

INTRODUCTION TO WASTEWATER TREATMENT

The term wastewater is commonly used to describe liquid wastes that are collected and transported to a treatment facility through a system of sewers. Wastewater is generally divided into two broad classifications: domestic wastewater and industrial wastewater. Domestic wastewater comes from communities of homes, businesses, and institutions. Domestic wastewater is 99.9% water and only 0.1% solids. Milligrams per liter (mg/L) is the metric equivalent of parts per million (one part in a million parts). One percent (1%) is equal to 10,000 mg/L. So a 0.1% solids concentration is equal to 1000 mg/L. The solids in domestic wastewater are both dissolved and suspended solids. Suspended solids can be settled out or filtered but dissolved solids will have to be converted to suspended solids during the treatment process.

BOD AND SUSPENDED SOLIDS

The strength of the wastewater is determined by measuring the amount of suspended material in the water and the amount of organic material in the water. The suspended, filterable solids in the waste flow are known as Suspended Solids or SS. They can be trapped on a filter, dried, and weighed to determine the concentration. The organic strength of the wastewater is determined indirectly. The microorganisms in the biological treatment processes decompose or stabilize the raw organic material in the waste flow. As they do this, they use oxygen as part of the respiration process. Instead of directly measuring the strength of the organics, the amount of oxygen that the "bugs" use as they eat it is determined. This is known as the Biochemical Oxygen Demand or BOD. If these organics are not stabilized in the treatment process they will deplete dissolved oxygen from the receiving water. This oxygen depletion can result in fish kills and damage to the aquatic ecosystem.

Some of the suspended solids are organic, but most of the organics in the wastewater are dissolved. About 40% of the BOD will be suspended particles and most of them will settle out without further treatment. But 60% of the BOD is dissolved and must be used as "Bug Food" to grow a culture of microorganisms that become "suspended solids" that are again removed by settling. Suspended solids are classified as "Suspended" and "Settleable". About 60-70% of the Suspended Solids in raw wastewater are settleable. The rest will have to be made settleable in the biological processes. Domestic wastewater will have a BOD of between 150-300 mg/L and SS in the 100-400 mg/L range. Nitrogen, in the form of ammonia, will also be present in domestic wastewater. Ammonia concentrations usually run from 10-40 mg/L.



Wastewater System Operator Manual Ragsdale Associates

John Giorgi



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Introduction to Water Engineering, Hydrology, and Irrigation Mohammad Albaji, 2022-06-14 This book is designed as an undergraduate text for water and environmental engineering courses and as preliminary reading for postgraduate courses in water and environmental engineering including introductory coverage of irrigation and drainage water resources hydrology hydraulic structures and more The text and exercises have been classroom tested by undergraduate water and environmental engineering students and are augmented by material prepared for extramural short courses It covers basic concepts of agricultural irrigation and drainage including planning and design surface intakes economics environmental impacts wetlands and legal issues Features Numerous illustrations throughout to clarify the concepts presented Examines and compares the advantages and disadvantages of several methods of irrigation practice Explains the integral components including pumps filters piping valves and more Considers fertilizer application and nutrient management This comprehensive and well illustrated book will be of great interest to students professionals and researchers involved with all aspects of water engineering hydrology and irrigation

Sustainable Water Technologies Daniel H. Chen, 2016-10-14 Development of advanced technologies is a critical component in overcoming the looming water crisis Stressing emerging technologies and strategies that facilitate water sustainability for future generations the second volume in the two volume set Sustainable Water Management and Technologies provides current and forthcoming technologies research development and applications to help ensure availability of water for all The book emphasizes emerging nanotechnology biotechnology and information technology applications as well as sustainable processes and products to protect the environment and human health save water and energy and minimize material use It also discusses such topics as groundwater transport protection and remediation industrial and wastewater treatment reuse and disposal membrane technology for water purification and desalination treatment and disposal in unconventional oil and gas development biodegradation and bioremediation for soil and water Stresses emerging technologies and strategies that facilitate water sustainability Covers a wide array of topics including drinking water wastewater and groundwater treatment protection and remediation Discusses oil and gas drilling impacts and pollution prevention membrane technology for water desalination and purification biodegradation and bioremediation for soil and water Details emerging nanotechnology biotechnology and information technology applications as well as sustainable processes and products

Public Works Manual ,1986 **Land and Water** ,2005 **Government Reports Announcements & Index** ,1981-11 *American Export Register* ,1980 *Spellman's Standard Hdbk for Wastewater Operators, Three Volume Set* Frank R. Spellman, 2000-04-10 Spellman's Standard Handbook for Wastewater Operators Three Volume Set is a readily accessible source of information for review in preparing wastewater personnel for operator certification and licensure These resource manuals and troubleshooting guides contain a compilation of wastewater treatment information data operational material process control procedures and problem solving safety and health

information new trends in wastewater treatment administration and technology and numerous sample problem solving practice sets many based on actual tests The Handbook s Three volumes review the wastewater operator s job related knowledge as job requirements identified by the examination developers as essential for a minimally competent Class IV through Class I or Grade I through Grade V wastewater treatment plant operator Every attempt has been made to make the three Handbook volumes as comprehensive as possible while maintaining their compact practical format The Handbooks goal is to enhance the understanding awareness and abilities of practicing operators and those who want to become operators The three volumes are designed to build on each other providing increasingly advanced information For persons preparing for operator s licensing this is critical because wastewater treatment is a complex process For licensed veteran operators continuous review is also critical because wastewater treatment is an evolving dynamic ever changing field Spellman s Standard Handbooks provide the vehicle for reaching these goals

Wastewater Operator Certification Study Guide

John Giorgi,2011-01-12 **Spellman's Standard Handbook for Wastewater Operators** Frank R. Spellman,1999-04-28
Spellman s Standard Handbook for Wastewater Operators Volume 1 Fundamental Level provides information and unit process trouble shooting guidance required on a daily basis not only by the plant manager plant superintendent chief operator lab technician maintenance operator but more importantly by and for the plant operator and those in preparation for taking the entry level Class IV Class III or Grade I II operator examinations This handbook was prepared to help operators obtain licensing and to operate wastewater treatment plants properly It can be used as a textbook in technical training courses in technical schools and at the junior college level Spellman s Standard Handbook for Wastewater Operators is the first volume of a new study guide and readily accessible source of information for review in preparing wastewater personnel for operator certification and licensure These handbooks are resource manuals and troubleshooting guides that contain wastewater treatment information data operational material process control procedures and problem solving safety and health information new trends in wastewater treatment administration and technology and numerous sample problem solving practice sets many based on actual tests The Handbooks goal is to enhance the understanding awareness and abilities of practicing operators and those who want to become operators The three volumes are designed to build on each other providing increasingly advanced information For persons preparing for operator s licensing this is critical because wastewater treatment is a complex process For licensed veteran operators continuous review is also critical because wastewater treatment is an evolving dynamic ever changing field Spellman s Standard Handbooks provide the vehicle for reaching these goals *Operator Certification Study Guide* John Giorgi,2003 This book is a revision of the popular study guide for water system last published in 1993 This study resource is a practical tool for treatment plant operators and distribution system personnel as they prepare for the certification exam Actually formatting is used with the sample questions all of which have been reviewed by ABC Association of Board of Certification and are based on information

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