Agenda: Wastewater Treatment Fundamentals II: Solids Handling and Support Systems

In Partnership with Water Environment Federation

This online eLearning course is being offered in partnership with Water Environment Federation (WEF).

Summary - Wastewater Treatment Fundamentals II: Solids Handling and Support Systems covers all aspects of solids handling and support systems and helps operators prepare for the first three levels of certification examinations. In addition to learning the basics of solids handling, operators will gain a thorough understanding of critical aspects of thickening, dewatering, aeration systems and aerobic digesting.

Estimate to Complete - 60 hours

Course Orientation (not included in est. 60 hours) - This preliminary section orients the student to the course content and mechanics.

Chapter 1: Introduction to Solids Handling - This introductory chapter provides a brief overview of solids handling and dewatering theory that will be expanded upon over the next three chapters on thickening, stabilization, and dewatering.

Chapter 2: Thickening - Thickening is performed at various locations throughout the water resource recovery facility (WRRF). Thickening most commonly occurs before sludge stabilization or dewatering. It is an important step in the treatment process because it reduces pumping costs, heating costs, electrical costs, and other operational and maintenance-related costs. Primary, waste activated, a combination of these, or other types of solids are thickened to reduce the volume of water moving through other downstream processes within the WRRF.

Chapter 3: Aerobic Digestion - Aerobic digestion is one of several processes defined in the Biosolids 503 Regulations as a process to significantly reduce pathogens (PSRP). It is capable of meeting the requirements for Class B biosolids. Autothermal thermophilic aerobic digestion (ATAD), a variation of aerobic digestion, is capable of meeting the requirements for Class A biosolids.

Chapter 4: Anaerobic Digestion - Anaerobic digestion has been in use for nearly a century,

but is only used in less than 5% of all water resource recovery facilities (WRRFs). As of 2020, there were 1,269 WRRFs in the United States using anaerobic digestion to stabilize their biosolids (American Biogas Council, n.d.). There are an estimated 33,912 WRRFs throughout the United States (U.S. EPA, 2008). Anaerobic digestion is typically used at larger WRRFs that have permitted capacities greater than about 19,000 m3/d (5 mgd) and in WRRFs that produce primary sludge (WEF et al., 2018). Aerobic digesters are more common in smaller facilities and those that produce only secondary sludge.

Chapter 5: Dewatering - Dewatering is used to reduce the volume of sludge or biosolids for further processing or ultimate disposal. Dewatering differs from thickening in that while sludge thickening produces total solids in the range of 2% to 10%, dewatering typically produces solids in the range of 10% to 45%. Sludge dewatering systems convey and process thickened liquid sludge, stabilized biosolids, or scum streams to reduce the amount of excess water in those streams.

Chapter 6: Electrical Fundamentals and Motors - This chapter will cover electrical fundamentals, the relationship between electricity and magnetism, how direct and alternating current motors work, and the different types of electrical drawings. There are many excellent books and video resources available that discuss electricity, troubleshooting of electrical systems, and motors in much more detail. The references included at the end of this chapter are easy to read and understand. Be sure to follow your employer's safety policies and procedures before performing any work on electrical equipment.

Chapter 7: Pumps and Lift Stations - Different types of pumps are used in many ways throughout our water resource recovery facilities (WRRFs). They are critical equipment used by operators in collection systems and WRRFs all around the world. This chapter will cover the basics of pump terminology and performance. We will look at how different pump designs work and what applications each type is best equipped to handle. The final section in the chapter looks at how pumps work together in systems in different types of lift stations.

Chapter 8: Aeration Systems - Aeration systems are crucial to the operation of water resource recovery facilities (WRRFs). Their primary goal is to provide dissolved oxygen (DO) to biological treatment processes so bacteria can convert organic matter to biomass and ammonia to nitrite and nitrate. Aeration systems also provide mixing, which is needed to keep bacteria and pollutants in suspension and in contact with each other so that microorganisms can break pollutants down. Mixing also helps to prevent short-circuiting in the process tanks.

Chapter 9: Laboratory Procedures - This chapter presents information on flow monitoring, representative sampling, and step-by-step procedures for some of the most commonly used test methods in wastewater treatment. These test methods are used across many different treatment processes and may also be used for regulatory compliance. The official versions of

these test methods may be found in Standard Methods for the Examination of Water and Wastewater, a joint publication of the American Public Health Association, the American Water Works Association, and the Water Environment Federation (WEF) (APHA et al., 2017).

Chapter 10: Chemical Storage, Handling, and Feeding - Chemicals are commonly used in water resource recovery facilities (WRRFs) to achieve removal of regulated constituents and support treatment processes. The safe application of chemicals includes the steps of receiving bulk chemical deliveries, chemical storage, transfer, dosing, and application. Chemical treatment can often generate significant amounts of inert sludge that must be incorporated in the solids handling process and will also add to the total dissolved solids (TDS) in the facility effluent. Chemicals can come in any phase—gas, liquid (or aqueous solution), and solid.

Final Assessment - Students need to answer 70 out of 100 questions correct to pass the final assessment and receive credit for the Wastewater Treatment Fundamentals II: Solids Handling and Support Systems course.

WWTF II: End of Course Survey (not included in est. 60 hours) - After passing the final assessment, students are directed to an end of course survey to evaluate the learning experience and provide license information to ensure the information in the LMS is correct.

Course Schedule: Wastewater Treatment Fundamentals II: Solids Handling and Support Systems

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Estimate to Complete - 60 hours

Module Title	Average Time to Complete
Course Orientation (not included in est. 60 hours)	Not Applicable
Chapter 1: Introduction to Solids Handling	6 hours
Chapter 2: Thickening	6 hours
Chapter 3: Aerobic Digestion	6 hours
Chapter 4: Anaerobic Digestion	6 hours
Chapter 5: Dewatering	6 hours
Chapter 6: Electrical Fundamentals and Motors	6 hours
Chapter 7: Pumps and Lift Stations	6 hours
Chapter 8: Aeration Systems	6 hours
Chapter 9: Laboratory Procedures	6 hours
Chapter 10: Chemical Storage, Handling, and Feeding	6 hours
Final Assessment	4 hours
WWTF II: End of Course Survey (not included in est. 60 hours)	Not applicable