

Module 1 – approximate duration – 30 minutes (0.5 CPEs)

Presented by Dr. Philip Brown, Extension Specialist in Soil Science and Septic System Education at Virginia Tech

Title: **Properties and Consequences of Using Shrink – Swell Soils for Onsite Sewage System**

Training Module content and objectives:

1. Shrink Swell Clay - Problem Definition
2. How do soils shrink and swell?
3. Why do shrink – swell soils effect onsite wastewater systems?
4. Case study survey for Alabama Black Belt soil

Module 2 - approximate duration – 60 minutes (1.0 CPEs)

Presented by Dr. Erik Severson, Ph.D., Director of the Onsite Wastewater Management Training Program at the North Carolina State University Crop and Soil Science Department and Cooperative Extension.

Title: **Why Do My Clays Shrink and Swell?**

Training Module content and objectives:

1. Shrink Swell Soils – Why Do We Care?
2. Where do Shrink Swell Soils Come From?
3. Clay Mineralogy
4. Identification with laboratory tests
5. Survey of case studies in Identification of shrink swell clays

Module 3 - approximate duration - 30 minutes (0.5 CPEs)

Presented by Dr. Ryan Stewart, Associate Professor in the School of Plant and Environmental Sciences at Virginia Tech

Title: **Water Flow In Saturated Soils**

Training module content and objective

1. Understanding relationship between water movement and energy
2. Concept of capillarity in water movement
3. Saturated vs unsaturated flow in soils
4. Darcy's Law
5. Saturated hydraulic conductivity (Ksats)

Module 4 - approximate duration - 30 minutes (0.5 CPEs)

Presented by Dr. Ryan Stewart, Associate Professor in the School of Plant and Environmental Sciences at Virginia Tech

Title: **Shrink Swell Soils: Characterization Methods**

Training module content and objectives

1. Shrink-swell (Vertic) soil, expansive soils
2. Characterization of shrink-swell soils – in the field and in the laboratory
3. Consistence, Rupture Resistance, Stickiness, and Plasticity as criteria
4. Estimating clay mineralogy using consistence and color
5. Slickensides
- 6 Atterberg Limits and Plasticity Index (PI)
7. Vapor Sorption and Coefficient of Linear Extensibility (COLE)
8. Soil Shrinkage Curve

Module 5 – approximate duration – 30 minutes (0.5 CPEs)

Presented by Dr. Ryan Stewart, Associate Professor in the School of Plant and Environmental Sciences at Virginia Tech

Title: Shrink Swell Soils: Physical and Hydraulic Properties

Training module content and objectives

1. Physical properties of clays (particle size, structure, etc.)
2. Cation Exchange Capacity (CEC)
3. Specific Surface Area
4. Clay swelling (rates, hydraulic properties)
5. Porosity and soil shrinkage curves
6. Dynamic Ksats and effect on infiltration and runoff

Module 6 – approximate duration – 60 minutes (1.0 CPEs)

Presented by Pamela Pruet, MAOSE, MASSO; Owner of Environmental System Consulting, LLC, current Chairperson of the Sewage Handling and Disposal Appeals Review Board and the Virginia Department of Professional and Occupational Regulation Board for Waterworks and Wastewater Works Operators

Title: Use of Permeameter Equipment to Analyze Saturated Hydraulic Conductivity in Shrink Swell Soils.

Training module content and objectives

1. Permeameters and regulatory requirements – general information and background.
2. Use in prediction of mounding
3. Permeameter Apparatus
4. Test holes - location and preparation
5. Factors affecting outcomes
6. Analytical solutions and significance of results
7. Offering attendees a practical perspective on Ksat testing

Module 7 – approximate duration – 30 minutes (0.5 CPEs)

Presented by Steve Thomas, LPSS, MAOSE, Technical Services Soil Scientist, Virginia Department of Health, Office of Environmental Health Services

Title: Water Movement Using Field Saturated Hydraulic Conductivity Tests (Ksat)

Training module content and objectives

1. Survey of Shrink swell soil locations in physiographic regions of Virginia
2. Movement of water along macropores – ped faces, and root channels, rock controlled structure
3. Lateral water flow when vertical flow inhibited by permeability restrictions
4. Identifying shrink swell soils in the field
5. Regulatory references to features restricting permeability and triggers for further evaluation
6. Research on shrink swell soils in Virginia with results and conclusions

Module 8 – Live Question and Answer Session with Instructors and Initial Attendees (approximate duration - 2 hours, 0 CPEs) – Optional

Recorded for later view viewing by later attendees