SLOW SAND FILTRATION:
Recent Developments in
Water Treatment Technology

Editor: Dr N. J. D. GRAHAM, Lecturer in Public Health Engineering, Department of Civil Engineering, Imperial College of Science and Technology, University of London.

This state-of-the-art review of slow sand filtration brings together academic, industrial and research organisations for a valuable discussion of the latest and most relevant developments in this important field of water treatment processing. It investigates the recent advances in the understanding of the scientific basis of slow sand filtration, as well as reviewing recent advances in the operational aspects of slow sand filter processes, e.g. the use of fabrics, low-cost pretreatment techniques.

Taking a balanced approach throughout, the book investigates the application of slow sand filtration techniques both in developed and developing countries, and shows how these techniques are the subject of a widespread renaissance of world-wide interest for two important reasons. Firstly for the effectiveness and relative simplicity of slow sand filtration technology; secondly, the necessity for a practicable biological process for the treatment of nutrient-rich surface waters by the removal of organic matter which is potentially assimilable by micro-organisms.

Readership: The water and wastewater industries, concerned with slow sand filtration techniques and environmental protection. International water agencies, government aid agencies, water research institutions. Also university departments of environmental and civil engineering. Biologists, environmental biologists, biochemical engineers and chemical engineers.

The cover design is based on a photograph showing experimental slow sand filter units (foreground) next to full-scale operational slow sand filter beds at the Thames Water Ashford Common Treatment Works, UK.
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Preface

This book presents recent research and state-of-the-art information on the scientific basis, modes of use, and engineering developments of slow sand filtration. The information is loosely grouped into the following themes: filter design, operation and management; pretreatment methods; biological aspects; process performance; process developments; and developing country case studies.

Slow sand filtration is well known for being an effective water treatment unit process provided appropriate pretreatment is incorporated. However, its low-technology image and perceived disadvantages (e.g. low throughput, high operation and maintenance costs) have resulted in it being considered generally inappropriate as a treatment alternative for industrialized countries. Such perceptions are now rapidly changing in the light of the rising need to meet higher drinking water quality standards. In particular, the use of slow sand filtration as a means of reducing dissolved organic carbon (e.g. trihalomethane precursor material, assimilable organic carbon) and pathogenic micro-organisms from polluted surface water sources is currently receiving considerable attention in Europe. In developing countries slow sand filters are well established as an appropriate treatment technology. However, many installations fail as a result of inadequate pretreatment facilities, lack of a proper understanding of the process, and poor operation and maintenance practise.

Although slow sand filtration has been applied widely as a unit water treatment process throughout this century, our knowledge of the scientific basis of the process remains extremely limited. This is in part the result of the lack of interest in the process in the industrialized countries, as well as due to the very complex nature of the treatment process.

The purpose of this book is to bring together the experience and knowledge from a broad spectrum of related disciplines, such as plant operators and designers, universities and research organisations to focus on and summarize the latest understanding and developments in this important process of water treatment. Each chapter of the book has been compiled from presentations made at the International Seminar "Advances in Slow Sand Filtration", held at Imperial College, London, between the 23rd and 25th November 1988. The contributions of the authors, session chairmen and conference organizers at Imperial College made this International Seminar and book possible, the editor wishes to express his thanks to them for their assistance.

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