

Wastewater treatment

Improved inspection of wastewater treatment works

New guidelines developed through funding from the WRC helps wastewater treatment works inspectors to ask the right questions.

Need for guidelines

The National Water Act (Act 36 of 1998) (NWA) requires that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons. Wastewater treatment works are just one of the many water users of these resources. To ensure that water use by these works remains within the legal requirements of the NWA, the Department of Water Affairs (DWA) is obliged to have these works monitored by means of periodic inspections.

In order to undertake an inspection and give guidance on how to solve any problem that may be encountered, it is important that the inspector fully understands the complex nature of various unit processes involved in the treatment of wastewater. Several handbooks with relevant technical information for the various processes are currently available. However, the process controllers or inspectors (attached to either the DWA, a local authority or various contractors or consultants) are not always adequately skilled to correctly interpret this technical information, and do not always know what to look for when undertaking an inspection.

In view of the current lack of understanding and skills needed to fully meet monitoring needs relating to wastewater treatment works, it has been deemed necessary to compile a comprehensive *Inspection Guideline* that would enable acceptable inspections to be carried out despite existing shortcomings.

Purpose of the guideline

This guideline document deals with the requirements for undertaking an inspection at a wastewater treatment works. It aims to:

- Assist the **process controller** to a) prepare for inspection and b) to take corrective action where a problem is identified; and to
- Assist the **inspector** to a) undertake an inspection and b) give guidance where a problem is identified.

Overview of the guideline

Part 1: Guidelines

Part 1 of the document presents the inspector with general guidelines for undertaking an inspection at a wastewater treatment works. It also provides support in using the checklists set out in Part 2.

The guideline explains the why, what and how of undertaking an inspection, while also covering various performance areas and providing corresponding lists of performance indicators. The two main performance areas cover a) process operations and b) management and administration.

With regard to process operations, the guidelines start off by considering the process configuration of the wastewater treatment works. Of importance here is ensuring the availability of firstly, a flow diagram to assist in understanding the structure and correct operation of the works and, secondly, information on the plant's design capacity.

The next important area considered in the guidelines is that of process control operations throughout the various phases of wastewater treatment, namely the preliminary, primary, secondary, tertiary and sludge treatment phases. Following this, the guidelines then process to address process operations concerned with wastewater treatment works maintenance and safety and, finally, laboratory operations.

Management and administration considerations addressed include legislative issues, human resources, budgets, records and reporting.

Part 2: Checklists

Part 2 of this document sets out checklists that facilitate effective and efficient inspections. These should be completed at various times throughout the year, depending on the operational status of the wastewater treatment works.

Checklist 1: The wastewater treatment works in a nutshell

This checklist helps the inspector to understand the makeup of the wastewater treatment works in terms of unit processes, and to draw a flow diagram depicting the works. Examples of flow diagrams of various wastewater treatment works configurations are provided.

All process managers and process controllers should have completed this checklist when commencing employment at the wastewater treatment works and completed it again whenever upgrades are done to the works. External inspectors should complete this checklist with the process manager prior to undertaking an inspection.

Checklist 2: Primary assessment

This checklist gives an overall evaluation of the wastewater treatment works, focusing on the mechanical equipment and its maintenance, the condition of the final effluent, the biological treatment, housekeeping practices, paper work and safety issues. The inspection should be undertaken by an experienced person, preferably external to the works, who will make a decision on whether a comprehensive inspection needs to be undertaken or not.

Checklist 3: Comprehensive inspection

This checklist includes a number of individual checklists, covering the following:

- Inspector's observations upon entering the wastewater treatment works;
- Preliminary treatment: screens, grit removal, flow;
- Primary treatment: primary settling, oxidation pond systems, trickling filters;
- Secondary treatment: rotating biological contactors, activated sludge, clarification/secondary settling;
- Tertiary treatment: chemical disinfection, constructed wetlands, maturation ponds;

- Sludge treatment: thickening, dewatering, anaerobic digestion
- Resources: legislative issues, human resources, financial resources, documentation, laboratory resources.

Depending on relevance, individual checklists also include questions that address maintenance issues as well as environmental and safety issues.

Checklist 3 should be used by the regulators and other inspectors when a wastewater treatment works has failed the primary assessment, i.e. all aspects have failed or certain parts of the works have serious problems. The checklist aids in the identification of problems and making of improvements.

Checklist 4: Quarterly inspection

This inspection should be undertaken quarterly once the wastewater treatment works has been subjected to a comprehensive inspection and/or primary assessment, and has been deemed to be running optimally. Nine performance areas (final effluent, process configuration, operation, laboratory, maintenance, supervision and management, safety, emergency preparedness and response, legislation/regulations) are rated. Scores will indicate whether the works is in fact performing satisfactorily or whether a comprehensive assessment is required for the entire works or any specific area thereof.

Concluding remarks

The guideline document provides expert guidance for both internal and external inspectors of wastewater treatment works. Guidance is encapsulated in an attractive, well-illustrated, well-organised and easily-understood volumes. As such, it should compensate well for any current shortage of skill or experience among those responsible for ensuring satisfactory performance of wastewater treatment works in South Africa.

Further reading:

To obtain the *Guideline for the Inspection of Wastewater Treatment Works (Report No: TT 375/08)* contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565; E-mail: orders@wrc.org.za; or Visit: www.wrc.org.za