



# Reverse-Circulation Cementing and High Performance Geothermal Cements

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# Overview

## § Reverse Circulation Cementing

- Advantages of Reverse Circulation Cementing

- Challenges of Reverse Circulation Cementing

## § Geothermal Cements

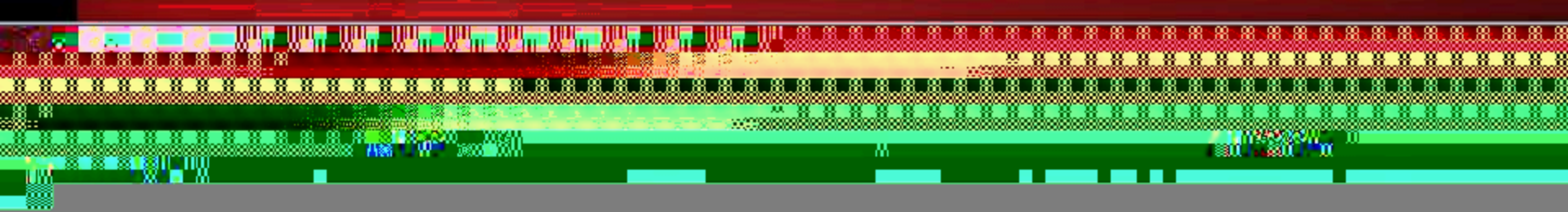
- Foamed Cement

  - Properties

- Latex Cement

- CaP Cement

## § Summary

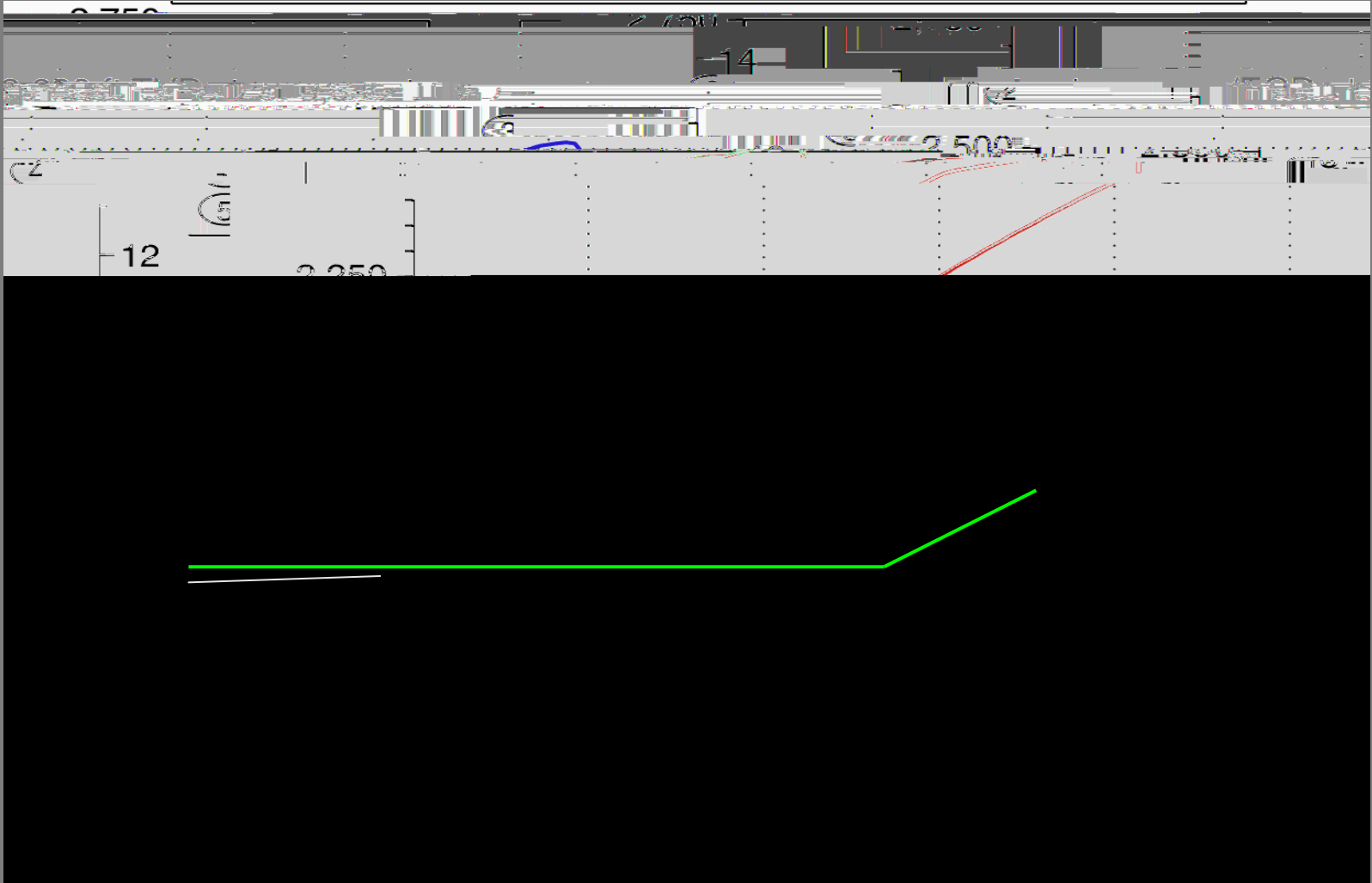


# Reverse Circulation Advantages

- Š Reduced ECD
- Š Reduced job pump time
- Š Shorter slurry thickening times



# Conventional vs. Reverse ECDs



# Reverse Circulation Challenges

- § Determining cement location
- § Rig up
- § Job design and execution
- § Float equipment
- § Experience

# Geothermal Cements

## Foamed Cement

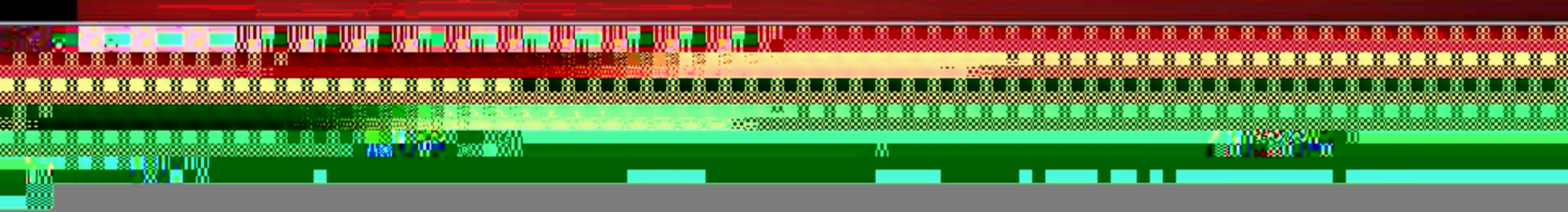




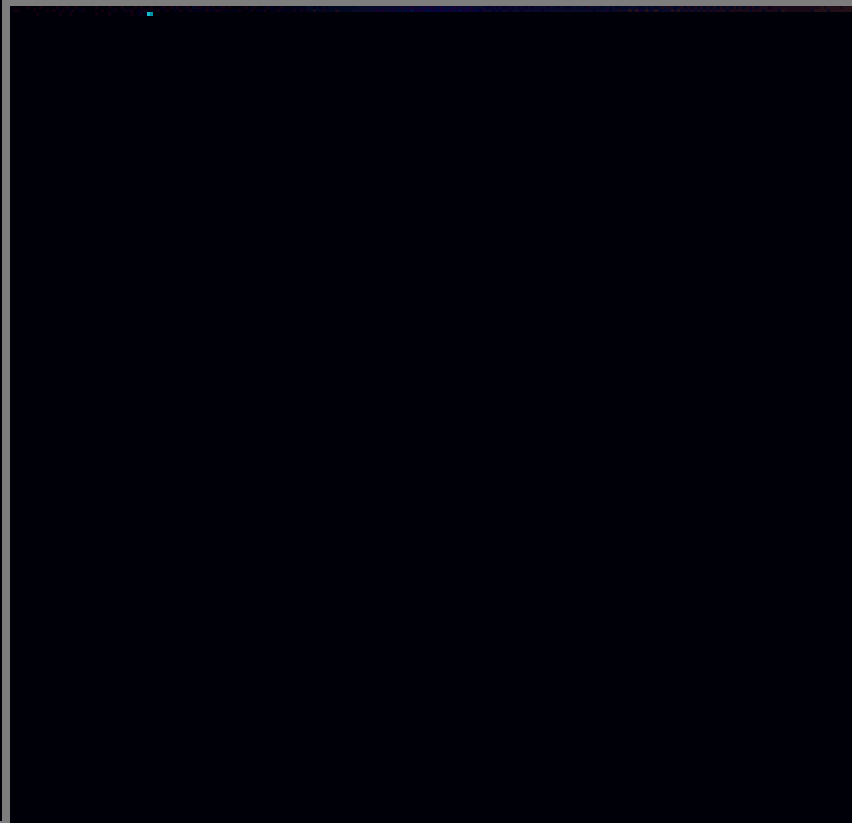
# Geothermal Cements

## Foamed Cement Properties

- § Light weight
- § Energized
- § Improved displacement
- § Ductily
- § Low fluid loss
- § No free water
- § Variable density
- § Gas migration control



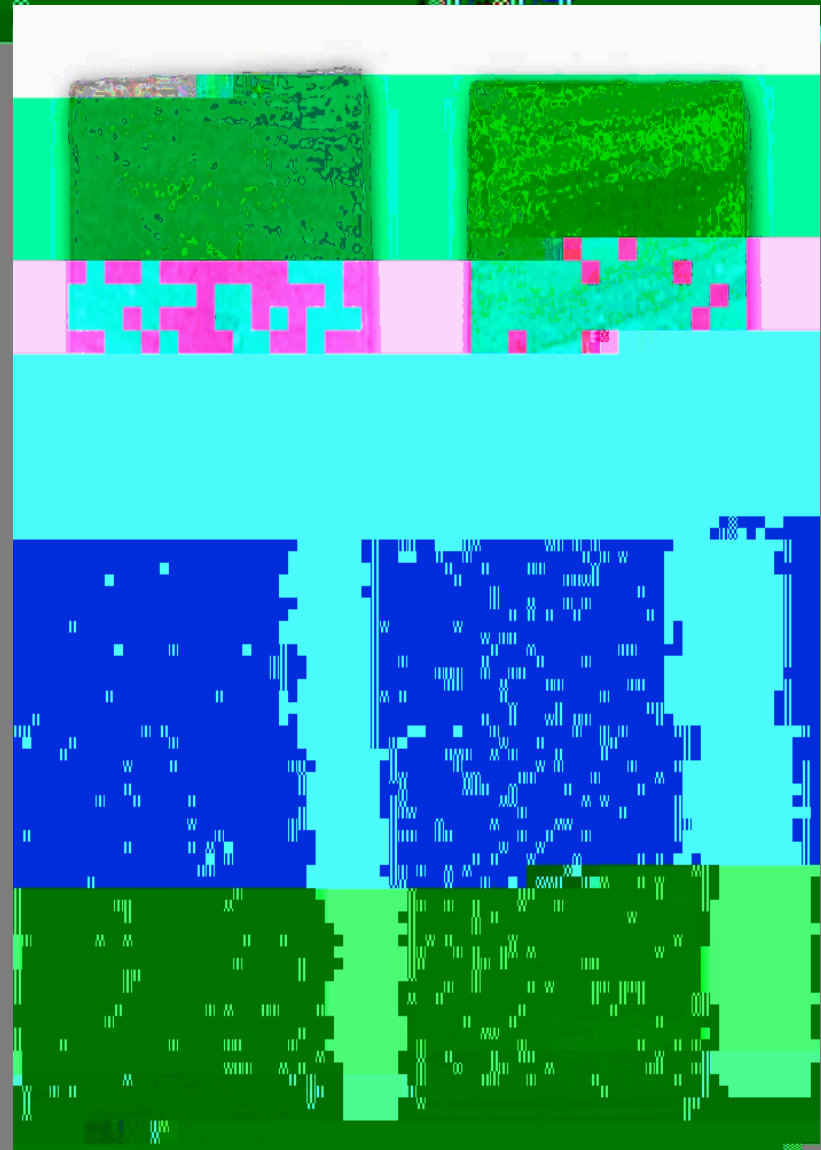
# Foamed Cement Properties



# Geothermal Cements

## Latex Cement

- Improved acid resistance
- Fluid-loss control
- Excellent wetting properties
- Improved bonding
- Increased resiliency
- Slows CO<sub>2</sub> attack



# CaP Cement (Calcium Aluminate Phosphate cement )

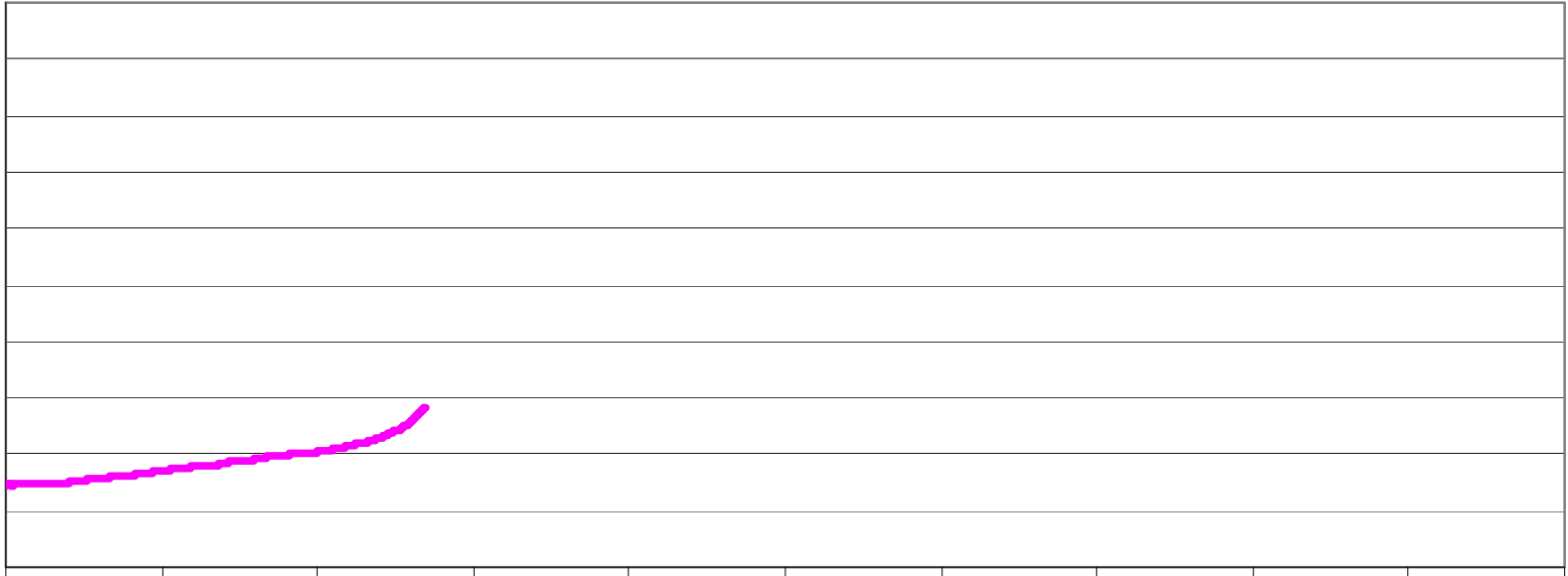
- § CO<sub>2</sub> resistant
- § Not subject to corrosion
- § Not subject to strength retrogression
- § Does not shrink
- § Good bonding properties
- § Tested @ 700 F

# Geothermal Cements





# Benefits of CaP Cement





# Summary

- § RCC is a viable option available to the geothermal industry
- § RCC is becoming a common and acceptable cementing technique
- § RCC can be the best method used to cement a well
- § RCC can increase the chances of achieving good zonal isolation
- § Mechanical properties of foamed cement may enhance the life of the well
- § Geothermal cements may reduce CO<sub>2</sub> attack effects