

**U. S. WASTEWATER CONTRACT OPERATIONS:
CONTRACT DETAILS AND VIEWS OF CONTRACTING**

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As wastewater and water utility contract operations become mature, our ability to evaluate the cost and performance of these types of operations has similarly reached its prime. Public officials continue to have limited information available to them when contracting for operations or renewing contracts. What is the range of going rates for wastewater contract operations in different size plants? What advantages or disadvantages of contracting have surfaced recently? Have the structure of these types of contracts changed over time? Budget and schedule limitations may limit the public official's ability to answer these questions. This paper seeks to unlock the mysteries surrounding both the costs and performance of utility contract operations.

George Mason University, in cooperation with Black and Veatch Management Consulting, has conducted a nationwide survey of contract operations of over 200 plants. Building upon the results of two previously conducted surveys; this study has expanded the state-of-the-knowledge significantly. By including an analysis of the renewal (or more importantly non-renewal) of contracts and contract structure changes, this new survey addresses many previously unanswered questions. More is now known about the level of effort associated with contract management. The results of the survey provide valuable insights into contract terms, staffing, new approaches to repair and replacement responsibility and capital renewal, innovative incentives and other trends over the last six years. The comprehensive nature of this study provides municipal governments with the information necessary to achieve operational cost savings goals relative to the size and scope of the operation.

I Introduction

George Mason University, under a grant sponsored by Black and Veatch Management Consulting, has recently completed a nationwide survey of contract operations of over 200 privately operated wastewater treatment plants. This is the third such survey conducted over the past 6 years. The objective of these surveys has been to collect information regarding contract operations of wastewater treatment plants and to summarize this information in a format that would be of use to government officials seeking to achieve a high quality, low cost operation. The response rate to our four-page questionnaire was about 50%; of the 235 places contacted, 115 have responded with varying amounts of information.

The objective of this paper is to present the results of the survey. The results are shown in an agglomerated manner so as to protect the identity of each participating plant. An attempt was made to address the following questions:

- What are typical costs and staffing levels for plants of differing sizes?
- What are the staff level changes that have been the result of contract operations?
- What is the average length of the contract or the renewal term?
- What was the renewal rate for contracts? Were the renewed contracts renegotiated or re-competed? What were the reasons for non-renewal?
- Which contract management tools do municipalities have?
- How are the plants doing in terms of effluent quality?
- What are the main advantages and disadvantages of contracting?
- What major changes were made in the new contracts?
- How are client/contractor relationships characterized?

II Cost and Staffing Levels

Of the plants surveyed, 78 provided detailed cost breakdowns for their operations and these were used in the cost analysis. In order to make valid comparisons of costs of operation, the total costs of wastewater treatment were calculated in a precise manner. Total costs were determined by adding the contract operations and maintenance costs to any pass through costs (i.e., city assumed costs) for electricity, chemicals and sludge

handling and disposal. Costs for collections and repair and replacement were excluded from the total costs. If the plant was not able to separate out the costs for collections, their data were excluded from the evaluation. Similarly, if the contract included pass through costs for which data was not available, these plant cost data were not analyzed. Ultimately, the goal was to develop a contract operation cost value that included all treatment and disposal costs including all pass through cost and excluded collection costs.

The average daily flow for the preceding year was used to differentiate the plants. Data for ten flow ranges are compared, as shown in Table 1.

Table 1 **Cost and Staffing Levels**

AV. DAILY FLOW RANGE (mgd)	NUMBER OF PLANTS	COST RANGE COST/mgd (\$1000)	AVERAGE COST¹/mgd (\$1000)	FTE RANGE PER PLANT	AVERAGE FTE²/mgd
.05 - .2	7	490 – 3537	1027	1 – 4	.. ³
.25 - .5	7	310 – 1214	706	2 – 4	7.7
.51 - 1.0	8	294 – 1393	646	1.25 – 9	6.0
1.1 - 1.5	8	367 – 944	540	3 – 13	5.3
1.6 - 2.5	12	209 – 564	337	2 – 14	3.3
2.9 – 4.0	9	224 – 1103	289	4 – 25	2.6
4.1 – 5.7	9	175 – 758	284	6 – 38	2.6
6.4 – 10.0	6	203 – 535	271	9 – 34	2.0
11.8 – 15.7	6	227 – 323	267	21 – 23	.. ³
16.1 – 30.0	6	162 - 233	218	13 - 14	1.1

The wide ranges of cost/mgd and staff per plant underscore the great diversity of wastewater treatment systems and plants. The cost differences may also reflect a lack of

¹ Excludes both the highest cost and the lowest cost in each range.

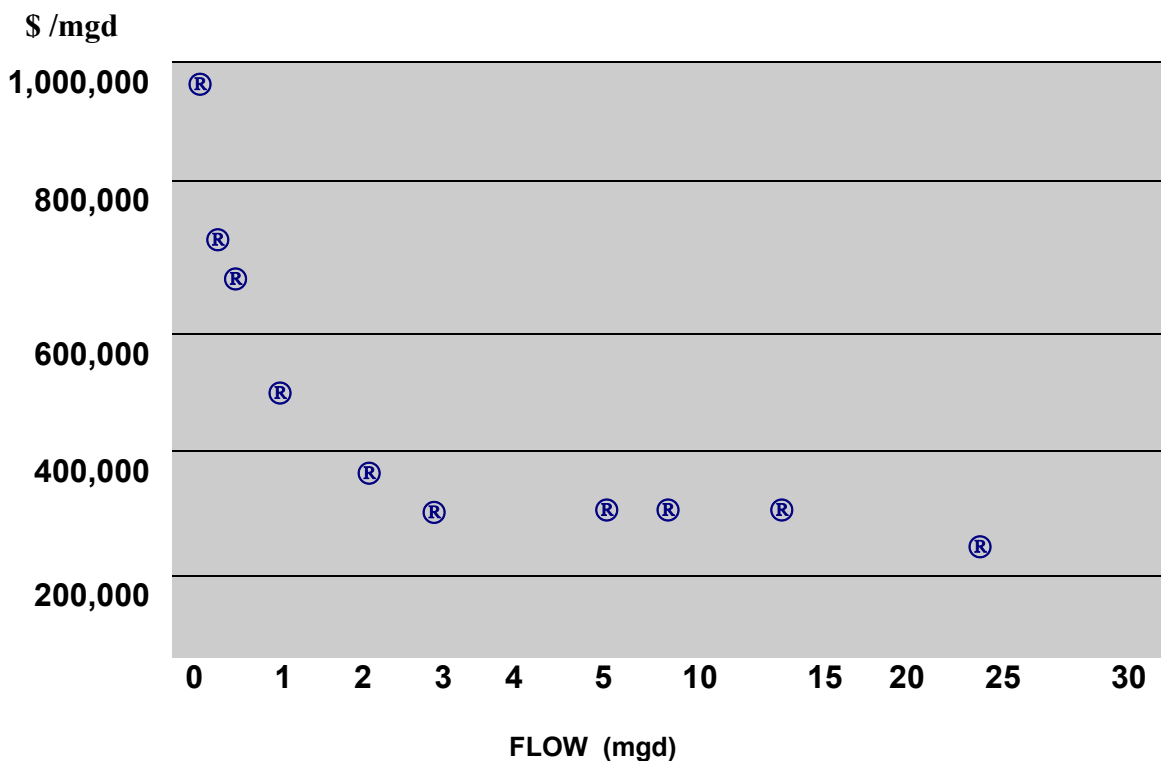
² Excludes both the highest FTE and the lowest FTE in each range

³ Too few observations to calculate a meaningful number.

competitiveness to some degree. In order for the outliers not to distort the averages, the average cost/mgd and average FTE/mgd in each flow range were calculated by excluding both the highest and the lowest observations.

As expected, economies of scale are realized by larger plants. With each increase in flow, the average treatment cost per unit of flow drops. Similarly, the average full time equivalent (FTE) of staff drops as well. A representation of the average cost data is shown in Figure 1; it displays the average cost per unit of flow as a function of average daily flow. It is apparent that the costs of operations stabilize for the larger plants. Reductions in average cost per unit of flow are not very large above 3 mgd.

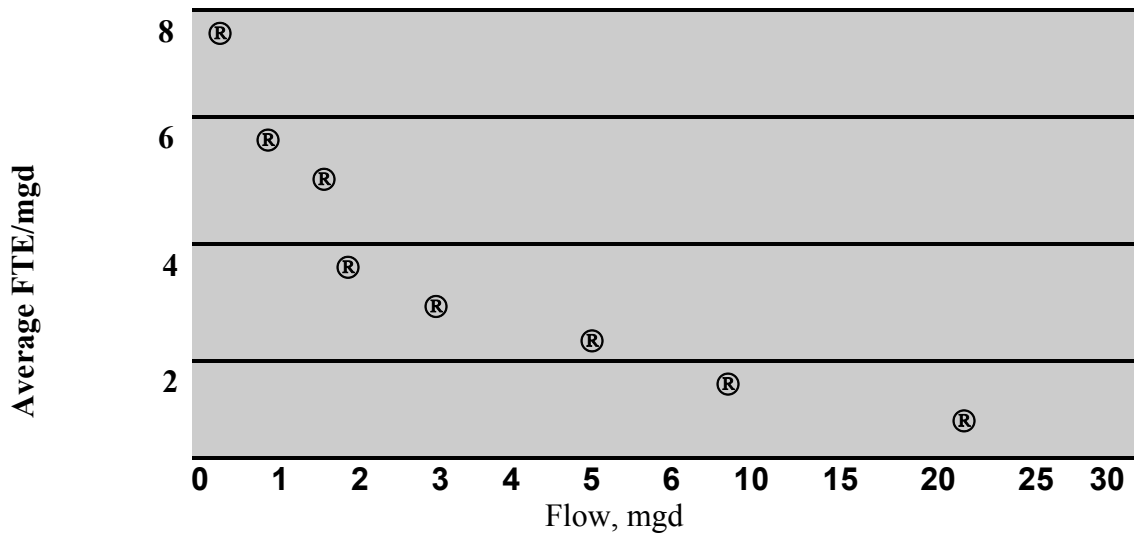
Figure 1 Average Wastewater Treatment Cost vs. Flow



The average staffing levels per unit of flow are depicted in Figure 2. In cases where the contract included wastewater collection, one or more staff members are involved with this function. From the estimated wastewater collection cost levels we could tell this did not increase the total staff very significantly. Unfortunately we did not have the precise labour data to adjust for the performance of this function. It also should

be noted that in some cases the contractor was not free to choose the level of staff; in 32% of the cases a minimum level was stipulated by either the contract or by state law.

Figure 2 **Average Staff Levels/mgd vs. Flow**



III Staffing Level Changes

When previous surveys were conducted, little information was available regarding the change in FTEs that had been realized as a result of contract operations. The recent survey was able to collect and compile data regarding changes in FTE. Of the 67 plants that provided information regarding FTE changes, 32 reported a reduction, 20 reported no change, and 15 reported an increase as a result of contract operations.

Staff level reductions reflecting increased levels of automation were anticipated. Since it is not known when these reductions took place, and over how many years, it is impossible to give a precise meaning to the actual changes in numbers. The presence of required minima, as referred to above, no doubt played a role in some of the cases where no change was reported.

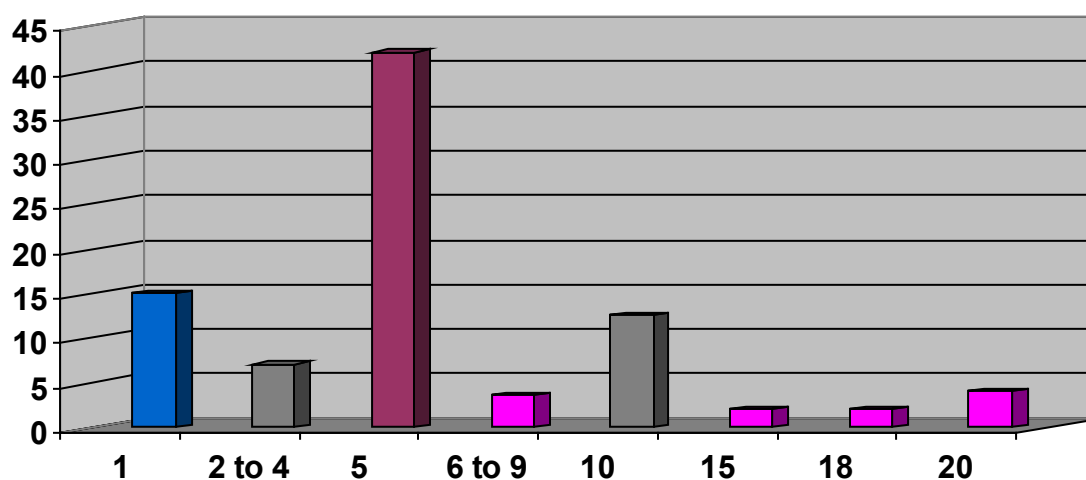
Increases in the staff level should not necessarily be viewed negatively. In some cases respondents were quick to point out that their plant was under-staffed at the time the contract was awarded. One of the problems solved by contract operations is improved access to qualified operators.

IV Contract Duration, Renewal, and Non-Renewal

Figure 3 pictures the duration of contracts or contract renewals. This information was received for a total of 87 plants/contracts. As shown, a 5-year term is by far the most popular. The duration of contracts nowadays ranges from 1 – 20 years. The drawback of shorter terms, i.e. less than 5 years, is that these terms are not conducive to the contractors making significant capital investments.

Information regarding the method of renewal was provided in 66 cases. Of the 66, 48 (or 73%) of the contracts were renegotiated with the existing vendor; the remaining 18 (or 27%) of the municipalities chose to re-compete their contract.

Figure 3 Duration of Contracts or Renewal Terms



As was expected, not all contracts were renewed. Out of a total of 107, 16 municipalities (15%) reported that their facility's operation had reverted back to public sector management. The main reasons given by municipal officials are listed in Table 2. Often more than one reason was given. In almost all cases, 13 out of 16, it was thought that performing the job in-house, would save money. In one-third of the cases, 6 out of 16, a concern was expressed about the contractor's performance, i.e. that the contractor had not been living up to responsibilities. Table 2 also identifies several other reasons.

Table 2 Reasons for Non-Renewal of 16 Contracts

➤ Cost Savings	13 cases
➤ Inadequate performance of contractor	7 cases
➤ Neglect of equipment and condition of facility	3 cases
➤ Poor response to customer complaints	1 case
➤ More control of facilities	1 case
➤ To consolidate W/WW staff into one department	1 case
➤ Employee satisfaction	1 case

V Municipality's Contract Management and Monitoring Tools

In this survey seven different management and monitoring tools were identified.

They are:

- Direct supervision of operations
- A required minimum number of employees
- Pass through costs for electricity, chemicals and sludge disposal
- Caps on pass through costs
- Sharing of cost savings
- Threshold for repair and replacement costs
- Annual allowance for repair and replacement costs

Direct Supervision

Our data on municipalities' overhead costs for contract management and monitoring, i.e. direct supervision of operations, are not very complete. One reason is that about 25% the questionnaires were completed by the contractor, and the contractor did not have such information available. Of the 59 places for which we did receive a

response, 24 (or 40%) had budgeted \$10,000 or more for this function. Another 5 places (or 8%) had budgeted less than \$10,000. The remaining 25 (or 52%) had not formally allocated any resources for direct supervision. The highest ratio for overhead costs as a percentage of the total contract cost was 8%; in some cases as many as 2 FTE's were budgeted for.

The apparent complete lack of direct supervision in many cases came as a surprise. After all, the total annual costs of many contracts amount to millions of dollars. As a matter of fact, in several cases the failure of the contract operation was in part attributed to a lack of supervision by the municipalities.

Other Management Tools

We already reported on a required minimum number of employees; it applies to 32% of the contracts. Minimum staff levels, of course, help protect against the contractor cutting corners in operations and maintenance of the facility.

The feature of pass through costs, where the municipality directly pays the bills for electricity, chemicals, sludge handling and disposal or "other" (propane, for example) is used to varying degrees, as Table 3 shows.

Table 3 Contracts With Pass Through Costs and Caps

COST ITEM	PASS THROUGH COSTS?			CAPS?		
	YES	NO	TOTAL	YES	NO	TOTAL
Electricity	42	50	92	13	29	42
Chemicals	18	74	92	4	14	18
Sludge Disposal	21	71	92	4	17	21
Other	9	83	92	2	7	9

Electricity costs, which can be subject to significant rate level changes, are the most common pass through cost item. In our survey this was found to apply 42 out of 92 (46%) of the cases. The remaining three cost items are less commonly passed through to the client.

Pass through costs perform a function somewhat similar to a stipulate minimum staff contingent. With pass through cost items there is no incentive for the contractor to skimp and cut corners. Furthermore, the contractor is protected against unforeseen price increases. In turn, and this is a benefit to the client, there is no need to build in a margin for this possibility into the operations and maintenance service fee.

Is there any protection for the client? The answer is “yes”, and it takes the form of caps. About one-third of the contracts that feature pass through costs also have stated caps on one or more of these four kinds of variable costs.

Further incentives for contractors to monitor budgeted costs closely are created by the sharing of certain cost savings. Such arrangements are part of about one-third of the contracts. The sharing proportions range from as little as 10% going to the contractor and 90% going to the client to the more common 25%/75% or 50%/50% sharing arrangement.

Most contracts stipulate an annual maximum for repair and replacement (R & R) costs. Consultation with and approval of the client is required in cases where stipulated thresholds per activity are to be exceeded. R & R costs were often the subject of caps. Due to the at times irregular nature of these costs we decide against including them with the operations and maintenance costs.

VI Effluent Quality

How well are contract operated plants doing in terms of effluent quality? And is the outcome noticeably influenced by whether or not the contractor can pass through certain costs to the municipality? Assuming that our sample of responses is reasonably random, the answers are clear and simple. Tables 4A and 4B contain summaries of information to answer these two questions. Our findings are:

1. Table 4A shows that, by and large, plants do an excellent job in terms of effluent quality. To be specific, 70% or more of the plants report emission levels for BOD and Suspended Solids below one-half of what their permit allows. Very few plants emit close to, or more, than what is allowed.
2. Table 4B shows that these excellent results do not appear to be affected by whether or not the contractor can pass through certain costs to the municipality.

Whereas one might think that with pass through costs the results would be better, this does not appear to be the case.

TABLE 4A

COMPLIANCE OF U. S. CONTRACT OPERATE PLANTS IN 2001
All Plants (n = 73)

<u>ACTUAL</u> REQUIRED	BOD (n=73)	S. SOLIDS (n = 73)	PHOSPHORUS (n = 11)
RANGE	%	%	%
0 – 25%	33.3	36.1	18.2
<u>26 – 50%</u>	<u>36.2</u>	<u>41.7</u>	<u>18.2</u>
0 – 50%	69.5	77.5	36.4
51 – 75%	15.9	13.9	36.4
76 – 100%	11.6	5.6	27.3
>100%	2.9	2.8	0

TABLE 4B

CONTRACTS WITHOUT AND WITH PASS THROUGH COSTS

	WITH NO PASS THROUGH COSTS (n = 37)		WITH PASS THROUGH COSTS (n = 36)	
<u>ACTUAL</u> REQUIRED	BOD	SUSP. SOLIDS	BOD	SUSP. SOLIDS
RANGE	%	%	%	%
0 – 25%	40.5	37	22.2	32.5
<u>26 – 50%</u>	<u>35</u>	<u>39.5</u>	<u>36.1</u>	<u>43.3</u>
0 – 50%	75.5	76.5	58.3	75.7
51 – 75%	13.5	13.5	16.7	13.5

76 – 100%	5.5	2.5	16.7	8.1
> 100%	5.5	5.5	8.3	2.7

VII Views Of Contracting: Main Advantages and Disadvantages

Views held by public officials reflecting their experiences with contracting were solicited under the headings of Main Advantages of Contracting, and Main Disadvantages of Contracting. Summaries of the most common observations are found in Tables 5A and 5B.

As expected, frequently cited advantages are the contractor's resources in the form of expertise, experience, knowledge, professional staff and quality personnel, professional services and technical support. Offsetting these advantages, to some degree only, are the number of cases of inadequate contract performance as perceived by the contractor's client. Other frequently mentioned advantages are cost savings and cost control. However, it is perhaps ironic that a similar number of respondents cite higher cost as a major disadvantage

A third advantage, of course, is that of administrative convenience. A sense of reduced control or loss of control offsets this. Liability protection and risk shifting were also seen as advantages, whereas negotiating a contract with clear language that addresses all issues is time consuming, and can be costly and politically volatile.

Several respondents reported higher quality services. However, there are no free lunches; over one-third of the places chose to incur overhead costs stemming from contract management and monitoring.

VIII Major Changes in the New Contracts

Almost one-half of the respondents reported that no major changes were made in the new contract. The other changes reported were, in most cases, relatively minor changes. The most commonly noted changes were:

- Cost adjustments (increases as well as decreases in fees)
- Increases in the length of the contract term

- Changes in the scope of the contract
- Changes in the financial incentives

Perhaps the most challenging issue for the municipalities, besides paying a reasonable fee, is seeing to it, somehow, that the quality of the plant is protected in the

TABLE 5A MAIN ADVANTAGES OF CONTRACTING

1. <u>CONTRACTOR'S RESOURCES</u>		
➤	EXPERTISE, EXPERIENCE, KNOWLEDGE	18
➤	PROFESSIONAL STAFF, QUALITY PERSONNEL	6
➤	PROFESSIONAL SERVICES, TECHNICAL SUPPORT	5
2. <u>COST SAVINGS AND COST CONTROL</u>		
➤	COST SAVINGS	15
➤	FIXED COST, COST CONTINUITY, LEVELING	7
3. <u>ADMINISTRATIVE CONVENIENCE</u>		
➤	NO STAFF TRAINING, SUPERVISION, HASSLES	6
➤	DAY-TO-DAY OPERATIONS BY OTHERS	4
➤	ABILITY TO FOCUS EFFORTS ELSEWHERE	1
4. <u>LIABILITY PROTECTION AND RISK SHIFTING</u>		
➤	CONTRACTOR IS UP-TO-DATE WITH NEW RULES AND REGULATIONS	5
	INCREASED LIABILITY PROTECTION, SOME RISK SHIFTING	4
5. <u>HIGHER QUALITY OF SERVICES</u>		
➤	IMPROVED PERFORMANCE, COMPLIANCE	3
➤	BETTER SAFETY RECORDS	1
➤	BETTER SERVICE TO THE PUBLIC	1

TABLE 5B MAIN DRAWBACKS OF CONTRACTING

1. <u>INADEQUATE CONTRACTOR PERFORMANCE</u>		
➤	REASON CITED IN 7 OUT OF 16 CASES OF NON-RENEWAL	7
➤	CONTRACT DELIVERABLES ARE NOT ACHIEVED	1
➤	LOW SERVICES TO INFRASTRUCTURE	1
2. <u>HIGHER COST</u>		
➤	REASON CITED IN 13 OUT OF 16 CASES OF NON-RENEWAL	13
➤	HIGHER COST (4), POSSIBLY HIGHER COST (4)	8
3. <u>REDUCED CONTROL OR LOSS OF CONTROL</u>		
➤	REDUCED OR LOSS OF CONTROL	12
➤	RESPONSE TIME TO CRITICAL WORK	1
➤	KEEPING CONTRACTOR MOTIVATED; POOR LEADERSHIP POSSIBLE	1
4. <u>NEGOTIATING A CONTRACT</u>		
➤	WITH CLEAR LANGUAGE THAT ADDRESSES ALL ISSUES	1

➤	TIME CONSUMING, COSTLY, POLITICAL VOLATILE	1
5.	CONTRACT MANAGEMENT AND MONITORING	
➤	AT LEAST 35 PLACES (OUT OF 91) CHOSE TO INCUR OVERHEAD COSTS ASSOCIATED WITH CONTRACT MANAGEMENT AND MONITORING	3

reasonable fee, is seeing to it, somehow, that the quality of the plant is protected in the short run as well as in the long run. Several approaches were noted or recommended to accomplish this important goal. They include:

1. Select a contractor who has an excellent track record in other places
2. Spell out in the contract the various required maintenance activities at specific time period intervals.
3. Require in the contract the purchase and installation of new equipment.
4. Increase the maintenance budget.
5. Remove maintenance from contract
6. Specify in the contract penalties for non-compliance.
7. Include in the contract a clause permitting unconditional contract termination.

IX Client/Contractor Relationships

The responses received in this section of the questionnaire were, with relatively few exceptions (13 or 11%), positive. Answers were received from 92 municipal officials and from 23 contractors. Included in the totals are the responses of municipal administrators who did not renew their contract. It is assumed that in the 7 cases where the client was not satisfied with their contractor, the relationship was “unsatisfactory”. The relationship descriptions are shown in Table 6.

Table 6 CLIENT/CONTRACTOR RELATIONSHIPS

Relationship Description	Number of responses from:	
	Clients	Contractors
Harmonious	39	15
Businesslike/Satisfactory	40	8
Confrontational at times	3	

Unsatisfactory	10	
TOTALS	92	23

X Advice from City Managers

City Managers who are satisfied with the performance and fee levels of their contractor needed to do little except renew or re-compete the contract, and perhaps negotiate some changes in the contract language. In other cases, however, where the contractor's performance was deemed to be unsatisfactory, a major decision had to be made. Either a new contractor had to be found, or the work had to be done in-house again.

We solicited the views of City Managers who had been faced with unsatisfactory contractor performance. In response to this situation the City of Marlette, Michigan, sought a new contractor, modified the contract language, and is now receiving exemplary services. It's City Manager, Mr. Dale Kerbyson described in detail what took place.

“Privatization of the Marlette Wastewater Treatment Plant was done in excess of 14 years ago. The plant has functioned under contract Operations and Management (O & M) that entire time. The plant was upgraded to a sequential batch reactor system in 1989 and has had no upgrades to the system since. The most major repair has been the maintenance rebuilding of the large system pumps.

“Private O & M has been both good and bad for Marlette. As expected, when the company takes over O & M for a facility they start out on their best behavior. Marlette signed a three-year contract with the first company and were very pleased with the level of service they received for their money. When that contract expired the City simply renewed the contract with the original company at a COLA increase every year for the next three years, expecting that the company would maintain its level of service.

“Somewhere during the second contract the level of service began to drop. The deficiencies were not in the quality of the effluent but in the level of maintenance of the facility. Issues began to arise, for instance, who was responsible to cut the lawn and plow snow at the facility? How many hours can

the contractor count as hours spent on the facility by corporate office personnel who did purchasing, staffing and payroll? Our contractor wanted to equate the administrative work that was being done at the corporate office as one of the two required (but not specifically called for) forty hour a week plant employees.

“Then came a change in City Managers. The new City Manager had to learn the operations of the plant, inspect for what he considered was acceptable O & M of the facility, and then bring any deficiencies to the attention of the contractor. That is when the City, after a one year extension of the existing contract, went out for bids on a new contract. The new City Manager was able to identify very specific things that needed to be placed in a new contract to guarantee a certain level of performance from the new O & M contractor. Additionally, penalties were installed for non-compliance in the contract as well as a short term termination clause added. Under the new contract no reason needs to be given for almost immediate dismissal.

‘When the new contractor took over the performance was exemplary. Now, three years into the contract, the service is still exemplary. At the time of the reviewing bids for a new O & M contract, the City Manager visited several of the sites listed as references by the two final O & M contract bidders. These visits were without warning. This was the best way to assess the level of service these companies provided. When a contractor was selected, the City awarded a five year contract to improve the ability of the contractor to finance his startup equipment costs and initial maintenance projects over a longer time. At the end of the existing five year contract it is the City’s intent to re-bid to all qualified bidders to keep the current contractor at the market rate for his services.”

The City of Rockland, Maine, decided to take over the operations of its treatment plant in response to unsatisfactory performance by its contractor. The reasons given for contract termination were 1) cost, 2) condition of the facility, and 3) poor response to complaints.

In response to the question whether or not to contract, Mr. Terry Pinto, the current Municipal Plant Manager, shared with us the following thoughts:

“The concern is will you save money by contracting your operations out to a private company? The answer could be yes or no. If your own organization is mismanaged and operated inefficiently, you will save money. However, a government owned system pays no taxes and is not required to make a profit. How can a private company compete? Yet they are willing to make management decisions that a government will not.

“A private company can avoid cumbersome bidding requirements, is willing to properly train their personnel, and is willing to discharge undesirable employees. Government can operate the same way, but many times chooses not to. In my

own personal experience contracting out operations looks good in the short term. Although there may be a saving in operating costs, the physical integrity of the facility suffers. The operator will not make a capital investment in the facility, and the owner normally under funds it.

“The municipality must decide do they want to commit to operating their utility in a well-organized, well-managed professional fashion. There are many such operations out there. If, on the other hand, the municipality sees the utility as a necessary evil---it should not only contract out the operation, but also consider privatizing the entire operation, i.e. sell the assets.

“Water and wastewater facilities are one of the most important assets a community has. Providing such services determines proper and organized growth. A community without good water has no value and no future. A good public utility is an investment that provides an enormous return.

“A water and wastewater treatment utility is the heart of any community. Would you want to contract out the operational responsibilities of your heart?”

XI Summary and Conclusions

1. Cost and staffing levels vary greatly from plant to plant. This reflects, in large part, the diversity of plant configuration, automation, and treatment processes. Insufficient competition may also play a role in cost differences. The ranges and averages can provide baselines for contract development.
2. Contracts for wastewater treatment are being renewed at high levels (85%). Most public officials chose to renew their existing contracts (73%); others (27%) solicited new bids. Non-renewals were most commonly attributed to cost and/or inadequate performance of contractors.
3. The duration of most contracts, or their renewals, is five years or longer. Some contract periods are as long as 20 years.
4. Municipal officials have a number of management tools including direct supervision, requiring a minimum number of employees, paying directly for certain variable costs such as electricity, chemicals and sludge disposal, placing caps on such costs, sharing certain cost savings, and specifying thresholds and annual totals for repair and replacement costs.

5. Contract operated plants do an excellent job in terms of effluent quality. Whether or not the contractor can pass through certain variable costs such as electricity, chemicals or sludge disposal does not appear to affect this outcome.
6. Our respondents to the survey offered quite a variety of views as to the main advantages and disadvantages of contracting. Of particular interest is the fact that on the question of whether or not contracting results in cost savings, the opinions were more or less equally divided. Most contract non-renewals were motivated by the view that the job could be done in-house at a lower cost, or to avoid poor contractor performance.
7. Relatively few changes were made in contract language at the time of the most recent renewal. Perhaps the most challenging issue that municipalities face is the protection of the physical quality of the plant in the short run and even more so in the long run.
8. Relationships between clients and vendors were, with few exceptions, positive; almost 90% of the respondents related their relationship as “satisfactory,” or better.

In summary, contract operations continue to offer many advantages as well as challenges to public officials. It is our hope that the increased knowledge gained from the results of carefully conducted surveys will contribute to improvements at each renewal cycle.

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