

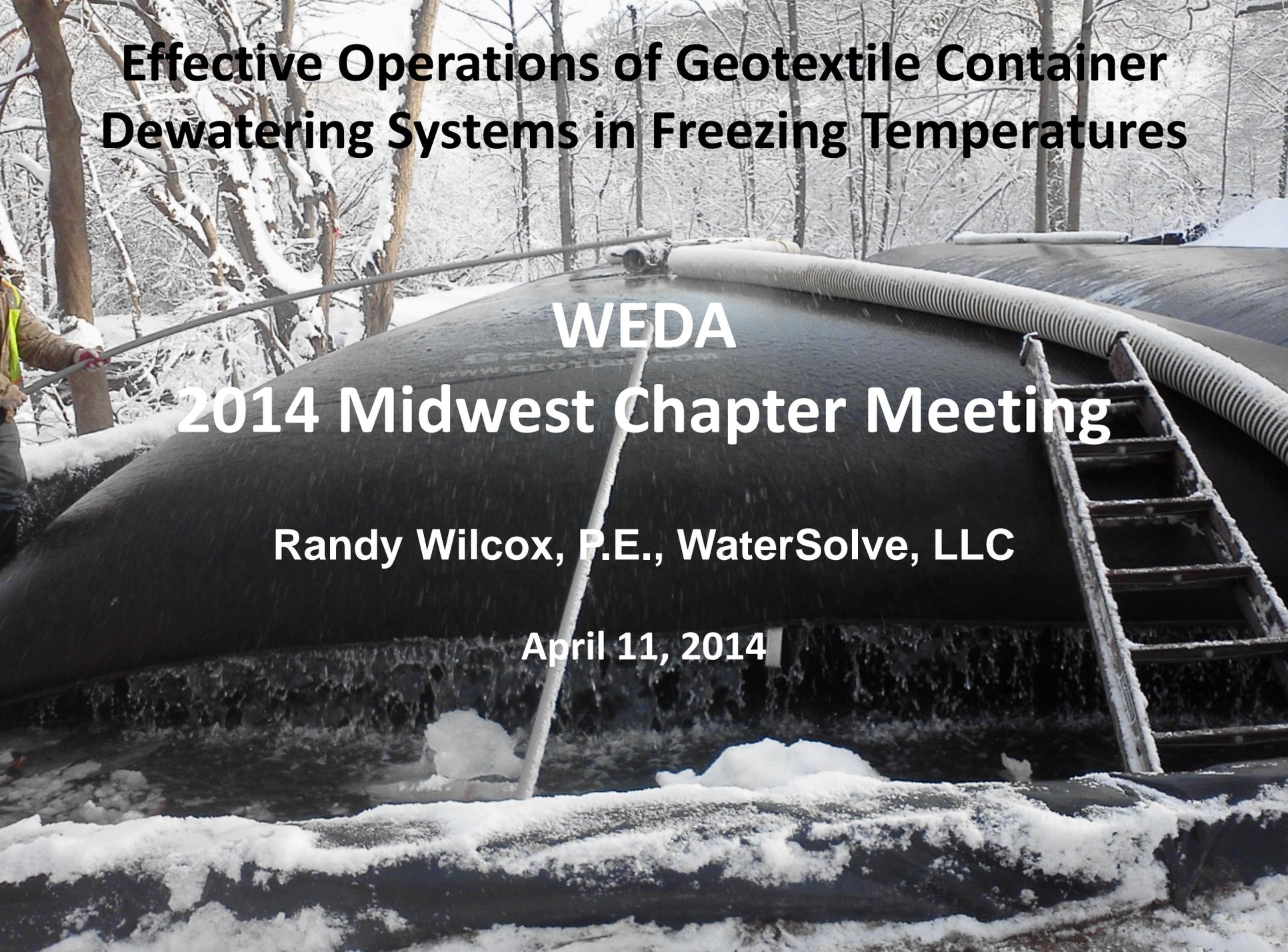
Effective Operations of Geotextile Container Dewatering Systems in Freezing Temperatures

WEDA

2014 Midwest Chapter Meeting

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Introduction

Freezing Temperatures Effects on...

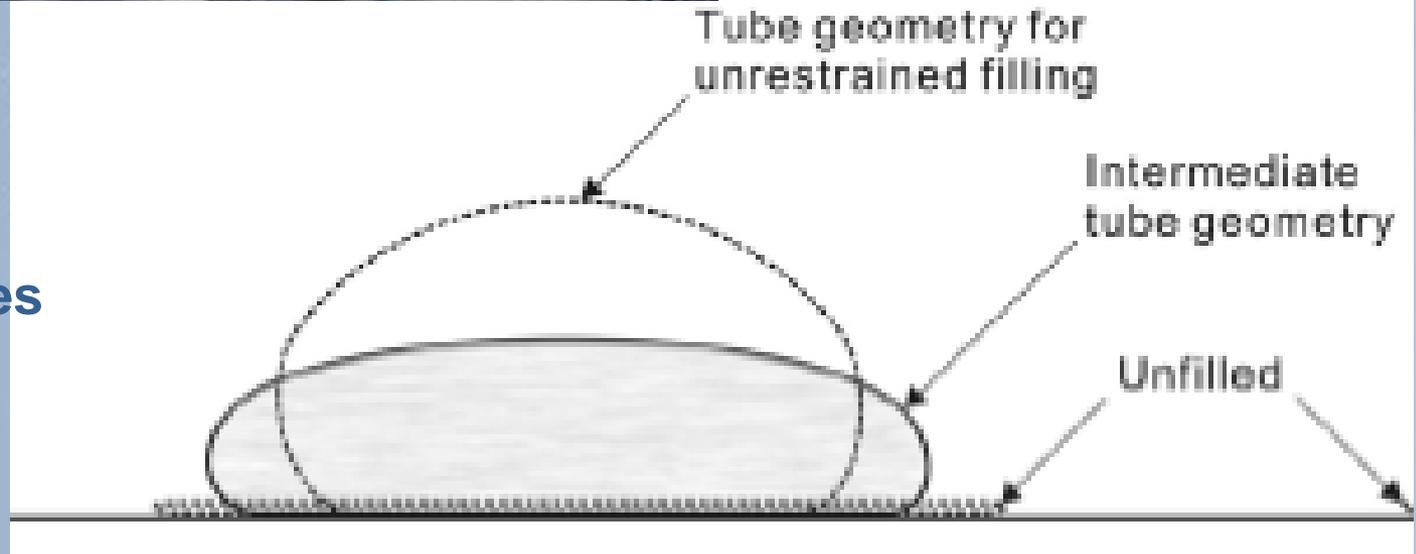
- **Geotextile Containers**
 - Freezing and Thawing
 - Fabric Stresses
- **Piping and Manifold Systems**
 - Draining Pipes
 - Valve Selection
- **Chemical Feed System**
 - Heated Enclosure Required
 - Polymer Efficiency
 - Polymer Make-down
 - Polymer Freezing
- **Filtrate Management**
 - Gravity Drainage Preferred
 - Pumping considerations
- **Working Conditions and Safety**
 - Slips, Trips and Falls
 - Personal Health Concerns
- **Recommendations**
- **Conclusion**

Geotextile Containers



Freezing and Thawing

Fabric Stresses



Piping and Manifold Systems

- Draining Pipes
- Valve Selection



Chemical Feed System

- Heated Enclosure Required
- Polymer Efficiency
- Polymer Make-down
- Polymer Freezing



Polymer Efficiency

1. Settling Rate

STOKE'S LAW: $v = 2Gr^2 (\rho - \rho_o) / 9\eta$

v = **SETTLING RATE**
G = **GRAVITATIONAL CONSTANT**
r = **RADIUS OF PARTICLE**
 ρ = **DENSITY OF PARTICLE**
 ρ_o = **DENSITY OF LIQUID**
 η = **VISCOSITY OF LIQUID**

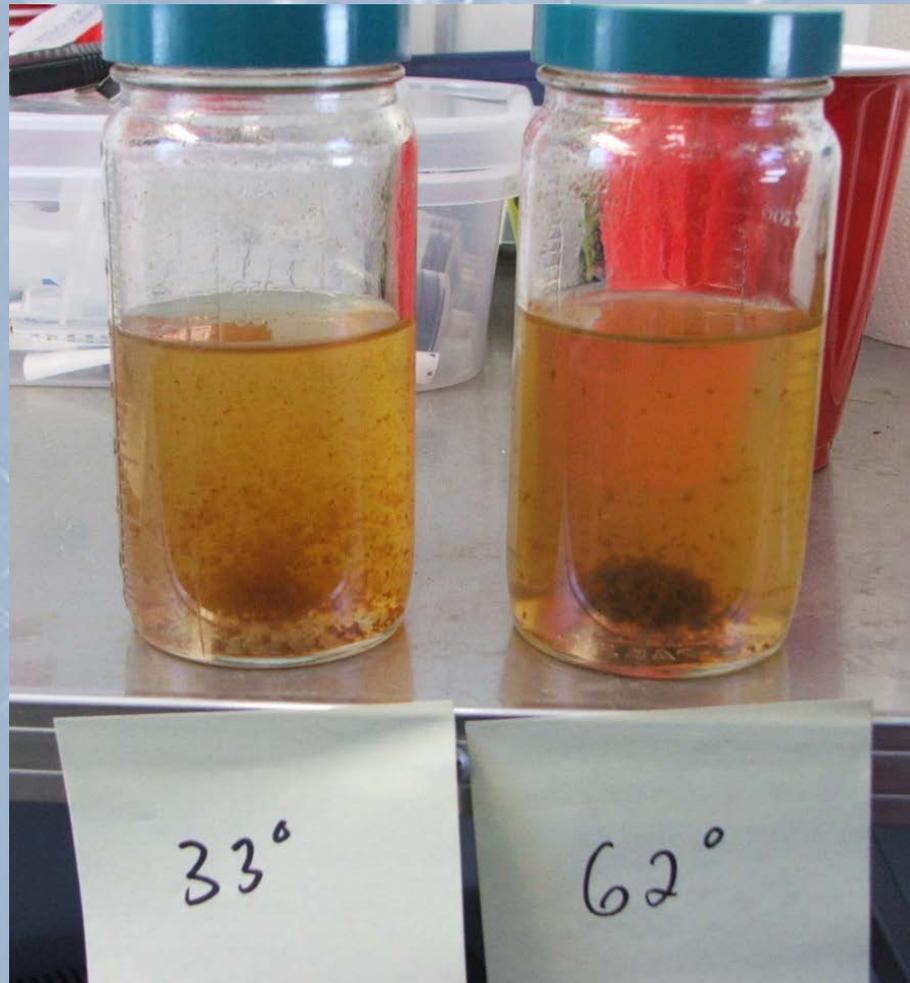
**HIGHER ρ , MEANS SLOWER SETTLING
IF $\rho > \rho_o$**

**HIGHER η MEANS SLOWER SETTLING
OR SLOWER FLOTATION**



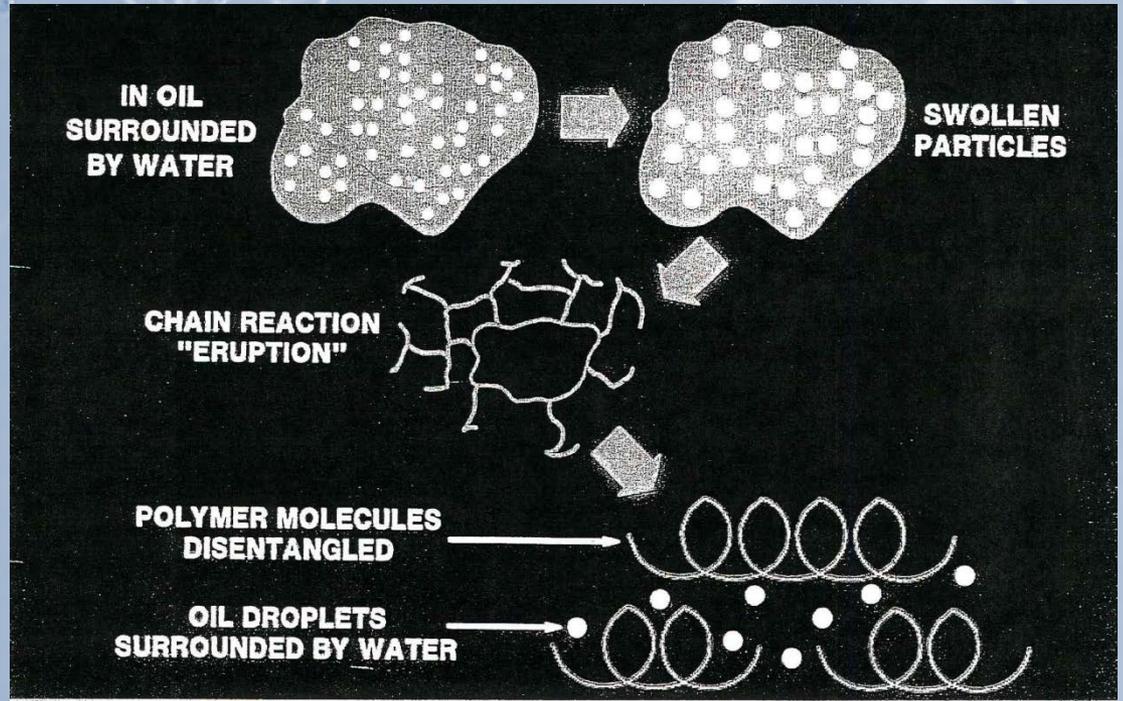
Polymer Efficiency

2. Adsorption Rate and Activity



Polymer Make-down

- Dissolution Rates of Polymer in Water Slower
- $> 10^{\circ}\text{C}$ Recommended for Emulsions
- 30°C Recommended for Dry Products



Polymer Freezing

- Emulsion Polymers Should be Protected From Freezing
- May Coagulate During Thawing
- Shipping Should Include Protection



Filtrate Management

- Gravity Drainage Preferred
- Pumping Considerations



Working Conditions and Safety

- Slips, Trips and Falls
- Personal Health Concerns



Winter Operation Recommendations



- ▶ Operations need to be staged and planned
- ▶ Cannot fill a tube with solids that are frozen, if the solids height is more than $\frac{1}{3}$ of the tube capacity
- ▶ During Winter months, may need to use several tubes, then top them off in the spring and summer months
- ▶ Use a heated structure
- ▶ Take extra time to work safely

Conclusion

Dredging and geotextile container dewatering operations in freezing temperatures are inherently difficult, but can be completed effectively and safely with the proper precautions and procedures.

Questions?

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