

BAND TECHNICAL PUBLICATIONS



MANAGEMENT OF MUNICIPAL SERVICE SYSTEMS

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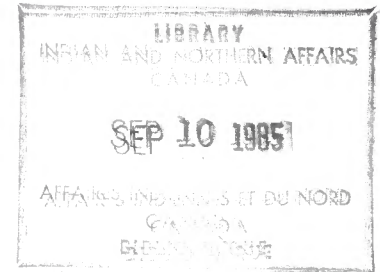


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**Technical Services
and Contracts**

**Services techniques
et marchés**

MANAGEMENT OF MUNICIPAL SERVICE SYSTEMS

January 1985

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MANAGEMENT OF MUNICIPAL SERVICE SYSTEMS

1.0 INTRODUCTION

This publication summarizes the management activities required for the satisfactory utilization, operation, and maintenance of municipal service systems (water, wastewater and solid waste). It is intended for managers responsible for municipal systems. Emphasis is on small systems serving Indian reserves.

2.0 HISTORICAL DOCUMENTS AND MANUALS

2.1 Historical Documents

A complete set of site specific documents describing all aspects of previous municipal servicing activities, including feasibility studies, engineering reports and contract documents, must be kept on-site. These documents provide a permanent record of the existing facilities and are helpful for operation and maintenance, and future work.

2.2 Operation and Maintenance Manual

The operation and maintenance manual is the most important document. For each municipal service project constructed, it should contain:

- a. the purpose, anticipated performance, and major design assumptions;
- b. instructions and requirements for day-to-day operation, ongoing tests and monitoring, preventive maintenance, repairs and emergencies; and

- c. a record of any revisions which have been made to the system following construction.

This manual should be prepared by the engineering services consultant during the construction of the project.

2.3 As-built Plans

An accurate set of as-built plans of the facility should be available. These plans describe all the sizes, elevations, locations, and special features of the facility. Keep reproducible copies of the as-built plans in safe storage.

3.0 RECORDS, SCHEDULES AND PERSONNEL

3.1 Operation and Maintenance Records and Reports

3.1.1 General Considerations

An orderly set of operation and maintenance records is important for:

- a. defining and recording all required operation and maintenance tasks;
- b. showing when required operation and maintenance tasks were completed and recording the precautions taken should a question arise; and
- c. providing data to aid in the identification and rectification of problems. This is particularly helpful to future designers.

3.1.2 Maintenance Management System

Set up a maintenance management system as described in BTP-GT-6 Maintenance Management Manual. Records to be kept in this system are asset inventory forms and maintenance management system forms. These forms are contained in BTP-GT-6.

Use the operation and maintenance manual to assess the work involved in the various maintenance tasks.

3.1.3 Operation Records and Reporting

Daily records include:

- a. a daily log of events (maintenance work, failure of equipment, accidents, floods or storms, complaints, etc.);
- b. a daily accounting report including small purchases and payments; and
- c. a daily record of measurements, tests and observations.

Daily records should be presented in a monthly report. An example of the information to be recorded on water supply includes the following:

- a. the operator's name, the date and the time of each visit;
- b. raw and treated water quality;
- c. particulars of filter runs, including date, duration of run, head loss, and wash water volume;
- d. pump operation, including the number of pumps operated and any mechanical problems;
- e. chemical usage and amount of chemical supplies on hand;
- f. chlorination rate;
- g. quantity of water produced;
- h. system operating pressure;
- i. laboratory test results;
- j. consumption rates;
- k. static water levels, flows and drawdowns from wells;

- l. repairs to the system; and
- m. customer complaints.

Inform the band council of the status of the system and any anticipated major maintenance.

3.2 Consumer Records

Since the service provided by the band is, in some cases, partially paid for by the users it is essential that customer records reflect the frequency of use.

The following information should be recorded for each customer:

- a. each service location;
- b. customer complaints and remedial action taken; and
- c. accounting information such as invoices and payments.

4.0 BUDGET

4.1 Operation and Maintenance

Establish an annual operation and maintenance budget by preparing maintenance management system forms and, specifically, the performance budget worksheet and summary. Procedures are outlined in BTP-GT-6.

Include budget requirements for the following:

- a. general operation and maintenance needs;
- b. emergency responses;
- c. supplies such as fuel and lubricants;
- d. new equipment requirements;
- e. vehicles and tools; and
- f. major maintenance.

4.2 System Improvements

System improvements include:

- a. overhaul or replacement;
- b. changes in the required system capacity; and
- c. extension of the distribution/collection system.

The following conditions may require system expansion:

- a. consumption rates/flows which approach the design capacity of the existing system;
- b. reduced service or inadequate quality; and
- c. land development proposals.

Inform the band council of the need for system expansion and include the timing, size, extent, and urgency of any expansions, as well as the required lead time and costs.

4.3 System Rates

4.3.1 General Description

Service rates are intended to recover the capital and/or operating and maintenance costs for providing the service. The decision as to what portion of costs should be recovered is made by the band council.

4.3.2 Flat Rate

Flat rate water/sewer service billing is a constant charge to each customer regardless of the amount of use. The advantage is its relative simplicity. Modifications to the flat rate system include per capita-based billing, user type billing (domestic or commercial), and metering of major water users.

4.3.3 Metered Rates

The metered water/sewer rate is a more complex billing system in which charges are determined by consumption. Variations include:

- a. a uniform rate with a constant charge for each unit consumed, and
- b. a variable rate where different rates are based on total consumption or peak demand.

The disadvantages of metered water rates are the need for separate meters for each user and the additional time spent by maintenance personnel in reading meters. The advantages are that users pay according to their consumption and consequently there is more incentive to conserve water.

4.3.4 Solid Waste Rates

Solid waste system rates, where used, are based on one of the following:

- a. a household service charge per pick-up, collected each month;
- b. a user charge for each delivery to the disposal site; or
- c. a yearly per capita charge.

5.0 PERSONNEL

5.1 Organization

Personnel requirements can be identified according to the operation and maintenance manual, designer's recommendations, experience with similar facilities elsewhere, and local community capabilities.

Clearly identify the operation, maintenance, and management duties required for the particular facility. Assess present capabilities and the future capabilities that could be developed through training, and prepare realistic position descriptions.

Assess the requirements for contractual work with equipment suppliers, service firms, local contractors, specialists, and adjacent communities.

As an example, a small facility in a remote community may have only one person responsible for its operation. This person would carry out routine supervision, minor maintenance duties, performance testing, reporting, and minor repair work as required. A second person, possibly part-time, should be trained and available, in case of illness and leave. A larger facility may require two or three persons, including a full-time plant manager/operator and a full-time maintenance person.

For new facilities, positions should be filled and staff trained during construction, to ensure familiarity with the facility.

For additional information on staff requirements, see BTP-GT-6.

5.2 Emergency Response

The ability to respond to emergencies is necessary 24 hours a day, seven days a week. This can include fire, water-main or force main break, freeze up, mechanical failure, loss of electrical power, and vandalism. Staff must be scheduled to ensure there is always someone to respond to an emergency.

5.3 Facility Manager's Duties

The facility manager should:

- a. maintain efficient plant/facility operation and maintenance;
- b. maintain capital asset inventory, and operation and maintenance records;
- c. review and update personnel schedules and requirements;

- d. prepare budgets, accounts and related annual reports;
- e. ensure a safe working environment;
- f. ensure proper facility operation by analyzing operational data;
- g. establish training requirements;
- h. promote cost and energy efficiency;
- i. establish emergency procedures;
- j. develop a first aid capability, report and record any injuries and carry out detailed injury investigations;
- k. maintain good public relations; and
- l. assess capital expansion requirements.

6.0 TRAINING

6.1 Training Methods

6.1.1 On-site Training

On-site training may be accomplished by the following:

- a. familiarization with the facility gained during its construction (however, this method does not provide all the information required to adequately operate and maintain the facilities); or
- b. training by expert instructors.

Advantages of training on-site include:

- a. procedures from the operation and maintenance manual can be demonstrated; and
- b. training is highly specific, concerned only with those matters which directly relate to the specific facility.

The major disadvantage of training on-site is the high cost of importing instructors.

6.1.2 Off-site Training

Training off-site normally involves sending several operators from different communities to one central location for instruction.

Advantages of this training are:

- a. lower costs;
- b. expert instructors can be used;
- c. operators are given an opportunity to meet other operators in similar circumstances;
- d. operators get a broad range of operating and maintenance experience.

Training off-site has major disadvantages, including:

- a. the disparity between classroom instruction and using the local facility; and
- b. instruction which is not specific to the needs of individual operators or sites.

6.2 Training Resources

Resources for training operation and maintenance staff are available from:

- a. regional engineering and architecture units;
- b. other federal agencies, such as Environment Canada and Health and Welfare Canada;
- c. provincial agencies;
- d. consultants and manufacturers;
- e. neighbouring local municipal utilities;

- f. operators of similar facilities; and
- g. the facility operation and maintenance manual.

In addition, a wide variety of operation and maintenance literature is available from federal and provincial agencies, and other bodies such as the American Water Works Association and Water Pollution Control Federation.

7.0 SAFETY AND SECURITY

7.1 Role of the Band Council

Implementing an adequate safety program for operating personnel is normally the responsibility of the chief operator or facility manager. The band council must ensure that this program includes instruction in safety practices, the provision and use of safety equipment, and the maintenance of a safe working place.

7.2 Safety Hazards

The safety program must identify precautions to protect workers from a wide variety of hazards, including:

- a. hazards from machinery, tools, climbing and falls;
- b. confined space hazards such as working in manholes;
- c. electrical hazards;
- d. chemical hazards, including toxicity, corrosiveness and flammability;
- e. construction hazards, including construction equipment and excavations;
- f. traffic hazards arising from vehicle operation and work on roadways; and
- g. infections from water-borne contaminants.

7.3 Sources of Assistance

Assistance in the preparation of a safety program may be obtained from:

- a. the Department,
- b. provincial labour authorities,
- c. the Workers' Compensation Board,
- d. the Construction Safety Association, and
- e. safety publications available from outside agencies.

For safety practices in wastewater treatment plants, see BTP-MS-16, Safety in Wastewater Systems.

7.4 Facility Security

Adequate security is required to protect the public from on-site hazards and prevent contamination or damage to the system. Adequate facility security involves:

- a. denying access (usually by way of fencing); and
- b. providing lighting, housing for mechanical equipment and site supervision (security or police patrols).

8.0 EMERGENCIES

8.1 Vulnerability Assessment

Determine the vulnerability of the municipal service in various emergencies by considering:

- a. how a breakdown of any component would affect the system and its users, giving special attention to vulnerable components such as pumps and motors;
- b. possible natural, mechanical or operator-induced emergencies which have an impact upon the system;
- c. service requirements anticipated during an emergency; and
- d. the impact of emergency operations on users.

8.2 Preventive Measures

8.2.1 Designed and Built-in Features

Establish priorities for providing protective measures, based on the frequency with which a component is found to be critical during the vulnerability assessment.

For example, protective measures frequently included in a water system are:

- a. the use of high quality materials in critical components;
- b. equipment such as dual pumps and fire booster pumps;
- c. water storage for fire and domestic demands;
- d. a looped water-main system;
- e. freeze-up prevention measures;
- f. standby power; and
- g. alarm systems.

8.2.2 Operation and Maintenance Procedures

Conduct the following operation and maintenance procedures to reduce emergencies caused by equipment failure:

- a. regularly scheduled preventive maintenance on critical equipment;
- b. testing of emergency equipment (for example, standby power sets); and
- c. monitoring the operation and condition of the system.

8.3 Emergency Response Planning

Inform members of the community, especially fire and police personnel, whom they should contact when a problem arises. Notification of emergencies can be made by:

- a. automatic alarm for critical functions;
- b. reports by the police of such events as vandalism, power outage, and observations during patrols (for example, open fire hydrants, failed lift stations or flooding); and
- c. complaints from the public.

Ensure that the personnel schedule has considered emergency response requirements.

All maintenance personnel should be aware of the location of emergency equipment, procedures for use, and whom to contact for assistance.

9.0 CUSTOMER RELATIONS

9.1 Public Awareness

Consumer attitude and habits dictate the success or failure of any municipal services program.

Present public awareness programs both in schools and the community at large.

An information campaign should:

- a. contain examples of community problems or issues that the local people can identify with;
- b. be directed to the whole community; and
- c. generate community action.

9.2 User Enquiries and Complaints

Users must always be treated with courtesy and understanding even when upset or abusive. As long as a complaint is within the facility manager's realm of responsibility, the customer should be assured that the problem will be taken care of as quickly as possible. The length of time required for corrective action should be given, if known. It is helpful to explain factors contributing to a problem in terms that are understandable.

Provide employees with clear, concise guidelines regarding customer relations.

9.3 Regulation of Sewer Use

It is suggested that communities adopt a by-law to ensure that the sewer system is fully and properly used.

The following basic criteria apply to the regulation of sewer usage:

- a. Privies, septic tanks, holding tanks, and other individual disposal methods should not be permitted where a community sewer has been provided for wastewater collection.
- b. No explosive, corrosive or toxic substances should ever be dumped into sewers. This can cause physical damage to the sewers and treatment plant, interfere with the operation, and cause unreasonable maintenance and expense.

Communities, in consultation with the Department and the designer, should develop a sewer by-law that meets their requirements.

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