



# ENVIRONMENTAL RESEARCH BRIEF

## Reactivation of Activated Carbon with Aqueous Chlorine and Chlorine Dioxide

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### Acknowledgements

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### Abstract

Federal involvement in water pollution abatement programs has traditionally been focused on providing grants to public entities for the construction of new, expanded, or upgraded wastewater treatment facilities. Despite sizable investments of public funds, the achievement of water quality objectives is not being fully realized. Although studies have documented that many factors contribute to this problem, a chief cause is inadequate attention to operation and maintenance (O&M) requirements. This paper provides an overview of the contract services currently being offered by private sector consultants to assist municipalities in the operation and management of wastewater treatment facilities. Over 100 responses were obtained to requests for information on firms offering contract O&M services. Information received included data on types of services offered, staffing levels, and staff and firm achievements and capabilities. Examination of these data showed that 24 firms now offer

full contract O&M services and that other firms could potentially offer these services in the future.

This report covers a period from March 1979 to March 1980.

### Introduction

Federal municipal water pollution control strategies have relied on grant assistance for the construction of publicly owned treatment works (POTW's). Since the passage of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500), about \$28 billion has been committed by the Environmental Protection Agency Construction Grants program to upgrade existing facilities and to build new wastewater treatment facilities. The federal government has consistently and strongly resisted suggestions that federal subsidies or other assistance be given to the operation and maintenance (O&M) of POTW's. Only modest technical assistance and O&M inspection programs are operated at the federal and state levels.

Recent studies clearly indicate that a major percentage of all POTW's are not meeting effluent standards. Studies sponsored by the Municipal Environmental Research Laboratory to identify the causes of poor plant performance indicate that a large number of communities are unable to operate or are not properly committed to operating their treatment works. A compounding problem is that much of the O&M information, guidance, and technical assistance currently provided appears to be incorrect, irrelevant, or inadequate. A number of policy options are available at the federal and state levels to address the POTW O&M problems. This paper addresses the role of private sector technical assistance to municipalities in improving POTW



performance. When Agency policy is developed in this area, the results of the private sector's O&M activities should be considered.

This study was undertaken to determine how many and what kind of private firms were involved in operational assistance and what range of services they provide. A further objective was to identify the minimum qualifications necessary for these firms to provide satisfactory O&M services. By soliciting EPA regional offices and the Municipal Operations Branch staff, inserting a notice in the April 6, 1979, issue of the Commerce Business Daily requesting qualifications and experience statements, and directly contacting over 200 consulting engineering firms, a list of firms providing O&M services was constructed. A response form was developed to evaluate each firm that submitted a response to the request for information.

Before this study, perceptions of the availability and effectiveness of private sector O&M services were largely shaped by the aggressive marketing of a limited number of firms.

## Results

### *Types of O&M Activities*

Evaluation of the responses revealed that operational assistance activities vary widely with regard to the type of service provided, the type of firm providing the service, and the time involved.

### *Type of Service Provided*

The range of operational services currently offered by the private sector include

- Operational evaluation
- Review of design for operational flexibility and reliability
- Planning for staffing and management
- Operator training
- Trouble-shooting
- Process monitoring and optimization
- Laboratory services
- Plant start-up services
- Provision of employees to fill selected key operational positions
- Provision of full plant operational staff, but with client retaining management/administrative decision-making responsibility
- Provision of full plant operational staff, with contractor assuming total managerial responsibility.

In contrast to more traditional, less comprehensive, O&M services, contract operation of POTW's is a relatively recent phenomenon. This trend, although quite modest in view of the total number of POTW's, is more widespread than is commonly realized. During this study, two dozen plants currently being operated by an outside contractor were encountered.

### *Type of Firm Providing Service*

The majority of the firms that have provided contract O&M are traditional engineering firms. In a few cases, wholly owned subsidiaries have been established or are being considered to market O&M services. For the most part, new clients are not sought aggressively; rather, these services

are provided to existing or past design clients. Generally, an O&M group is closely affiliated with the usual design services of the firm. In other instances, operational services are being offered by divisions or subsidiaries of wastewater laboratories and equipment suppliers. Another model is the comparatively recent development of firms that specialize in providing *only* operational services. Many firms have considerable experience in providing operation services and contract operations of wastewater for industrial clients. Although this experience may be transferable to the public sector, there are significant institutional differences that make the contractual mechanisms more complex.

### *Length of Involvement*

Assistance may vary from telephone consultation provided free of charge to an on-going design client to a multi-year, multi-million dollar comprehensive services contract to operate the POTW. Most operational assistance activities involve in-plant evaluation and training varying from several days to several weeks. With the exception of planning, design, and plant start-up related activities, EPA provides no financial assistance for O&M services although the Agency strongly encourages their use.

### *Response Summary*

Of the 107 responses received to requests for information pertaining to contractor capabilities and experience in providing O&M services to POTW's, 95 qualified for evaluation. The evaluation concentrated on contractor organization, staff personnel, staff experience, staff licensing, contractor's O&M services, documented experience of contractor, and contractor's interpretation of the private sector's role in POTW O&M. An overall summary of responses, broken down by EPA region, is given in Table 1. Of the 95 qualified firms responding, 24 (25 percent) offered full O&M services including contract operation and maintenance, O&M technical assistance, and design related O&M services (category A firms in Table 1). In addition to these 24 firms, 57 of the responding firms offered O&M technical assistance and design related O&M services (category B firms). The remaining 14 respondents (15 percent) were in design or related fields and exhibited some interest in O&M (category C firms).

The majority of the firms responding were consulting engineering firms with considerable design-related experience in wastewater treatment. These firms also provided many other engineering, architectural, and construction services. They had become involved in O&M services as a result of their design work support. Operational technical assistance activities were not a major portion of their yearly workload. As a result of recent developments in regulations and enforcement, however, many of the larger firms had established or were in the process of establishing O&M departments within their organizational structure to specifically offer these types of services. The consultants noted POTW managers were becoming increasingly aware of rising O&M costs and the implications of noncompliance in meeting minimum POTW discharge standards. Consultants also cited recent research reports defining the cause and effect of POTW O&M problems as motivation to review O&M practices.

In addition to the consulting engineering firms, a number of equipment manufacturing firms responded to our request

**Table 1.** Evaluation of 95 Private Sector Firms Offering O&M Services to POTW's, by EPA Region

Region	(States)	Responsees	Categories*		
			A	B	C
1	(CT, ME, MA, NH, RI, VT)	8	5	1	2
2	(NJ, NY)	8	0	7	1
3	(DE, MD, PA, VA, WV)	15	4	9	2
4	(AL, FL, GA, KY, MS, NC, SC, TN)	12	3	7	2
5	(IL, IN, MI, MN, OH, WI)	21	5	13	3
6	(IA, KS, MO, NE)	6	0	5	1
7	(AR, LA, NM, OK, TX)	3	0	3	0
8	(CO, MT, ND, SD, UT, WY)	3	1	2	0
9	(AZ, CA, HI, NV)	14	6	6	2
10	(AK, ID, OR, WA)	5	0	4	1
Totals		95	24	57	14
Percent Distribution			25%	60%	15%

\*O&M Service Categories:

A: Firms offering contract O&M, O&M technical assistance, and design-related O&M services.

B: Firms offering O&M technical assistance, and design-related O&M services.

C: Firm offering only design-related O&M services.

for information. Typically, these firms marketed wastewater treatment equipment and, to support their product lines, had developed complete technical assistance service programs to ensure proper operation and performance of their own equipment. This service concept eventually expanded to encompass the entire plant, becoming the most comprehensive contract O&M service package available to POTW's.

Since industry has utilized the contract O&M concept in petrochemical processing plants and power generating facilities for years, it was not surprising to receive responses from firms experienced in industrial O&M. These firms possessed the financial and operations management skills but lacked the treatment technology expertise that is essential to most biological wastewater treatment systems.

## Conclusions

### *Minimum Qualifications for Private Sector O&M Firms*

During the execution of this study, some observations were made concerning the minimum requirements that would serve as a guideline in determining the capabilities of a firm offering technical assistance and/or contract O&M to POTW's. Because operating problems differ from one treatment plant to another, the importance of these minimum requirements to the needs of a particular POTW will vary.

The basic requirements necessary to provide contract O&M services to POTW's include, but are not limited to, the following. The order of presentation is not significant.

- Personnel management, staffing, and scheduling capabilities
- Financial management, contracts, legal, and insurance capabilities
- Clerical personnel
- Proficiency in purchasing and inventory
- Proficiency in public and government relations
- Treatment process evaluation capabilities
  - Engineering design

- Biological considerations
- Chemical considerations
- Laboratory experience or capabilities
- Experienced and licensed operations personnel
- Experienced maintenance personnel
- Training program development and implementation skills
- Access to mechanical, electrical, and other consulting engineering staff

## Outlook

The overall effectiveness of the private sector in providing operational services to POTW's cannot be determined based on the information collected to date. Such a determination would require a much larger effort than was in the scope of this project. Documentation indicating that treatment plant reliability and cost effective operation have been achieved, however, is available from some communities that have received O&M services.

Some stumbling blocks have slowed the growth of O&M servicing. According to our respondees, questions of liability and operating insurance are major considerations in providing total contract operations. Furthermore, the nature of wastewater treatment and the O&M of the facilities require a diversity in staff expertise, a factor that favors large firms. In many cases, the expected profit is not of sufficient magnitude to attract capable firms, large or small, to the O&M specialty market.

Cost effective decision-making demands that continued government expenditures in the wastewater treatment area be justifiable. Indeed, after spending a decade and considerable sums of money on construction of wastewater treatment facilities, it is not unreasonable to pause and evaluate the results of these efforts. Since studies have clearly indicated that a large number of POTW's are not meeting the intended effluent water quality standards, new approaches are necessary to improve water pollution control program performance. Some shift in emphasis may occur from constructing new treatment facilities to improving the O&M of existing facilities. If such a shift does

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occur, well qualified private firms capable of handling O&M problems could become highly sought. At that point, a knowledge of what firms are available and an evaluation of their competencies would be useful. The value of this limited analysis and of further studies in this area lies in their potential to provide serviceable information of this type.

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