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The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

TECHNICAL BRIEF

Drinking water

Small water treatment plants

New guidelines and training aids are assisting small water treatment plants to improve their operation and maintenance.

O&M deficiencies: threat to small water treatment plant sustainability

The selection and implementation of the correct water treatment system is only the first step in ensuring sustainable supply of potable water to small communities. Of even greater importance are the following of correct operational and maintenance (O&M) procedures. Unfortunately, most local small water treatment plants experience problems in this regard owing to a number of factors, both technical and human.

Previous investigations have not succeeded fully in identifying and characterising these O&M-related problems. Guidelines provided to clients by suppliers of small water treatment systems have thus not been sufficiently comprehensive to enable problems to be identified and adequately addressed. Furthermore, suppliers of treatment systems are unable to provide clients with post-commissioning training on a sustainable basis.

Investigating issues related to O&M deficiencies

It has, therefore, been necessary to investigate the nature and full extent of the problems experienced in order to provide for the generation of practical, user-friendly guidelines, tailor-made to assist treatment plant managers, process controllers and O&M personnel to take appropriate preventative and remedial actions in dealing with problems encountered.

Steps in the investigation included:

- Identifying the various O&M-related technical and management issues that impact upon the quantity and quality of potable water before distribution; and
- Developing technical and management guidelines for O&M personnel of small water treatment plants and compiling these guidelines into a user-friendly document, suitable for everyday use as a general reference for practical execution of O&M on all categories of small treatment plants found in South Africa.

A comprehensive review of international literature at the outset of the investigation provided insights into all aspects related to O&M of small water treatment systems. The review covered all treatment systems and technology types used for small-scale water-treatment applications, with specific attention being given to non-technical issues affecting the sustainability of small water treatment systems, the most notable of which are the management and human resources issues. Information gathered also enabled the aims, structure, operation and funding systems to be articulated for a proposed *Small Water Systems Technical Assistance Centre*.

The focus of the investigation then shifted to reviewing current management practices being used for small water treatment plants in South Africa, as a means of identifying the best-practice methods that would ensure long-term sustainability of these plants. Issues, especially O&M matters, that have or may have an impact on the quantity or quality of treated water, were identified and evaluated. Thereafter, issues were further investigated by visiting 45 small water treatment plants, representing all types and categories used throughout the country.

Guidelines and training aids that facilitate best O&M practice

Having identified the technical and socio-economic issues that impact on effective plant O&M, a set of specific guidelines was developed for treatment plant managers, process controllers and O&M personnel to facilitate adoption of best practices for O&M of small water treatment plants in the interests of long-term sustainability of such plants. Guidelines were thereafter incorporated into a user-friendly manual, *Guidelines for the Operation and Maintenance of Small Water Treatment Systems in South Africa*.

These address the need in the municipal water treatment sector for managers, supervisors and process controllers to have a reference document, specifically on O&M of small to medium-sized water treatment plants, which can be used to improve the performance and sustainability of these plants. In addition, a comprehensive suite of training aids on how to implement and run efficient O&M programmes for the small treatment systems was developed for use of trainers and managers in the continuous training of O&M personnel at the various water supply authorities and small municipalities.

The guidelines and training aids were introduced to the municipal water treatment sector by way of a series of technology transfer workshops held in the different provinces. Each workshop participant received the guidelines and training aids, packaged in the form of a *Small Water Treatment Plants Operation and Maintenance Training Tool Box*.

Some particular benefits derived from the introduction of the Guidelines

General agreement exists that optimal drinking water supply services by municipalities are unlikely if the water services managers do not have full accountability for services delivered. The norms and guidelines contained in the guidelines should provide water services authorities and water services providers with standards against which the performance of managers can be assessed in key performance areas that relate to such accountability.

The emphasis placed on the importance of regular meetings between management and plant personnel for optimisation of O&M practice has been readily endorsed by municipalities and the guidance provided in this regard has been widely welcomed. Minutes of such meetings are also seen to be of great potential value in assisting external monitoring consultants with the evaluation of plant performance and compliance.

The general lack of awareness of the current developments in and application of risk assessment and management in municipal water treatment plants (and the whole drinking water supply function – from source to tap) has been highlighted. The section on risk in the guidelines will sensitise water care managers to the need for drawing up water safety plans. However, further awareness needs to be created, specifically with regard to hazards and critical control point identification, risk evaluation and development of risk reduction measures. This can also be done through proposed support initiatives such as the *Technical Assistance Centres*.

Attention has been drawn to the challenges of deteriorating infrastructure and the need for encouraging accelerated implementation of asset management programmes.

Supervisors have been sensitised to the need for monitoring programmes for small water treatment plants, despite mixed responses to the programmes that have been proposed (considered either too comprehensive given the realities of staff shortages and lack of funds, or inadequate in terms of analysis frequency).

Ensuring sustained usage of the Guidelines and Training Aids

Essential elements that need to be in place prior to the launching of O&M training sessions at municipalities, during which supervisors or designated trainers are to be provided with hands-on training on how to implement the guidelines and training aids in their municipalities, include:

- A champion who is dedicated and motivated to improve and maintain a high quality of water supply services and management in the municipality;
- External support to assist with and ensure the extensive use of the operational and management tools and training aids by the municipality;
- Appropriate mentorship programmes;
- Effective communication within the municipality;
- Incentive systems implemented for the motivation of managers and technical personnel; and
- Blue Drop certification.

Recommendations

It is recommended that:

- The application of the newly developed guidelines and training aids be actively promoted as management tools for capacity building in the municipal water treatment sector
- The *Technical Assistance Centre for Small Water and Wastewater Treatment Plants* play a leading role in ensuring dissemination of these and other tools to the small water treatment market sector and that the *Technical Assistance Centre* website be used as a communication medium between support groups and municipalities.

Further reading:
To obtain the report, *Guidelines and training aids for the sustainable operation and maintenance of small water treatment plants* (**Report No: 1559/1/09**), contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565; E-mail: orders@wrc.org.za; or Visit: www.wrc.org.za to download a free copy.