

EXECUTIVE SUMMARY

Need for Sustainable Operation and Maintenance of Small Water Treatment Plants

The performance of small (and also some medium-sized) water treatment plants in terms of the provision of a potable standard of drinking water to the end consumer is suspect, mostly due to inadequate management aspects. Various studies and programmes in South Africa have shown, and continue to show, that in those non-metropolitan communities with adequate water supply services the drinking-water quality is often poor and even not fit for consumption at point of use. In particular, it is noted that effective water treatment is largely accepted as a necessity, but that the need for effective monitoring and management of water quality from raw water supply to point of use is less recognized and often very superficially performed. Studies have also shown that the overall management of water provision is not as effective as it should be. Although ensuring effective water treatment is already the focus of various provincial and national initiatives, further attention to this matter is urgently required in order to strengthen and support these efforts.

This situation is caused by a variety of reasons. One of these reasons is the lack of an adequate and efficient management information system. Water Services Providers (WSPs) either have their own system or do not use a system at all. A generic and user-friendly spreadsheet based system is required to assist plant owners and operators to manage their information flow in a logical and efficient manner and in a standardised way throughout the country. The performance of distribution systems in this regard should also be included to ensure that all factors up to the point of consumption are captured. The management system should include monitoring, operation, maintenance and asset management. The systems suggested should be piloted on a number of demonstration plants throughout the country in partnership with local government.

Aims of the Project

The aims of the project were as follows:

- a. Investigate the existence and characteristics of operational information management systems, used by other countries, which could serve as a basis for a South African system.
- b. Develop an operational information tool for South African small and medium sized water treatment plants (non-metro) under the jurisdiction of a water services authority.
- c. Develop training aids for the application of this information management tool.
- d. Pilot and apply the operational information tool on a test basis, using at least five representative Water Services Providers.
- e. Compile a pamphlet on this operational information tool. Arrange at least five information transfer workshops throughout the country, where this operational information tool will be presented to relevant treatment plant and other Water Services Authority representatives, demonstrating its value as a management and regulatory system.

Development of the Operational Information Tool (OIT)

The objective was to develop a simple and user-friendly system of a set of standardised, active sheets (analogous to log-sheets) to be filled in by operations and management staff. The sheets will be both in electronic format, but also available in hard copies for plants without adequate computer facilities. It will be possible to enter all categories of information that require immediate action or storage for later manipulation and use, such as flows, levels, qualities, chemicals, assets, human resources, finances, stock, maintenance schedules, etc. The operational information tool also links up with the manual and training aids that were developed for sustainable operation and maintenance of small water treatment plant (WRC Project K5/1599).

The tool was developed and designed to fit into present municipal systems, and the information tool was also developed to be integrated with the information systems that have been developed by the Department of Water and Environmental Affairs (DWEA), such as the Drinking Water Quality Framework and Management Tool. The information tool was furthermore integrated with the Electronic Water Quality Management System, eWQMS (functionality development) (www.emanti.co.za/ewqms/).

Training aids were also developed for application of the operational information tool. The training aids consist of interactive media and wall-posters indicating step-by-step processes for using the tool. Both the Operational Information Tool and the training aids are available on CD as well as on the Technical Assistance Centre (TAC) website (www.watersupport.co.za).

During the second project workshop it was decided that as many water treatment plants as possible will be targeted for piloting of the operational spreadsheets so as to obtain inputs across a wide spectrum in the water treatment sector. Whilst the original project proposal made provision for piloting at five WSPs, it was decided that 12 treatment plants would be provided with the spreadsheets and shown how the different monitoring and record-keeping spreadsheets should be customized by the managers or supervisors, and filled in by the process controllers on a daily basis.

Technology Transfer Workshops for the OIT were combined with workshops for the Guidelines for Operation and Maintenance of Small Water Treatment Plants. Five workshops were given to introduce the operational spreadsheets to the municipal water treatment sector: in KwaZulu-Natal, Free State, Eastern Cape, Western Cape and North West provinces.

Conclusions

The tool is a simple and user-friendly system, using standardised active log-sheets (developed as spreadsheets), that can be filled in easily by operations and management staff. It captures all information that requires immediate action or storage for later, *viz.* personnel attendance, plant in- and outflows, chemical dosages (including coagulants, oxidants and disinfection agents), chemical usage, water qualities, unit process operational control (including alert levels), water quality monitoring in the distribution network, daily sheets of tasks, events and incidents, and monthly summaries of costs and water qualities.

The OIT spreadsheets will also link up with operational support products developed in other WRC projects, such as the *“Manual and Training Aids for Small Water Treatment Plants”* and the *“Compliance Diagnostic Tool”*.

Benefits of the OIT are that it will assist WSAs and government departments (*e.g.* DWEA) with support and regulation of water treatment works, while the WSAs will be made aware of issues of concern, required remedial measures and current best practice techniques.

The WSAs will also have a useful tool to assess and optimise the performance of their water treatment works. This will ensure more cost-efficient operation and maintenance, and ultimately cost savings.

On a national level, the OIT will contribute toward a country-wide improvement in quality of drinking water to consumers.

Of particular advantage also to the water sector, is the integration of the OIT within the existing eWQMS. It is anticipated that with increased use of the OIT, user requests for additional features/functions requiring ongoing eWQMS modifications will result. The provision of resources to ensure ongoing user requirements are being met will be a key need for all stakeholders in the water sector in South Africa.

Recommendations

It is recommended that application of the OIT, as information management tool in the municipal water treatment sector, be actively promoted, and that the **Technical Assistance Centre for Small Water and Wastewater Treatment Plants (TAC)** play a leading role in ensuring dissemination of these and other tools to the small water market sector.

On-site training should be provided by Centre personnel during installation and implementation of the OIT, with managers receiving intensive training in this regard, as they will be doing the further in-house training to their supervisors and process controllers at their various water treatment plants on an ongoing basis (*i.e.* training and re-training).

During the implementation, the OIT posters that are supplied electronically on disk with this report, should be printed out in full-colour and posted on the walls of the process control room, office or plant laboratory.

The OIT should form an integral part of the “Tool Box for Small Water Treatment Plants” that is being distributed to all water treatment plants in the country.

The OIT and its training material should form part of training programmes for process controllers at water treatment plants.

The eWQMS team members should also be encouraged to train WSAs in the use of the OIT during their routine interactions and site visits. This will ensure rapid/maximum deployment of the OIT.

Consideration should be given to further enhance the OIT to include wastewater treatment facilities. The WRC wastewater treatment based OIT could then also be incorporated into the eWQMS. As wastewater challenges in South Africa are significant, a tool such as this will be of significant benefit.

Further Work

A follow-up project is proposed to roll-out the OIT to all the WSAs and WSPs in South Africa, which could be facilitated by the Technical Assistance Centre. This roll-out should ideally be combined with the roll-out of the diagnostic tool for water treatment plant that was compiled in WRC Project K5/1668.

