Address _____

Phone No. _____

1. How many households (not population) in your community receive wastewater treatment services? _____

2. What is the current estimated median household income in your community?

   $_____

3. What is the <u>current</u> average flow treated at your facility?

   _____ Gallons per day

4. What is your current estimated average wastewater flow per household per day?

   _____ Gallons per day

5. What is the level of treatment at your wastewater treatment facility?

   ___ primary ___ secondary ___ advanced

6. About how much of the money needed to construct your facility came from state or federal grants?

   $_____

7. How much does it cost to operate your facilities for a year? (operation, maintenance, and equipment replacement costs -- DO NOT include the costs of wastewater loans and bonds, or depreciation)

   $_____ Year of data _____

8. About how much money are you putting aside (as a percentage of operating costs) each year for equipment replacement?

   _____ %

9. How much are you paying each year to cover wastewater loans or bonds? (principal and interest costs only)

   $_____ Year of data _____

10. How much money (revenue) are you currently collecting to pay for wastewater collection, treatment and disposal, plus principal and interest costs on wastewater debt?

    $_____ Year of data _____

11. What is the current average annual sewer service charge per household?

    $_____ Year of data _____

INSTRUCTIONS FOR COMPLETING SURVEY

These instructions include information plus directions to help you complete some of the questions. If something does not fit your situation, answer as best as you can and explain the problem or call the number shown in the cover letter for more help.

QUESTIONS 1-6

There are several possible sources of information to complete Questions 1-6. Use the most current source that corresponds best to your wastewater facility's service area. Sources for data include the census, surveys conducted by a regional planning agency, etc. In all cases, provide the best information you have; give us your best estimate if actual numbers are not available.

1. **Households.** This should be the total number of households (residential customers) serviced, not the number of people or population. (Residential apartment buildings should be treated as equivalent dwelling units.)

2. **Median Household Income.** This should be the most recent census value or current estimate. Your local Bureau of Census, Data User Center, can provide this information.

3. **Current Average Flow Treated.** This value represents flow from all sources. Flow should be reported in gallons per day. If your flow is calculated in cubic feet per day, multiply the flow by 7.481 to convert it to gallons per day.

4. **Average Wastewater Flow Per Household Per Day.** Calculate as follows:

   gallons daily residential flow $\div$ number of residential customers = daily flow per household (gallons per day)

   Your figure for gallons daily residential wastewater flow might come from your water supply department or your billing office. The wastewater flow figure should include an adjustment for infiltration/inflow.

QUESTIONS 7-11

Cost and revenue information you provide in Questions 7-11 should include all parts of the wastewater system: collection (sewers, pumping stations), the treatment plant, and disposal (outfalls, sludge disposal).

7. **Annual Costs.** This number should include annual "operating costs," "maintenance costs," "replacement costs" for wastewater collection and treatment, and any charges from Regional systems. (It DOES NOT include the costs of wastewater loans and bonds, or depreciation).

Operating costs include labor, materials and supplies, utilities, and overhead (such as office rent).

Maintenance costs include preventive and corrective maintenance.

Replacement costs include costs to maintain but not to extend the useful life of the facilities (like pumps and motors).

8. **Equipment Replacement.** This question is intended to determine what percentage of the operating costs you included in Question 7 are being put aside to maintain but not extend the useful life of the facilities (like pumps and motors).

9. **Costs of Loans or Bonds.** This number should include all principal and interest payments you are making annually to pay for your wastewater treatment facilities.

10. **Money (Revenues) Collected Annually.** This should include all the money you collect for operating and financing all parts of the wastewater facilities--collection, treatment, disposal and debt service. DO NOT include grant monies.

11. **Annual Sewer Service Charge Per Household.** This should be an estimate of the typical total annual sewer service bill for a residential customer. One method of calculating this charge would be to use the wastewater treatment rate established in your sewer use ordinance and the average wastewater flow per household.

Appendix B

Formulas and Data

1. Ratio of Revenues to Costs
= Total Revenue (10) / [OM&R Costs (7) + Debt Financing Costs (9)]

2. Total Unit Costs per 1000 Gallons

$$\frac{\text{OM\&R Costs (7) + Debt Financing Costs (9)}}{\text{Current Average Flow in thousand of gallons per day (3) * 365}}$$

3. OM&R Cost per 1000 Gallons Processed
= (OM&R Costs (7) / [Current Average Flow in thousand of gallons per day (3) * 365])

4. Average Annual Charge per Household
= Current Average Annual Sewer Service Charge (11)

5. Average Residential Cost per Household

$$= \frac{\text{Residential Flow Proportion} * [\text{OM\&R Costs (7) + Debt Financing Costs (9)}]}{\text{Number of Households (1)}}$$

Where Residential Flow Proportion

$$= \frac{\text{Flow / Household (4) * Number of Households (1)}}{\text{Current Average Flow (3)}}$$

6. Ratio of Revenues to Costs: Residential

$$= \frac{\text{Number of Households (1) * Average Annual Sewer Charge (11)}}{\text{Cost of Treating Residential Flow}}$$

Where Cost of Treating Residential Flow
= [OM&R Costs (7) + Debt Financing Costs (9)] * Residential Flow Proportion

7. Total Residential Cost per Household as a Percent of MHI
= Average Residential Cost per Household / Average MHI (2)

8. Sewer Service Charge as a Percent of MHI
= Current Average Annual Sewer Service Charge (11) / Average MHI (2)

9. Equipment Replacement Funding
= Equipment Replacement as a Percent of OM&R (8)

10. Annual Debt Financing Cost Adjustment
= Total Grant Dollars (6) * Capital Cost Recovery Factor

11. Adjusted Debt Cost=

$$\frac{\text{Annual Debt Financing Cost Adjustment + Debt Financing Costs (9)}}{\text{Current Average Flow * 365}}$$

12. Adjusted Total Cost=
Adjusted Debt Cost + OM&R Cost per 1000 Gallons Processed

Where the Capital Cost Recovery Factor is assumed to be 0.102, representing the equivalent annual cost of borrowing the grant funding over 20 years at 8 percent interest per year.

Note that in computing these measures, any system which was missing one or more parts of the data was excluded from the calculation; thus, sample sizes vary from measure to measure.

Summary of User Costs Survey Information

Community Number	Average Flow (GPD)	Level of Treatment	Operation Costs	Debt Financing Costs per Year	Total Cost $/1000 Gal	Average Annual Service Charge per Household	Total Res Cost per Household	Total Residential Cost as a % of MHI
1	22,400	Secondary	$5,428,784	$1,487,778	$0.85	$85.00	$62.53	0.48%
2	2,600	Primary	$534,000	$1,265,262	$1.90	$60.00	$139.44	0.86%
3	780	Advanced	$584,000	$984,830	$5.51	$150.00	$568.60	3.42%
4	11,900	Secondary	$2,770,000	$3,328,270	$1.40	$140.00	$137.44	0.79%
5	980	Secondary	$278,175	$765,618	$2.92	$123.04	$263.08	1.10%
6	6,700	Secondary	$1,649,027	$621,813	$0.93	$0.00	$76.26	0.42%
7	149	Secondary	$155,411	$102,478	$4.74	$150.00	$453.82	2.55%
8	53,500	Secondary	$8,200,000	$1,970,000	$0.52	$65.00	$38.02	0.29%
9	792	Secondary	$380,600	$67,146	$1.55	$782.00	$199.00	1.22%
10	121	Secondary						
11	6,000	Primary	$2,222,980	$872,927	$1.41	$364.00	$165.63	1.17%
12	1,300	Secondary	$695,000	$1,047,617	$3.67	$124.20	$331.10	1.55%
13	2,400	Secondary	$993,836	$933,899	$2.20	$117.00	$172.69	0.94%
14	1,600	Secondary	$451,992	$475,570	$1.59	$0.00	$193.05	1.26%
15	2,800	Secondary	$1,458,244	$3,000,000	$4.36	$184.23	$318.45	1.70%
16	4,850	Secondary	$1,973,640	$1,607,559	$2.02	$158.17	$202.61	1.30%
17	2,000	Secondary	$650,000	$524,259	$1.61	$102.00	$111.14	0.63%
18	10,700	Secondary	$2,139,750	$191,250	$0.60	$65.00	$47.23	0.38%
Av					$2.22	$157.04	$204.71	1.18%
Me					$1.61	$123.04	$123.04	0.94%