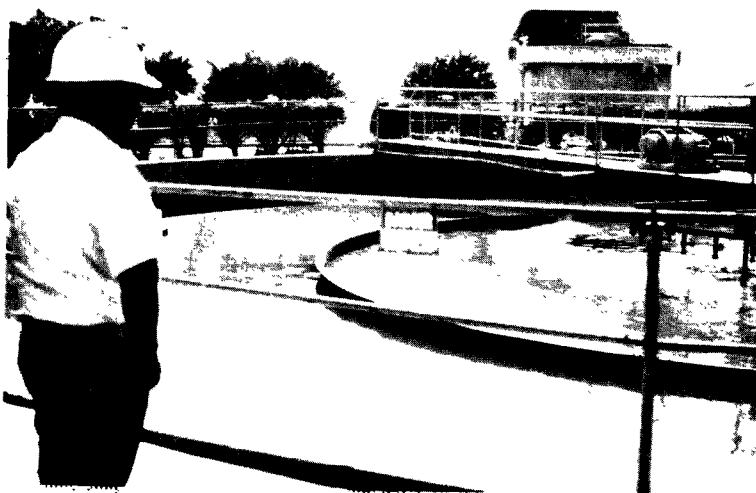




# Contract Operation and Maintenance

## The Answer for Your Town?



U.S. Environmental Protection Agency  
Region V, Library  
230 South Dearborn Street  
Chicago, Illinois 60604

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## CONTRACT OPERATIONS: THE ISSUES

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### OPERATIONS AND MAINTENANCE: ARE YOU PROTECTING YOUR INVESTMENT?

Many people worked long and hard to plan, build, design and build the facility that treats your town's wastewater. Now, what is this system working today? Is it meeting your goals?

- Are you getting the most out of your permit credits?
- Do you only find efficiency one year after?
- Consider routine maintenance.
- Properly and properly staffed?

What are these facilities being operated and maintained in a manner that protects the considerable investment taxpayers have made in environmental protection?

Over the years, the U.S. Environmental Protection Agency (EPA) has provided billions in federal construction grants. State and local taxpayers also contributed a sizable share of the construction costs. Even more important, local taxpayers are the day-to-day costs of operating and maintaining the wastewater facilities

built with these funds. Yet, in many communities across the country, our investment in water quality is being squandered due to inadequate operations and maintenance. Because operations and maintenance (O&M) are not being taken seriously enough, a host of interrelated problems has resulted: poor performance, staff turnover, violation of permits, public health problems, plant deterioration, costly operation, excessive capital replacement rates and costs, and a user charge that some consider too prohibitive to be borne by ratepayers.

Let's face it, most people don't really want to think about a day with sewage treatment plants. And that's part of the problem with a department whose work gets limited attention, respect, even though that work is, and often unpleasant, a department where morale and performance are likely to be low.

Of course, your plant may be exceptionally well run by a conscientious manager with excellent strategies for cost control and a firm dedication to quality O&M. Plants with this sort of supervision are star performers. Those that are not could benefit from a closer look. How is your plant doing? Do you know?

## IMPROVING OPERATION AND MAINTENANCE

If the concept of improving O&M at your town's wastewater plant intrigues you, you have two basic choices on how to proceed. Your municipality can undertake the challenge on its own. Or, you may want to acquire expert help from a contract operations firm. These companies contract with municipalities to manage and run their treatment plants. They offer to take the headaches of wastewater O&M off the municipality's shoulders, run the plant professionally and economically, and sometimes even save the town money.

EPA has surveyed the services offered by these contract operations firms and investigated some of their projects. This brochure summarizes the findings of that study. The information is designed to help you evaluate your unique situation and decide whether you should engage an O&M expert. While it may not be right for every city or town, contract operations may be the answer for you.

## ALL ABOUT CONTRACT O&M

As part of EPA's study, staff at several contract operations firms were interviewed. Here is a synthesis of their answers to typical questions about their wastewater management, operations, and maintenance approaches.

### What is Contract Operations?

When referring to contract O&M in this brochure we mean arranging with an outside organization (usually a private for profit firm) to perform all operation and maintenance functions at your wastewater treatment plant. Sometimes this is also referred to as full contract O&M (FCO). With this arrangement the municipality still owns the plant and equipment—so this is not privatization. However, the plant staff become employees of the contract firm and the firm generally assumes responsibility for all plant functions—therefore contract O&M is more than contract management. You should recognize that a range of other contract services is available—lab work, training, maintenance management, start-up and troubleshooting. You need to carefully decide which level of service is appropriate for your situation. This brochure will discuss only the full contract O&M level of service.

## HOW CONTRACT O&M WAS EVALUATED

EPA evaluated contract O&M by talking to the firms and their references: the city officials and plant staff at several treatment plants (POTWs) where O&M is contracted. Four national contract O&M firms and one regional firm were included in the study. Interviews were held with each firm, and a list of plants under contract with three of the firms was compiled. From this list, eight plants were selected for detailed study.

site  
guide  
basis

location.

We asked questions such as:

- What were O&M costs before and after contracting?
- What was the effluent quality before and after contracting?
- Were there changes in staffing?
- What changes did the contract firm make in management, operations, and maintenance?
- How was the need for a contractor determined?
- How were responsibilities split between the city and the contract firm?

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### Who Will These Firms Serve?

The large contract operations firms look nationwide for their clients, evaluating business opportunities against plant size and location. They will tackle any process type or treatment level. They look for plants from 1 (but usually 2) million gallons per day, on up. (Most plants range between 2 and 10 to 15 mgd.) To extend service to smaller plants a contract firm may look for towns where services can be shared among several small, neighboring plants.

Contract operations firms are generally reluctant, however, to take on problem-ridden plants in situations where the community is not willing to pay a realistic sum to turn the plant around. Strife over the wastewater budget is only one of several difficult political situations in which these firms prefer not to get involved. Dissension on the municipal council over whether or not to choose the contract operations option, labor disputes involving plant staff, a willingness to accept routine noncompliance levels in an attempt to keep or attract industry, are examples of circumstances where a contractor may choose to stay away.

### Who Are These Specialists?

A handful of large firms exists—all highly experienced. At least one is operating in your area of the country. These specialists provide a wide range of expertise in plant management, process engineering, design engineering, automated systems, procurement, training, and budgeting.

On the other end of the spectrum are small, local firms with varying levels of experience and sophistication. Many are now moving into the business. Such local providers may offer the advantage of being intimately familiar with your plant's design and equipment or may understand your municipality's unique political climate very well.

### What's the Deal?

Naturally, contract operations firms are in business to make money, but they can also offer distinctly attractive benefits to potential clients. They:

- Promise to improve performance and increase efficiency.
- Put great stock in good management and staff motivation and training.
- Install computerized management systems.
- Provide corrective and preventive maintenance.
- Offer the experience and specialized knowledge needed to implement these approaches skillfully; expertise gained from work on many different plants.

- Many contracts provide for full cost disclosure and end-of-year reckoning, with any budget under run returned to the city. Some categories of cost savings are split with the contractor.
- Keep "open books" and report regularly so the city can see what's being done and what it costs.
- Usually seek 5-year contracts so that they can establish a track record with the client, prove their effectiveness over time, and spread their front-end costs over several years.
- Undertake most of the management headaches, leaving fewer responsibilities for the city.
- May help the city pay for costly capital improvements.
- Pay fines if they violate effluent limits.

This last feature indicates the confidence these specialists have that they can turn around a poorly performing plant.

## WHAT EVERY MUNICIPALITY WANTS TO KNOW

### How Can A Firm Beat Our Performance And Still Save Money?

Contract operations firms are proud of the cases in which they improved plant O&M and handed the city a check for shared savings at year's end. But if you seek bottom-line savings only, you may end up disappointed. Contract operations companies have improved performance as their primary goal, and focus on giving clients the most for the money they spend. In many instances, however, cost savings can also be achieved.

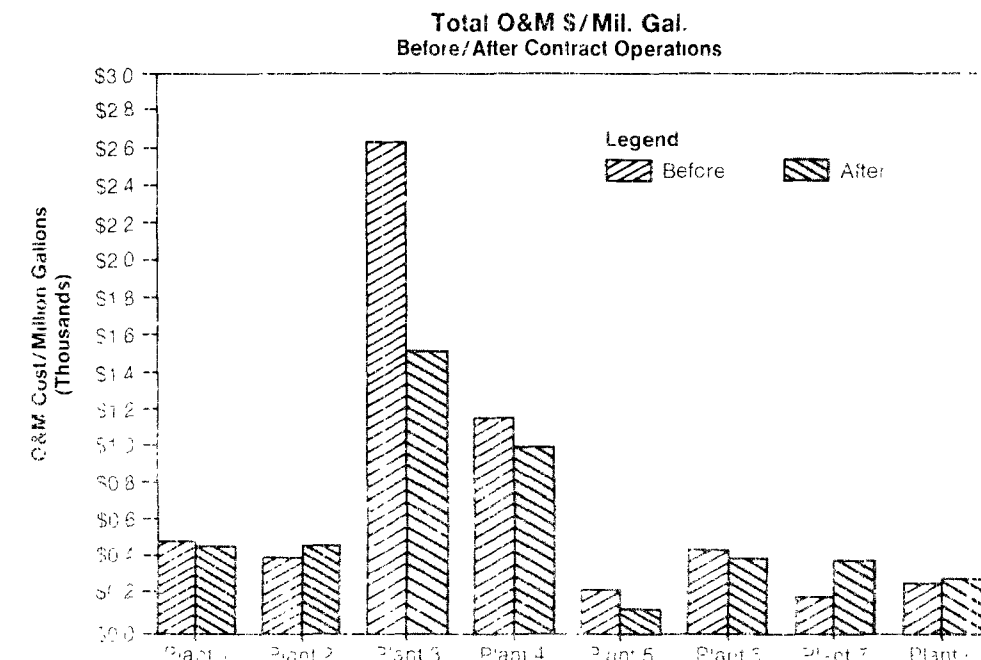
Savings depend on many things, particularly on the nature of your plant's problems. A history of severe chemical problems or very poor management at your plant may mean that cost conservation by a contractor must be shifted to plant deficient areas to improve performance. The overall plant improving plant O&M is also a factor; savings may be dramatic the first year but plateau thereafter. And, as techniques improve, efficiency

In short, don't expect a miracle, even though some companies do have miracles on their books.

### How Do They Do It?

Cost savings can be achieved in many ways:

**Energy Efficiency**—Analysis of design and operations often reveal ways to cut fuel and electrical consumption.



**Management**—Increases in pay and training improve morale and labor productivity. Management focused on bottom-line saving and using modern computer techniques can increase efficiency and foster troubleshooting and conscientious O&M.

**Purchasing Power**—Large Contract operations firms have national contracts for parts and chemicals.

**Staffing and Training**—Better trained and more productive personnel mean better teamwork and make possible a leaner staffing plan.

**Economies of Scale**—Contractors often operate a number of smaller plants with the "circus rider" superintendent or one ad-

**Backup Expertise**—Many firms have technical experts who can be brought in to solve problems before they become crises.

**Process Control**—Creative techniques put to work by knowledgeable, experienced managers can mean fewer chemicals and less energy used.

**Automated Systems**—Most firms feature computerized management, monitoring, and administrative systems that cut costs while increasing oversight power.

**Capital Improvements**—Contract firms identify long-term repair and replacement needs. Some will help municipalities finance major equipment replacement, creating dramatic cost savings.

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### Is Contract Operations Right for My Plant?

The decision to bring on a contract O&M firm should not be made in haste. It is essential to perform a complete evaluation to determine whether the in-house route is feasible and if so, more cost-effective. The place to begin is by getting input from sources that are as knowledgeable and objective as possible. To find out more about the present problems and in-house solutions, talk to the plant staff and superintendent. If your community is large enough to have these departments, check with the public works director, community relations officer, and financial manager. To find out more about contract firms that may be able to help you, check with the state health and environmental agencies. It may be very helpful to contact a city manager or plant superintendent in another municipality who has experience with contracting. You could also invite representatives from various contract firms to give you a presentation of their services. Don't expect a full-blown audit of your plant, however. These are costly and few firms will carry out a thorough plant review without a definite job prospect.

To better evaluate the information from contractors it can be beneficial to develop a cost estimate for in-house improvements. What will it really cost you to improve plant management, revise staffing, implement necessary training, install a preventive maintenance program, and carry out the other changes that a contract firm

would put in place. EPA's brochure on cost-effective plant operations—*Six Cities Save Over A Million Dollars*—should be helpful in making this assessment.

Another tool that can be used in your decision-making process is the accompanying plant checklist. Review the list and attempt to answer the questions realistically. If you answer "yes" to several of the questions, it may reflect major underlying problems with plant management and budgeting. In this case it may be hard to bring the plant around on your own. On the other hand, major changes in management, staffing, and financing can work wonders. It takes a major commitment, however.

Your final decision should also consider that it will cost you something to bring on and manage a contractor. Based on the communities we talked to you may spend one-third of a staff person's time for four or five months to research and write a request for proposal, and manage and evaluate the response. Contract management will also be required over the length of the contract term.

### What Can I Operations

Typically, the

- Immediately public image physical plant
- Put a top quality superintendent place (or keep a good one).
- Analyze the first steps toward fundamental improvement of operations.
- Fix gross deficiencies in the plant
- Give the ma efficient tools systems for maintenance, effective and
- Adjust motive
- Stress operations to e

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### **What's the Best Way to Engage a Firm?**

If you have completed the necessary facility evaluation and concluded that contract O&M is probably the best route to take, the next step is to develop and carry out a process for hiring a contractor. In our survey of plants across the country some chose to produce a request for proposal that clearly outlined their needs and then solicited technical and cost proposals from a number of contract firms. Others just accepted recommendations from other communities, professional organizations and other sources. In this case, bids from a small number of qualified firms were requested. Regardless of the approach taken to identify qualified firms, once information is received, you should review the materials and evaluate the following points at a minimum:

- Is the staff large enough to handle your needs along with other on-going work.
- Is the training and experience of the staff relevant and adequate for the work.
- Does the firm and the staff have experience with the treatment level and process type of your plant.
- Do reference checks verify that the firm's work has been professionally completed as scheduled and for the projected budgets.

Based on the review of qualifications, one or more firms should then be chosen and their bids evaluated. The first step is to compare the firms' projected costs to the in-house totals generated earlier. If they appear reasonable in this light, then compare the costs to each other. Make sure you know what each firm is promising for the cost—the number of meetings with the municipality, the types and frequency of reporting, the types of responsibilities the firm will assume, guarantees of performance and willingness to accept responsibility for fines, and most importantly, the basis of payment and willingness to rebate any savings. Negotiate with the top one or two firms until you are satisfied with one firm and feel that the bid price is best for the municipality. Before a contract is signed, make sure that it specifies the roles of the contractor and the community and that these roles are acceptable to you.

## EVALUATING WASTEWATER PLANT OPERATIONS AND MAINTENANCE: A CHECKLIST

Is your plant experiencing some of these problems? If so, you may want to seek expert help from a contract operations firm.

**Yes**

**No**

**Design Problems?** Has your plant had trouble meeting design specifications from the beginning? Have increasing design problems come to light as the plant has aged? Have staff had to jerry-rig solutions to design problems continually? Is the plant being run to design parameters?

**Excessive Costs?** Has the wastewater budget been increasing disproportionately as the plant has aged? Are replacement costs high? Are the same items being replaced too frequently?

**Personnel Problems?** Is morale low? Are staff overworked, but poorly utilized? Is staffing out of synch with workload and shift requirements? Are there labor/management disputes? Is salary commensurate with performance? Is it hard to acquire and keep staff?

**Public Image Issues?** Do you hear complaints from citizens about overflow and backup problems? Odors? Appearance? High user charges? Water quality problems?

**Operating Inefficiencies?** Do plant managers fail to take advantage of opportunities for cost savings or economies of scale? Are certain operating units underutilized? Have chemical or energy costs risen excessively?

**Compliance Difficulties?** Has your effluent frequently been in violation of standards? Have you experienced enforcement actions or paid fines? Is compliance regularly marginal, right at the "line"? Are periodic problems from industrial loads frustrating compliance?

**Training Issues?** Do plant managers fail to provide training in a consistent, effective manner? Are staff inadequately prepared to deal with sophisticated equipment? Do you have too many specialists on staff and not enough generalists? Have you had safety problems or lost-time accidents?



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## HOW SMOOTH IS THE PARTNERSHIP?

If you're like most municipal officials, you probably have concerns about relinquishing absolute public control of a municipal asset. There are probably nagging doubts about putting a profit-motivated enterprise in charge of the municipality's most costly capital investment. It may be helpful to describe the typical division of responsibilities and methods by which you will be able to exercise control over the contractor.

The contract operations firm will take over almost every aspect of plant O&M. Typically, the city is left with responsibility for the collection system including control of inflow and infiltration and industrial discharges, (although in some cases, it may be more cost-effective for pump stations and the collection system to be contracted also). In most cases, the municipality maintains responsibility for billing consumers, and property insurance. The accompanying chart shows a common division of labor between the city and the contractor.

The fear of losing control of the facility is a valid concern for officials who must answer to the public. However, the municipal managers in EPA's study did not raise this as a problem. In general, if you investigate the firm's reputation, carefully analyze its plan for plant improvement, read the contract carefully, establish regular reporting mechanisms, and keep a watchful eye on operations, you will have a great deal of control over plant O&M while getting rid of many of its headaches. These are simply common sense precautions that take few resources to carry out.

Because of public concerns that the firm's self-interest will tend to override the public interest, contract operations firms have wisely moved to allay fear by opening their books, committing to the payment of fines, rebating unspecial maintenance funds, and engaging in other sunshine practices to attract customers. Also, because news of a wastewater "horror story" travels fast in the industry, firms make sure they can make a plant work before they accept a job, and take great pains to fulfill their contracts. Despite these developments, question the firms closely to satisfy your concerns and get specific commitments in writing.

## SOUNDS GOOD, BUT SHOW ME

EPA's sample of contract operated plants revealed that contract operations is a successful technique for improving the performance and cost-effectiveness of many municipal treatment plants. Nearly all of the plants in the study experienced major problems prior to contracting out O&M. In most cases, conditions improved significantly after take-over by the contract firm. Often, however, the improvements came in the areas of performance and compliance, not necessarily cost. All but one of the plants studied have been brought into compliance on a regular basis, and even that one is coping well with high strength industrial waste loads. As detailed below, some plants did experience significant decreases in total costs, while others experienced significant increases.

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## CONTRACT OPERATIONS: TYPICAL ROLES AND RESPONSIBILITIES

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| Action                         | Responsibility                  | Action                                       | Responsibility  |
|--------------------------------|---------------------------------|--|---|
| • Collection System Operation  | City                            | • Maintenance Inventory Levels               | Contractor  |
| • Plant Operations             | Contractor                      | • Residues from Facility                     | Contractor  |
| • Plant Maintenance            | Contractor                      | • Liability Insurance                        | Contractor  |
| • Noncompliance Responsibility | Contractor (pays fines)         | • Fire, Casualty Eminent Domain              | City  |
| • Service Charges Payment      | City                            | • Grounds for Contract Termination           | Contractor / City (Breach of Contract)  |
| • User Charge System           | City                            | • Equipment, - Failure/Emergency Maintenance | Contractor  |
| • Design Modification Clause   | Contractor (with City approval) | - Performance<br>- Payment                   | Contractor / City (Contractor responsible up to \$1,000 per piece of equipment. City responsible for expenditures over \$1,000 per piece of equipment). |

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## **CONTRACT OPERATIONS: THE RESULTS**

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### **IMPROVING A PROBLEM LARGE PLANT**

A large midwestern secondary activated sludge treatment plant which was in significant non-compliance prior to contracting now meets weekly BOD limits but still occasionally exceeds 30-day averages. Previously, sludge had been temporarily held in lagoons. An on-going land application program has now been put in place and both the stockpiled sludge and current production is being disposed. Odor problems have also been significantly reduced.

The contractor has reduced the staff by 35 percent, implemented a computerized preventive maintenance system, and put in place numerous cost-saving operating techniques such as improved methane recovery and increased blower efficiency. Though all of these efforts have yet to be totally successful, there has been an improvement in performance. Cost to the city in constant dollars has not increased significantly under contract firm operation even though solids disposal costs are now greater and effluent quality is improved.

### **SMALL AWT ACHIEVES MAJOR COST REDUCTION AND PERFORMANCE IMPROVEMENT**

In another midwestern community contract operations was selected for a smaller, oxidation ditch plant with stringent limits for BOD and suspended solids, but no nutrient limits. This facility was brought under contract along with the town's water supply system when a newly appointed city manager found very poor management and operating conditions at both the facilities, and compliance problems with the wastewater plant. Three options were evaluated—turn things around with the existing staff, hire a new manager, or contract the entire operation out. Option three was chosen.

In the fifteen months since contract operation began the contractor has made numerous improvements at the plant. An energy audit was carried out, pumps and impellers were rebuilt, excessive sludge in the process units were gradually eliminated, and a computerized preventive maintenance system was put in place. Plant staff was trimmed, largely by cross-training operators so they can run both water and wastewater facilities. Major design problems with the plant have been identified and a correction program is about to get started. During this period, problems with solids have been eliminated, and effluent quality has increased. At this particular facility, the contractor has also been able to reduce annual costs to the municipality by over 50 percent.

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## **LIMITED CHANGES AT SMALL WESTERN PLANT**

A small western activated sludge plant was one of the exceptions to the overall finding of significant improvements. The key reason for this finding, however, may be that the facility was not experiencing significant cost or performance problems prior to contract operations. Effluent limits were routinely being met on a monthly average basis. However, the utilities director felt that it would be in the city's interest to put the facility under contract, partially because he was concerned that operation would become more complex with new units coming on-line.

Since the plant was put under contract, performance has remained about as it was previously. Improvements put in place by the contractor include redesign of sludge pumps to save on frequent replacement of pump diaphragms, implementation of a computerized preventive maintenance system, use of daily operating logs, and an increased emphasis on safety at the plant. Staffing at the plant has also been cut by over 20 percent. Opportunities to increase productivity of the staff, however, appear to have been missed, as there has been little salary increase for the remaining staff, and incentive pay has not been used to encourage performance or advancement as it has at other plants in the survey.

## **STAFF STABILITY AND BETTER EFFLUENT QUALITY ACHIEVED THROUGH CONTRACTING**

Another western municipality with a small activated sludge plant has also selected contract O&M. Prior to contracting out, the plant was experiencing difficulties in meeting effluent permit limits. The mayor and city manager also had experienced great difficulty in attracting a qualified plant superintendent. They also felt that the staff was not adequately skilled and trained. Long-term cost stability was another major issue.

The plant has now been under contract for over four years. During this period, effluent quality has improved until it is now well within permit limits. The staff has also been trimmed by nearly 20 percent partially as a result of cross-training and combining staff with the city's water plant. Total costs for the plant have decreased, but not by a significant amount. The contractor has put more money into staff salaries, significantly cut chemical cost, and trimmed electrical cost. Sludge handling efficiency has been increased, cross-training has lowered maintenance cost by 41 percent and a preventive maintenance system has been put in place. Maintenance efficiency has been improved through the use of infrared and ultrasonic testing of mechanical equipment. The city received a refund based on cost savings last year, and overall, city officials are well satisfied with the program.

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## RECOVERY OF A PLANT WITH MAJOR PROBLEMS STILL NOT COMPLETE

The study also examined two southern communities which put contract O&M in place. The first community operated a moderately-sized secondary activated sludge plant that was a classic example of what can happen when inadequate financial resources are distributed to the plant for its high maintenance and highly trained staff. The community had a very good record of effluent quality until the two years ago when the plant began to experience major solids handling and compliance problems.

The plant has now been in contract operation for two years. Significant results there have been significant overall improvements in operation and maintenance. A temporary solids handling system has been installed and plans are being developed for a major repair and replacement program. The staff has been trimmed, and remaining staff become more productive through weekly training classes. A safety program has been put in place, as has a computerized preventive maintenance program and cost accounting system. As a result, effluent quality has improved and the solids disposal problem is on the way to resolution. Overall, contract operations have brought significant improvements to the facility. However, because of the number of major improvements required, the plant budget has increased over 15 percent.

## MAJOR CHANGES IN OPERATION BRING BIG COST SAVINGS

In the second southern community difficulties were being encountered with the town's small advanced wastewater treatment facility. The plant's unique design was creating major operating difficulties for the city's superintendent and staff. The result was high operating cost and compliance problems. There was also a general feeling held by the city manager that a more reliable process and method of operating the plant was necessary to ensure service to the community.

This plant has now been operated and maintained by a private firm for over two years. During this period, effluent quality has been brought into compliance and costs have been decreased by over forty percent. Major increases in efficiency have been achieved by taking almost half of the plant off-line and revising operation of the remaining on-line units. Significant increases in staff have been put in place. A project manager has been assigned to the facility and a previous plant employee promoted to superintendent. A major training program has been put in place, resulting in significant improvements in staff capability and morale. Computerized operations and maintenance programs have also been installed at the plant. Town officials have been very pleased with the results of the contracting program. A number of cost rebates have been received and it is felt that the stability and reliability of the wastewater system was instrumental in a major manufacturing facility locating in the community.

## CONTRACT O&M PROVIDES STABLE MANAGEMENT AND IMPROVED EFFLUENT QUALITY

Two treatment plants in the southern United States were also included in the survey. One of these was a small secondary activated sludge plant run by a volunteer board with only two capable superintendents. The plant staff and a number of critical and insignificant design problems related to these conditions influenced the plant's ability to be maintained within permit limits. When a contract firm responded to the community's call for a new superintendent, a proposal was requested and other firms were also asked to respond. The firm was selected, and the plant has now been under contract for three years. During this time, effluent quality has been further increased, computerized process control and preventive maintenance systems have been put in place. The total plant budget has decreased slightly since the contract took over.

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## **MID-SIZE PLANT IMPROVES MANAGEMENT AND COMPLIANCE**

The final plant in the survey was a mid-sized secondary, activated sludge plant in the northern United States. This plant had experienced compliance difficulties and public image problems. The city also had significant personnel management problems. After being made aware of contract operation and maintenance through a National League of Cities meeting, the city manager researched contract firms and requested a bid from one firm.

The contractor has now been on board for about one year. The city's staff was retained including the plant superintendent; however, training was significantly increased. During this time, operations have been improved, a computerized preventive maintenance system put in place, and economies have been achieved in chemical use and purchasing. As a result of these efforts, the plant has been brought into compliance and costs cut by about five percent. The city manager believes that the contract firm provides the skills and operating stability the city needed, and has brought about a complete turn around at the plant.

## **WHERE CAN I GO FROM HERE ?**

If you are interested in obtaining further information about contract O&M there are a number of sources which we would recommend. A call to your state water quality management agency or EPA is a good starting point. Agency staff can probably provide names of O&M firms operating in your area. They may also know plants nearby that have turned to contract O&M. Most of the major, national firms advertise in wastewater and municipal management periodicals. Many of the firms have exhibits at municipal association conferences around the country. Once you have a list of names and references call the firms. They will be happy to send you further information and can probably have a representative come out and meet with you.

This brochure was prepared by EPA's Office of Municipal Pollution Control, Planning and Analysis Division. We wish to recognize the assistance of the following contract O&M firms: EOS; The Maryland Environmental Service; Metcalf and Eddy Services, Inc.; Operations Management International, Inc.; and Professional Services Group, Inc. We would particularly like to thank the employees at the eight survey plants who gave a significant amount of time and assistance. EPA was assisted in the preparation of this brochure by the staff of Roy F. Weston, Inc., and Peat, Marwick, Mitchell and Company.

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