

## Basic Introduction - Need to Know

### I. The Professional will understand the state, federal and local regulations related to septic systems.

#### A. State Programs

1. Minn. Stat. 115.55 and 115.56
  - a. Minnesota Pollution Control Agency Chapter 7080
    - (1) Technical requirements
      - (a) Demonstrate knowledge of definition, application and design limitations of different types of systems.
        - (i) Standard systems
        - (ii) Alternative systems
        - (iii) Other systems
        - (iv) Performance systems
        - (v) Warrantied
      - (2) Licensing Requirements
        - (a) Types of licenses
          - (i) Type 4 biosolids
          - (ii) Pumper septage
            - a. Training
            - b. Exams
            - c. Bond and insurance
            - d. Experience
            - e. Exemptions
            - f. Registration vs. Licensing
      - b. Minnesota Rules Chapter 7001 and 7050
        - (1) Covers systems over 10,000 gpd and those that surface discharge
          - (a) NPDES permit –surface discharge
          - (b) SDS permit – over 10,000 gpd subsurface discharge
    2. Minnesota Department of Health
      - a. Minnesota Rules Chapter 4715 and 4725
      - b. Plumbing Code administered by Minnesota Department of Health, Well Management Section.
        - (1) Plumbing code enforced where code has been locally adopted or in cities over 5,000
          - (a) Covers from home to septic tank
    3. Minnesota Department of Labor and Industry
      - a. Minnesota Rules Chapter \_\_\_\_\_??
      - b. Well Code administered by Minnesota Department of Labor and Industry, Construction Services Division, Engineering and Plumbing Unit.
        - (1) Well code statewide and sets setbacks for wells and ISTS
        - (2) Source water protection program
      - c. Sets definition of food, beverage and lodging establishment
      - d. Reviews ISTS designs for health care facilities
      - e. Does not review ISTS for food, beverage & lodging establishments
    4. Minnesota Department of Natural Resources

- a. Shoreland regulations
      - (1) Defines where shoreland is and setback distances
    - b. Floodplain designation
  - 5. Board of Soil and Water Resources
    - a. Wetland program
  - 6. Minnesota Department of Transportation
    - a. Vehicle requirements
  - 7. Gopher One
    - a. “Call before you dig”
  - 8. Department of Commerce
    - a. License boiler operators
  - 9. Occupation Safety and Health (OSHA)
- B. Federal Requirements
- 1. Class V system designation
    - a. Inventory forms
    - b. Restricts use of cesspools and floor drains from motor vehicle repair facilities
  - 2. Management guidelines
  - 3. Federal septage land application requirements 40CFR 503
    - a. At the state level the 40CFR 503 are applicable requirements that licensees must follow
- C. Local ordinances
- 1. More or less restrictive than Chapter 7080
    - a. Alternative local standards
  - 2. Must be protective of public health and the environment
  - 3. Cities and towns must be as restrictive as county
  - 4. Working in areas with no ordinance
  - 5. Permitting and inspection requirements

**II. The Professional will understand the general sewage treatment process with septic systems.**

- A. System performance
  - 1. Treatment
  - 2. Acceptance
  - 3. Treatment vs. just getting rid of the sewage
- B. Program performance
  - 1. Management
  - 2. Administration
  - 3. Performance code requirements
- C. General Treatment of Sewage
  - 1. Waste reduction
  - 2. Separation
    - a. Settling
    - b. Floating
  - 3. Screening
  - 4. Filtration
  - 5. Soil treatment

- a. Unsaturated flow
- b. Surface area/negative charges
- c. Oxygen
- d. Soil bacteria
- e. Pathogen removal
- f. Nutrient removal
- g. Chemical removal

### **III. The Professional will understand compliance criteria for septic systems.**

#### **A. Definitions**

- 1. Compliance inspection
  - a. Compliant
  - b. Non-compliant
    - (1) Failing
    - (2) Imminent public health threat
    - (3) Upgrade or repair time periods
  - c. Certificate of compliance/notice of non-compliance
  - d. Administrative requirements
  - e. Reporting
- 2. Disclosure
  - a. State requirement at property transfer

### **IV. The Professional will understand basic wastewater characteristics.**

#### **A. Wastewater sources**

- 1. Domestic
  - a. Only household type waste
- 2. Non-domestic
  - a. Not household waste or non-household mixed with domestic

#### **B. Hydraulics**

- 1. Dwelling
  - a. Sources
  - b. Non sewage sources
    - (1) Water treatment device
      - (a) Softner
      - (b) Iron filter
      - (c) Reverse osmosis
    - (2) Condensate lines from high efficiency furnaces
    - (3) Drain tile
  - c. Design flow determination
    - (1) Definition
    - (2) Estimated amounts
    - (3) Bedroom identification
      - (a) Final call on bedroom designation is the local building official.
    - (4) Home size
    - (5) Appliances

- d. Measured flow
  - (1) Methods
  - (2) Application
- 2. From an other establishment
  - a. Definition
  - b. Average
    - (1) Definition
    - (2) Application
  - c. Maximum
    - (1) Definition
    - (2) Application
  - d. Methods
    - (1) Estimation
    - (2) Measured
- 3. Waste Strength Components
  - a. Biochemical oxygen demand (BOD)
    - (1) Understand measurement and typical values
    - (2) Understand how it impacts systems
  - b. Total Suspended Solids (TSS)
    - (1) Understand measurement and typical values
    - (2) Understand how it impacts systems
  - c. Fats, Oils and Grease (FOG)
    - (1) Understand measurement and typical values
    - (2) Understand how can impact systems
- 4. Other components of wastewater
  - a. Bacteria and viruses
    - (1) Definition
    - (2) Fecal Coliform
  - b. Nitrogen
    - (1) Definition
    - (2) Treatment
      - (a) Ammonia and nitrate
  - c. Phosphorus
    - (1) Definition
    - (2) Treatment
  - d. Chemicals
    - (1) Additives
    - (2) Pharmaceuticals
    - (3) Household chemicals
    - (4) Hazardous waste
      - (a) Illegal drug production

**V. The Professional will understand a basic level soil terminology.**

- A. Soil definitions
  - 1. Bedrock

2. Texture
3. Structure
4. Consistence
5. Pores
6. Permeability
7. Color
  - a. Mottles
  - b. Redoximorphic features
8. Soil profile
9. Soil horizons
10. Soil morphology

**VI. The Professional will generally understand the steps in a site evaluation to identify basic site characteristics.**

- A. Overview of site evaluation process
  1. Purpose
  2. Overview of requirements
  3. Form
- B. Preliminary Evaluation
  1. Soil survey and geologic atlases
    - a. Soil types
      - (1) Drainage classification
      - (2) Soil types
      - (3) Slopes
      - (4) Water table depths
      - (5) Permeability
- C. Property Limitations
  1. Setbacks
  2. Lot line verification (survey)
  3. Easements
    - a. Road right -of -ways
    - b. Utility easements
    - c. Property lines
    - d. Dwellings
    - e. Lakes, rivers, streams
    - f. Wells
  4. Ownership
- D. Field Evaluation
  1. Landscape position
    - a. Flooding
  2. Slope
    - a. Slope determination
    - b. Benchmark
    - c. Contours
    - d. Position
    - e. Shape

3. Vegetation
4. Soil sizing factor
  - a. Soil texture
  - b. Soil structure
  - c. Percolation rate
5. Limiting layer identification
  - a. Saturated soils
    - (1) Soil color determination
    - (2) Soil color implications
  - b. Bedrock
  - c. Other restricting soil conditions
6. Proper protection of tested area
  - a. Caution tape vs. silt/snow fence

**VII. The Professional will understand the definitions and applications of typical septic system technologies.**

- A. Overall system overview
    1. Cluster
    2. Individual
  - B. Plumbing and collection
    1. Definition
    2. Basement sump, grinder pumps, effluent pumps
    3. Building sewer
      - a. Definition and description
      - b. Rule requirements
      - c. Purpose and application
      - d. Design basis and operational theory
      - e. Management
        - (1) Techniques to prevent freezing
          - (a) Minimize length
          - (b) Insulate sewer line
          - (c) Eliminate traffic or no traffic
          - (d) Maximize depth
          - (e) Proper slope
          - (f) Proper pipe bedding and compaction
          - (g) Installation of clean outs for mitigation
        - (2) Setbacks
- C. Separation technologies
  1. Definition and description
  2. Rule requirements
  3. Purpose and application
  4. Design basis and operational theory
  5. Management
- D. Holding Tanks
  1. Definition and description
  2. Rule requirements

- a. Setbacks
  - b. Contract required
- 3. Purpose and application
- 4. Design basis and operational theory
- 5. Management
- E. Septic Tank
  - 1. Definition and description
  - 2. Rule requirements
    - a. Materials
    - b. Baffles
    - c. Effluent screens and alarms
    - d. Manholes
    - e. Covers
    - f. Setbacks
    - g. Insulation
    - h. Depth
  - 3. Purpose and application
  - 4. Design basis and operational theory
  - 5. Management
- F. Flammable Waste Traps and their applications
- G. Aerobic Treatment units
  - 1. Definition and description
  - 2. Rule requirements
  - 3. Purpose and application
  - 4. Design basis and operational theory
  - 5. Management
- H. Media filters
  - 1. Definition and description
  - 2. Rule requirements
  - 3. Purpose and application
  - 4. Design basis and operational theory
  - 5. Management
- I. Constructed Wetland Systems
  - 1. Definition and description
  - 2. Rule requirements
  - 3. Purpose and application
  - 4. Design basis and operational theory
  - 5. Management
- J. Distribution of effluent
  - 1. Gravity distribution
    - a. Definition and description
      - (1) Serial - drop boxes
      - (2) Parallel -distribution boxes
    - b. Rule requirements
    - c. Purpose and application
    - d. Design basis and operational theory
    - e. Management

2. Pressure distribution
    - a. Definition and description
      - (1) Laterals
    - b. Rule requirements
    - c. Purpose and application
    - d. Design basis and operational theory
    - e. Management
    - f. Slope restrictions
  3. Pumping systems
    - a. Lift stations
    - b. Definition and description
      - (1) Manhole specifications
      - (2) Pump selection and general sizing
      - (3) Controls and panels
      - (4) Alarm
      - (5) Dose volume
        - (a) Setting floats
      - (6) Dosing frequency
      - (7) Serviceability of pump and floats
    - c. Rule requirements
    - d. Purpose and application
      - (1) Gravity
      - (2) Pressure
    - e. Design basis and operational theory
    - f. Management
  4. Supply pipes
    - a. Definition and description
    - b. Rule requirements
    - c. Techniques to prevent freezing
      - (1) Pipe selection
      - (2) Length of pipe
      - (3) Pipe support
    - d. Purpose and application
    - e. Design basis and operational theory
    - f. Management
    - g. Setbacks
  5. Drip
    - a. Definition and description
    - b. Rule requirements
    - c. Purpose and application
    - d. Design basis and operational theory
    - e. Management
- K. In-ground systems
1. Definition and description
  2. Trenches
  3. Seepage Beds
  4. General Specifications

5. Media choices
  - a. Rock/Geotextile
  - b. Chambers
  - c. Gravelless pipe
  - d. Others
6. Rule requirements
  - a. Geometry (Width and depth)
  - b. Location
    - (1) Setbacks
    - (2) Slope restrictions
  - c. Purpose and application
  - d. Design basis and operational theory
  - e. Management
- L. Above ground systems
  1. At-grades
    - a. Definition and description
      - (1) General Specifications
      - (2) Rock/Geotextile
      - (3) Rule requirements
        - (a) Geometry (Width and depth)
        - (b) Absorption width
        - (c) Location
        - (d) Setbacks
        - (e) Slope restrictions
        - (f) Cover material and depth
    - b. Purpose and application
    - c. Design basis and operational theory
    - d. Management
  2. Mounds
    - a. Definition and description
      - (1) General Specifications
      - (2) Distribution
        - (a) Rock/Geotextile
        - (b) Treatment
  3. Sand
    - a. Rule requirements
      - (1) Geometry (width and depth)
      - (2) Location
      - (3) Setbacks
      - (4) Absorption width
      - (5) Cover material and depth
    - b. Purpose and application
    - c. Design basis and operational theory
    - d. Management

**VIII. The Professional will understand the definition and requirements for system abandonment**

- A. Tanks
  - 1. Pumping
  - 2. Crushing and filling
- B. Soil treatment system

**IX. The Professional will understand the general concept of management and that each system needs proper management and the Professionals involved.**

- A. Purpose of management
- B. Management programs
- C. Individual management plans
  - 1. Pumping frequency
  - 2. General safety
  - 3. Removal techniques
  - 4. System monitoring
- D. General land application principals

**X. The Professional must have general math skills.**

- A. Add, subtract, multiply and divide
  - 1. Slope
  - 2. Unit conversion
  - 3. Metric vs. English
- B. Basic algebra/geometry
- C. Graphing (pump curves)

**XI. Trouble shooting**

- A. Common Problems
  - 1. Hydraulics
  - 2. Strength
  - 3. Design
  - 4. Construction