

# **Model Decentralized Wastewater Practitioner Curriculum**

## **Technology Overview**

### **Suggested Course Materials**

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# Technology Overview

## Suggested Course Materials

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## **Technology Overview Overview**

The Technology Overview Module is basic introductory training material for the initial short courses in the curriculum. It standardizes technological verbiage across the continent. This module introduces all onsite and cluster technologies from the basic gravity flow conventional septic system (including gravel-less trench options) to more advanced treatment units and improved distribution and dispersal technologies. The entire wastewater treatment and dispersal system consists of different components defined by the different functions they have. The course includes information needed to select the appropriate set of components to make up the wastewater system for any given site. Varying levels of detail are then presented on technologies grouped by the type of component. This course primarily relates to technologies that are used for individual and cluster on-site wastewater systems. The technologies frequently are useable for larger flows, also, but larger flows are outside the purview of this course.

The Technology Overview module can be used in a variety of ways. It is essentially designed as a multi-day course which can be presented in two consecutive days, 2 one-day sessions, or in a series of smaller modules. If a demonstration site is available where participants can view the different technologies, more time may be needed. The module can also be used by colleges and universities to form the outline for a semester-long course on onsite/decentralized sewage systems.

# Technology Overview

## Agenda

**There are several different formats that can be used in instructing this module. The following agenda assumes a two-day class.**

### Day 1

- |            |  |
|------------|--|
| 8:00 am    | Registration   |
| 8:30 am    | Welcome <ul style="list-style-type: none"><li>• Introductions</li><li>• Introduction to course</li><li>• Course goal and objectives</li><li>• Assumptions/prerequisites of knowledge and understanding</li><li>• Schedule, including an outline of the component categories and the technologies to be discussed</li><li>• Instructors</li></ul> |
| 9:15 am    | Strategies for using technologies <ul style="list-style-type: none"><li>• Review of the system selection process<ul style="list-style-type: none"><li>▪ Site and soil evaluation</li><li>▪ Wastewater source</li><li>▪ Matching of technology with site conditions and other factors</li></ul></li></ul>   |
| 10:00 am   | Break  |
| 10:15 am   | Strategies for using technologies (continued) <ul style="list-style-type: none"><li>• Technology selection strategies<ul style="list-style-type: none"><li>▪ Typical system</li><li>▪ Blackwater, greywater, reuse</li><li>▪ Options for distribution media – gravel, gravelless technologies</li></ul></li></ul>                                |
| 12:00 noon | Lunch  |
| 1:00 pm    | Collection and transmission components <ul style="list-style-type: none"><li>• Solids handling sewers</li><li>• Effluent sewers</li><li>• Holding tanks</li></ul>  |
| 2::15 pm   | Pretreatment components <ul style="list-style-type: none"><li>• Septic tanks</li></ul>   |
| 3:00 pm    | Break  |

- 3:15 pm Pretreatment components (continued)
- Grease traps
  - Aerobic treatment units
  - Media filters (start)

5:00 pm Adjourn

## Day 2

8:30 am General review of information presented on Day 1

- 8:45 am Pretreatment components (continued)
- Media filters (complete)
  - Constructed wetlands
  - Disinfection
    - Chlorination
    - Ultraviolet disinfection
  - Other
    - Lagoons
    - Anaerobic upflow filters

10:15 am Break

- 10:30 am Application/Distribution components
- Gravity-flow distribution
    - Parallel distribution
    - Serial distribution

12:00 noon Lunch

- 1:00 pm Application/Distribution components
- Dosed-flow distribution
    - Dose to gravity distribution
    - Pressure manifold
    - Pressure distribution
    - Drip distribution

2:45 pm Break

- 3:00 pm Final treatment and dispersal components
- Subsurface dispersal
    - Inground system
      - Drainfield
      - Drip field
      - Seepage pit
    - At-grade system

- Mound system
- Atmospheric dispersal
- Surface dispersal
  - Surface of the land
  - Surface water

4:45 pm      Wrap-up, handout certificates of attendance, concluding comments

5:00 pm      Adjourn

**Resources to be used:**

- PowerPoint presentation, including instructor notes
- Any quizzes, case studies, etc. that are developed locally
- Hands-on equipment and displays at demonstration site, if one exists. If this is not available, add more diagrams and pictures, either from the slide catalog or from local sources enabling a field trip to be taken via pictures.
- Working miniature models, if existing locally

# Technology Overview

## Module Outline

**Note:** Throughout the outline, links or references are provided to other practitioner or university curriculum modules that give more detail on a specific subject. These links or references, which are enclosed in parentheses and **bold** letters, provide information on the location of additional detail – both the curriculum and the module topic.

- I. Introduction
- II. Use Strategies
  - A. System selection process
    1. Soil & site evaluation (**Practitioner curriculum - Soil and Site Evaluation and Water Movement and Treatment in Soils; University curriculum - Site and Soil Evaluation**)
    2. Wastewater source – domestic/residential & non-residential/commercial (**University – Wastewater Characterization**)
    3. Matching of technology with site/soil conditions, client desires, etc.
  - B. Technology selection strategies
    1. Typical system
    2. Separation of blackwater and greywater
      - a. Composting toilets
      - b. Incinerating toilets
      - c. Greywater reuse (**University – Water Reuse**)
    3. Distribution media options in pretreatment and final treatment/dispersal components
      - a. Gravel/crushed rock
      - b. Gravelless technologies
- III. Collection & Transmission Components (**University – Hydraulics**)
  - A. Solids handling sewers
    1. Gravity
    2. Pressure sewer with grinder pumps
    3. Vacuum sewer
  - B. Effluent sewers
    1. Septic Tank Effluent Gravity (STEG)
    2. Septic Tank Effluent Pump (STEP)
  - C. Holding tanks
- IV. Pretreatment Components
  - A. Septic tank (**Both Practitioner and University - Septic Tanks**)
  - B. Grease interceptors
  - C. Aerobic Treatment Units (ATUs) (**University – Aerobic Treatment and ATUs**)
  - D. Media filters (**University - Media Filters**)
  - E. Constructed wetlands (**University curriculum - Constructed Wetlands: Critical**)

- Review and Constructed Wetlands: Design Approaches**
- F. Disinfection (**University - Disinfection**)
    - 1. Chlorine
    - 2. Ultraviolet
  - G. Other
    - 1. Lagoons
    - 2. Anaerobic upflow filters
- V. Application/Distribution components (**University curriculum – Effluent Conveyance, Controls and Hydraulics**)
- A. Gravity-flow distribution
    - 1. Parallel distribution
      - a. Distribution box
      - b. Other
    - 2. Serial distribution
      - a. Serial relief line
      - b. Drop box
  - B. Dosed-flow distribution
    - 1. Dose to gravity-flow distribution network
    - 2. Pressure manifold
    - 3. Pressure distribution system
    - 4. Drip distribution system
- VI. Final treatment/dispersal options
- A. Subsurface Dispersal
    - 1. Inground component
      - a. Drainfield
      - b. Drip field (**University – Drip Dispersal**)
      - c. Seepage pit
    - 2. At-grade component
    - 3. Mound component
  - B. Atmospheric Dispersal
  - C. Surface Dispersal (**University – Spray Dispersal and Water Reuse**)
    - 1. Surface of the land
    - 2. Surface water

### **Detail Provided on Technologies**

Information on many of the following topics will be discussed for each component:

- I. What it is - the components & subcomponents
- II. Principles of operation (How it works)
  - a. Components
  - b. Treatment mechanisms
  - c. Expected treatment efficiencies
  - d. Start-up treatment efficiencies
  - e. Reliability/Sensitivity

- III. Applications/Where used/Siting & location requirements
  - a. Soil and site restrictions
  - b. Climatic restrictions
  - c. Effects of site disturbances on locating a system
  - d. Role of remote monitoring & control as it relates to system operation
  - e. Effect of variation of flow and waste strength (from daily use, vacations, etc.) on system performance
  - f. Typical setback requirements
  - g. Ability of systems to be used for clusters and individual homes
- IV. Other important/useful considerations/information
  - a. Design considerations
  - b. Installation considerations
  - c. Operation, monitoring, maintenance considerations
  - d. Other

## **Technology Overview**

### **Goals**

The simple, overriding goal of this course is to provide a general understanding of the various on-site wastewater treatment and dispersal technologies used primarily for small daily wastewater flows from facilities producing wastewater quality similar to that expected from residential development. These flows will be from residences, single-family and clusters of homes, and commercial development.

## **Technology Overview**

### **Learning Objectives**

1. Participants will be able to identify and describe the different wastewater treatment and dispersal technologies available using consistent terminology.
2. Students can compare the technologies with regards to general concepts, function, regulatory requirements; site and location requirements; treatment efficiencies; esthetics and economic parameters; and design, installation and monitoring/maintenance needs.
3. Industry professionals will make better basic decisions related to their understanding of wastewater technologies and will know where to go for more in-depth information, particularly what other modules in the curriculum are available.

## **Technology Overview**

### **Prerequisites**

Prior to attending this class, on-site wastewater industry members are expected to:

1. Understand basic terms, definitions and rules important to on-site wastewater systems.
2. Have been introduced to on-site wastewater system siting, design, installation, inspection, operation, monitoring, and maintenance.
3. Understand the basics of soil properties and how they influence land suitability for on-site wastewater treatment and dispersal systems.

If this module will be used as part of a college/university curriculum, it is anticipated that the basics will be presented in the class prior to the detail on technologies.

## Technology Overview 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 completely covers the topic area.	1	2	3	4	5
The visuals completely cover 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 gained a better understanding of the different technologies available.	1	2	3	4	5
I gained a better understanding of how different technologies function.	1	2	3	4	5
I better realize the differences between the various technologies.	1	2	3	4	5
I will be able to make better decisions regarding technologies in my job.	1	2	3	4	5

What specific recommendations would you provide for the text? \_\_\_\_\_

\_\_\_\_\_

What specific recommendations would you provide for the visuals? \_\_\_\_\_

\_\_\_\_\_

What specific recommendations would you provide for the notes? \_\_\_\_\_

\_\_\_\_\_

Please give specific positive comments on the topic/module. \_\_\_\_\_

\_\_\_\_\_

## **Technology Overview Additional Materials**

Another file in this folder (Technology Overview Slide Catalog) contains pictures, diagrams, and schematics of the different technologies discussed in this module. The instructor may want to use other pictures as part of the PowerPoint presentation than those currently included. The instructor also can add his/her own pictures to this catalog.

The graphics are organized in the same way the technologies are organized – Use Strategies, Collection and Transmission Components, Pretreatment Components, Application/Distribution Components, and Final Treatment/Dispersal Components. Most of the slides contain information on the source of the graphic. Some contain other information explaining the graphic.