



Helping Hand for Small Water Treatment Plants

To aid government in its quest to improve the quality of drinking water served to rural communities, the Water Research Commission (WRC) has published a new set of guidelines for small water treatment plants.

Lani van Vuuren reports.

Water infrastructure in South Africa is generally well developed in urban areas. However, rural water treatment plants are often wrought with technical and management problems leading to the production of drinking water of an inferior quality with potential health consequences for affected communities.

To unravel the intricacies around the operational and management parameters impinging on the disinfection efficiency of these small water treatment plants the WRC funded a study involving 181 such plants (mostly municipal owned) across seven provinces. The goal was to determine the nature and full extent of the problems currently being experienced so as to provide

practical and user-friendly guidelines for intervention.

The study, led by Prof Maggie Momba from the Tshwane University of Technology, gathered information on the methods of disinfection applied, equipment employed, performance of the treatment plants, knowledge and skills of the operators as well as other technical and management issues, among others. It shed significant light on the challenges hampering the performance of the country's small water treatment systems.

Of the small water treatment plants surveyed, those in the Free State were found to deliver the best water quality, while those in the Eastern Cape

generally delivered the poorest quality water. The primary reasons for the failure of these plants included inappropriate technology, poor operation, lack of training, municipal financial constraints, lack of motivation of operators and lack of knowledge of basic water treatment operations.

CONTROL AND MONITORING

At most water treatment plants the characteristics of the incoming (raw) water will change from time to time demanding adjustments in the treatment process. Furthermore, there are variations in water demand which may require changes in raw water flow rate.

Around 50% of the operators and supervisors interviewed did not display the knowledge of the flow rates at which their plants operated and more than 78% were unaware of the chemical doses used or how to correlate the required dose to the flow rate. This often led to either an overdose or an underdose of coagulant and chlorine.

The general lack of skills of plant operators and supervisors was found to be particularly concerning. In some provinces, up to 60% of operators had not undergone relevant and appropriate training to enable them to acquire the necessary technical skills for the job. This is despite the fact that a number of training programmes exist in the country. "We found that many operators have a low level of formal education, and thus may find formal course material difficult to follow," explains Prof Momba. "Increased on-site training offered in local languages could improve the situation."

In terms of instrumentation, only 46% of plants surveyed had the instruments to measure turbidity, pH and chlorine residual (in some cases swimming pool kits were being used to measure pH and chlorine). While 95% of the plants reported that an external monitoring group visited the plants regularly (about once a month), most plants complained about a lack of feedback. In virtually all the plants studied, inadequate funding for operational and implementation activities was mentioned as a huge drawback for effective and efficient water services delivery.

POOR MAINTENANCE PRACTICES

Lack of maintenance of equipment was noted to be a major maintenance problem in about 60% of the small water treatment plants studied. This led to periodic equipment failures. Many operators interviewed felt that the culture in most small water treatment plants was one of 'repair or replace' rather than one of regular maintenance.

In addition, poor working conditions, depletion of chemicals (due to inadequate record keeping), the lack of emergency preparedness and poor communication were found to be significant contributors to the failure of these systems.

DISTRIBUTION SYSTEM

The quality of water reaching consumers depends not only on operating conditions at the treatment plant but also on changes occurring in the distribution system. The study revealed that at many plants final drinking water of the highest quality might be leaving the plant but its condition deteriorated before reaching consumers. High turbidity in the finished water, aged pipelines, breaks in distribution pipelines, biofilm growth, and sludge accumulation in storage reservoirs were some of the factors contributing to this occurrence.

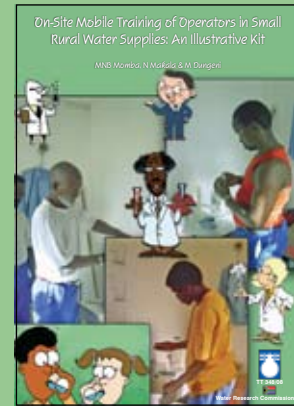
The resultant guidelines describe methods and processes for tackling some of these problems experienced at small water treatment plants. Practical solutions are offered, with emphasis on the multiple barrier approach to optimising disinfection.

In addition, the survey results have been shared with relevant stakeholders with an emphasis on the areas where water quality problems are being experienced. Nationwide workshops on the emergency disinfection of drinking water were also held earlier this year. "Much is already being done to improve drinking water quality in rural areas," notes Prof Momba. "It is important that everyone in the water sector works together to assist municipalities to provide the best quality water to their communities."

To order the Guidelines (**Report No: TT 355/08**) or related report, *Improving Disinfection Efficiency in Small Drinking Water Plants* (**Report No: 1531/1/08**) contact Publications at Tel: (012) 330-0340; Fax: (012) 331-3565 or E-mail: orders@wrc.org.za



ON-SITE TRAINING MATERIAL FOR OPERATORS



An illustrative training kit for rural water treatment plant operators is now available from the WRC.

In rural treatment plants there is a need for most operators to upgrade their training in order to achieve the necessary improvements in performance to produce water that is consistently safe to drink. While formal training in a classroom does have its benefits, operators with a low level of formal education may find the presentation of the course material difficult to follow.

This illustrative kit is the end-product of a series of on-site mobile training of 26 operators from seven different small water treatment plants in the Eastern Cape. It emphasises why each step in water treatment is important for the sustainable production and delivery of safe drinking water and how to check the performance at each stage.

To order *On-Site Mobile Training of Operators in Small Rural Water Supplies: An Illustrative Kit* (Report No: TT 348/08) contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565 or E-mail: orders@wrc.org.za