Model Decentralized Wastewater Practitioner Curriculum

Septic Tanks

Suggested Course Materials

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Citation of Materials

The educational materials included in this module should be cited as follows:

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Loudon, T.L., T.R. Bounds, J.C. Converse, T. Konsler and C. Rock. 2005. Septic Tanks – PowerPoint Presentation. *in* (D.L. Lindbo and N.E. Deal eds.) Model Decentralized Wastewater Practitioner Curriculum. National Decentralized Water Resources Capacity Development Project. North Carolina State University, Raleigh, NC.

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Suggested Course Materials

Table of Contents

Septic Tanks
Overview

This module is designed for onsite practitioners including system designers, installers, pumpers, regulators and maintenance personnel. In addition to giving an overview of the wastewater treatment processes that occur in septic tanks, the information included in the PowerPoint presentation and text is designed to provide the audience with sufficient detail to make informed decisions regarding tank selection relative to capacity and structural integrity. Additionally, industry practitioners will learn the importance of design features that not only improve tank function, but also facilitate monitoring/inspection and operation and maintenance activities. Finally, the practitioner will be able to impart information on the proper care of septic tanks to potential clients.

The Septic Tank Module emphasizes the importance of high quality, leak proof, structurally sound tanks. Tanks manufactured with all commonly used materials are included in the presentation. The physical separation functions of the tank and the hydraulic and biological processes involved as they influence tank selection and sizing are covered. Theoretical and scientifically documented benefits of different tank configurations, outlet and inlet baffle combinations, and effluent filter use are included. Tank management (including various procedures for determining the required frequency of accumulated solids removal) is discussed. The importance of tank access is discussed in detail. This section focuses on not only access but also on the fact that tank/riser seams and pipe penetrations must be watertight.

The Practitioner Septic Tank Module is intended to be a summary of septic tank function, design and use for presentation to practitioners in the onsite wastewater field. The module is divided into eight major sections, typical of the contents of sections needed in a module for any onsite system component. The sections are titled: overview, design, construction, installation, monitoring and inspection, operation and maintenance, trouble shooting, and abandonment procedures. This material is designed to provide complete materials for a class on septic tanks for those who deal with them in one role or another on a daily basis. It is not intended to make tank designers of participants but to prepare them to select quality tanks, understand how they operate, properly use and maintain them and be able to advise others on these points. An instructor can also select parts of the material for presentation to other audiences such as homeowners, designers, and policy makers who need a basic understanding of tanks.

Where the entire module is presented to practitioners, 2-3 hours of instruction time will be needed. The materials can be most effectively presented at a training center where instructors can use actual tanks to illustrate key issues. For other audiences, specific material can be selected and tailored to fit the time available for instruction.

Septic Tanks
Agenda

This module is designed to be presented in a short course format. The agenda presented below represents a one-day workshop scenario in which the PowerPoint presentation is the primary tool and the text (which provides additional detail) may or may not be included in materials distributed to participants. Certainly, PowerPoint handouts are recommended. Times listed for each topic are merely a suggestion: more or less time could be spent on any given section. Field activities included here are optional and would simply underscore the materials included in the slide presentation. One or more could be included depending upon time and distance constraints.

8:30 am Welcome
- Introductions
- Review of course materials and learning objectives

8:45 am Overview
- Tank functions: physical and Biological processes

9:00 am Tank Design
- Sizing and Compartmentation
- Appurtenances

10:00 am BREAK

10:15 am Tank Construction
- Materials used
- Procedures for achieving structural soundness
- Avoiding leaks and watertightness testing
- Joints and connections

12:00 pm LUNCH

1:00 pm Tank Installation
- Safety
- Excavation and bedding of tanks
- Pipe penetrations

2:00 pm Operation and Maintenance
- Sludge and scum measurement
- Pumping frequency
- Effluent screens
- Communicating with system users

2:30 pm Inspections and Troubleshooting

3:00 pm BREAK

3:15 pm Optional field activities

- Trip to Training and Demonstration center to view different types of tanks and appurtenances
- Visit to tank manufacturer to review construction techniques
- Trip to actual tank installation
- Monitoring/inspection visit to existing tank

4:30 pm Adjourn

Septic Tanks
Module Outline

I. Overview
- A. Physical Processes
- B. Biological and Chemical Processes

II. Design
- A. Tank Sizing
- B. Tank Geometry
- C. Tank Compartments
- D. Vehicular Traffic
- E. Tank Appurtenances
  1. Tees and baffles
  2. Effluent screens
  3. Access risers

III. Construction
- A. Materials
- B. Structural Soundness
- C. Manufacturing Methods
  1. Precast Concrete Septic Tanks
     - Mix Design
     - Structural Reinforcement
     - Manufacturing Practices
     - Joint Design
     - Sealing Materials
     - Proof Testing for Structural Soundness
     - Access Risers
     - Pipe Penetrations
  2. Rotationally Molded Polyethylene/Polypropylene Septic Tanks
  3. Fiberglass-Reinforced Plastic Septic Tanks
- D. Overall Quality of Tanks

IV. Watertightness Testing
- A. Hydrostatic Testing
- B. Vacuum Testing
- C. Testing Existing Tanks

V. Installation
- A. Safety
- B. Planning and Excavation
- C. Bedding Material
- D. Setting the Tank and Joining Seams

E. Backfilling the Installation
F. Installations in High Groundwater Conditions
G. Pipe Penetrations
H. Access Risers

VI. Operation and Maintenance
A. Pumping
B. Effluent Screens
C. Myths and Additives
D. Recommendations to Homeowners

VII. Monitoring and Inspections

VIII. Tank Abandonment Procedures

Septic Tanks
Goals

The goal of this module is to provide information on the first pretreatment component of small scale wastewater treatment systems to help practitioners make informed decisions.

Septic Tanks
Learning Objectives

After participating in this module, students will:

a. Be able to describe the physical, chemical and biological processes that occur in septic tanks and understand the importance of the processes in wastewater treatment.
b. Know the parameters used to size septic tanks for various facilities, understand the importance of adequate capacity, and the value of including appurtenances that improve tank function and increase accessibility for inspection and maintenance.
c. Be familiar with materials used to construct tanks, understand the importance of using construction techniques that render structural soundness to tanks, and be able to conduct tests to determine watertightness of completed tanks.
d. Know the basic requirements for tank installation and grasp the paramount importance of working safely during that process.
e. Know the monitoring/inspection parameters, operation/maintenance requirements for tanks and be able to conduct troubleshooting activities.
f. Know the proper procedures used to abandon tanks that are no longer in use.

Septic Tanks
Prerequisites

Prior to attending a workshop in which this material is covered, participants should have some basic knowledge of subsurface wastewater treatment systems. General knowledge regarding construction and installation of tanks is helpful, but not required.

Septic Tanks
Evaluation Form

Reviewer: _____

We are requesting your assistance in reviewing the modules developed through the On-Site Consortium curriculum project. Please complete the following form while reviewing the materials

With a rating scale of 1 (Disagree) to 5 (Agree), please respond to the following questions

Review of printed materials:

	Disagree Agree
The text (if used) completely covers the topic area.	1 2 3 4 5
The PowerPoint completely covers the topic area.	1 2 3 4 5
The discussion notes completely cover the topic area.	1 2 3 4 5

Review of learning objectives:

I am better able to describe the processes that occur in septic tanks.	1 2 3 4 5
I understand parameters used to adequately size septic tanks.	1 2 3 4 5
I learned the function of tank appurtenances and understand the importance of accessibility for tank inspection and maintenance.	1 2 3 4 5
I am more aware of the importance of structural integrity in tanks.	1 2 3 4 5
I learned how to test tanks for watertightness.	1 2 3 4 5
I learned basic tank installation requirements and abandonment procedures.	1 2 3 4 5
I understand the importance of tank inspection/monitoring procedures and operation/maintenance activities.	1 2 3 4 5
I will be able to make better decisions regarding septic tanks.	1 2 3 4 5

What specific recommendations would you provide for the text? _____
_____

What specific recommendations would you provide for the PowerPoint? _____
_____

What specific recommendations would you provide for the speaker? _____
_____
_____

Please give specific positive comments on the topic/module. _____
_____
_____