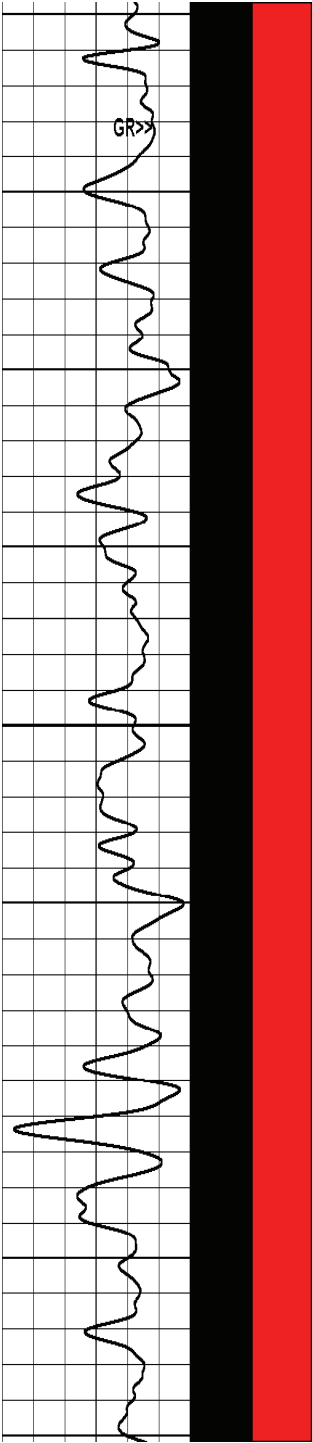
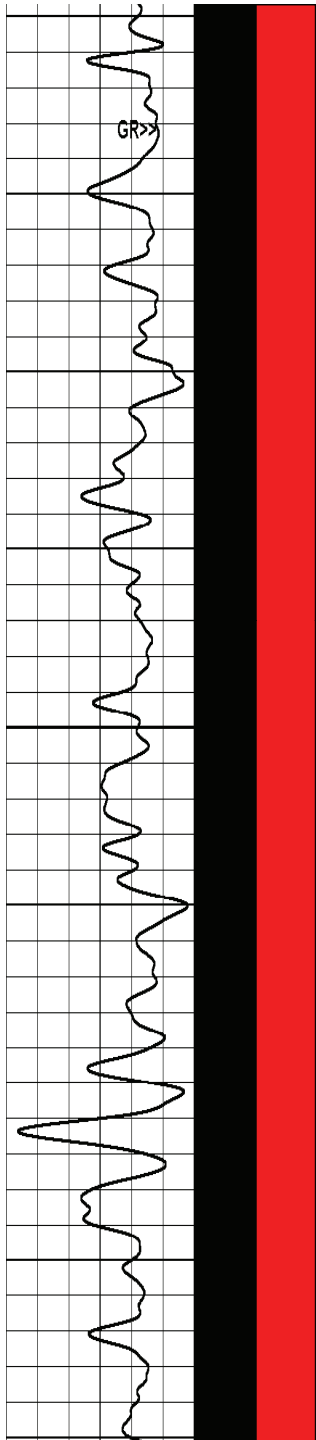




Use of Alternative Cement Formulations

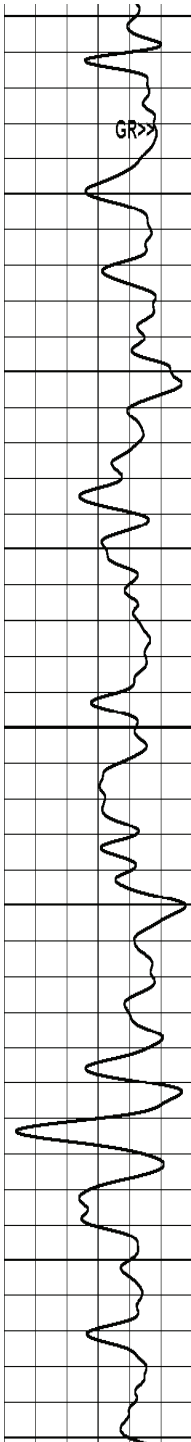
Don Getzlaf
Marty Stromquist
Cemblend Systems Inc.





Wellbore

Removing formation
Removing drill fluids
Replacing with
Casing and Cementing



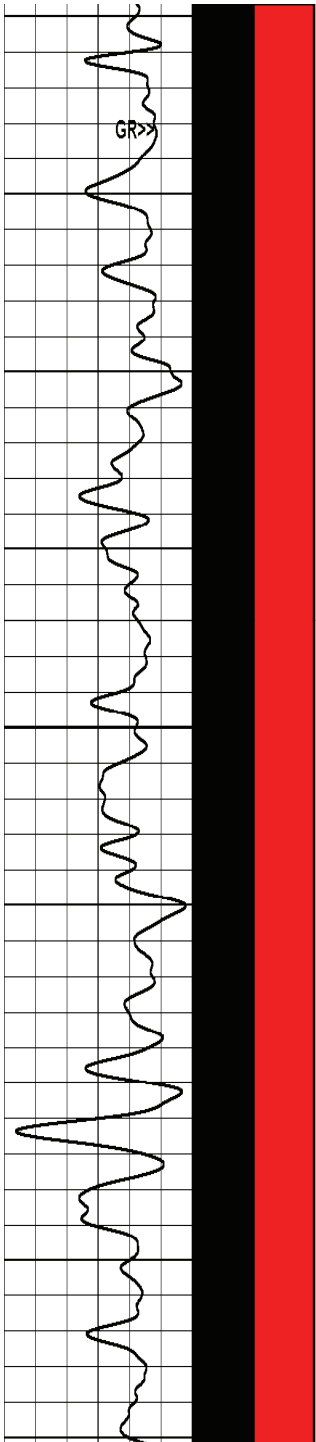
Cement History

Bentonite
Silica
Foams
Latex
Slag

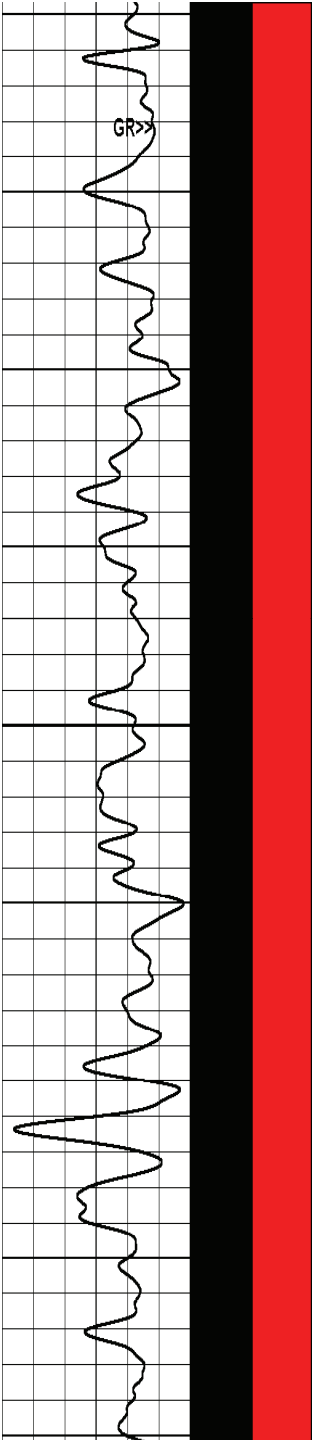
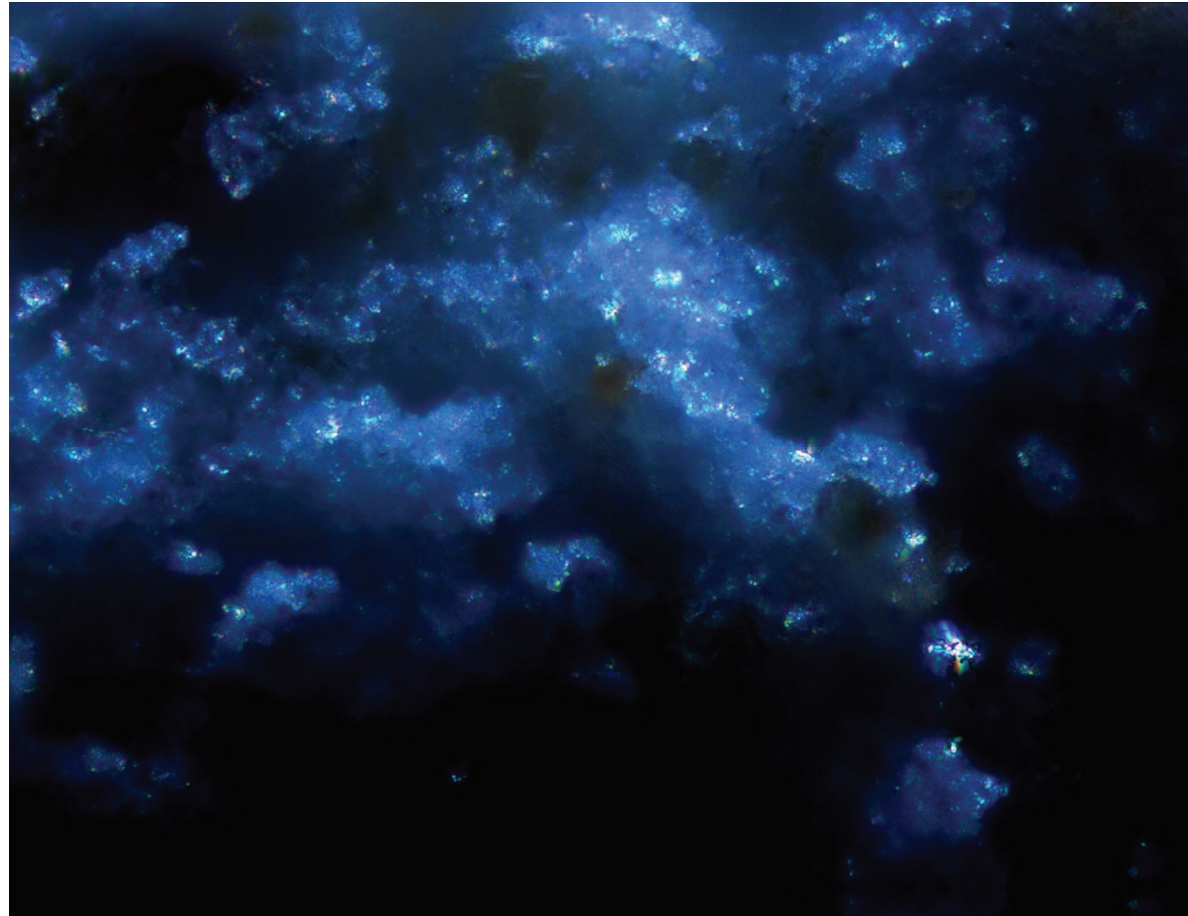


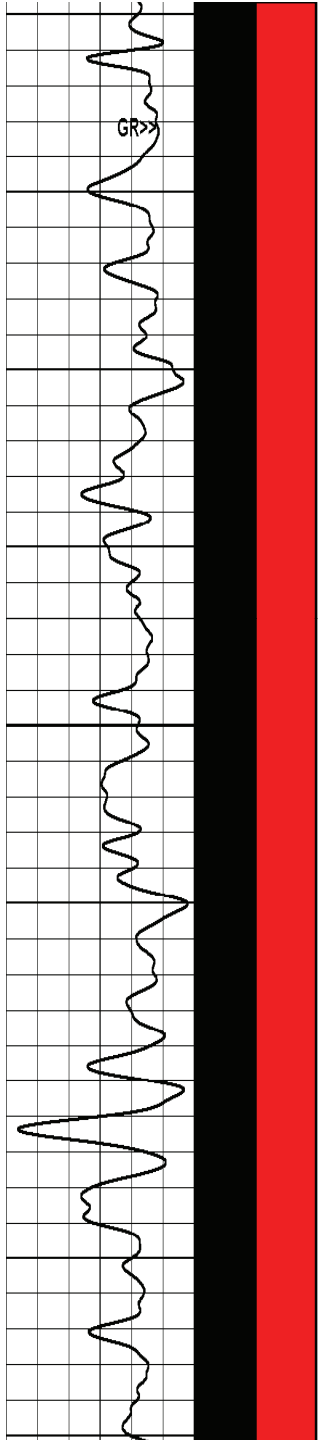
Flyash
Silicafume
Zeolites
Metakaolin
Beads

**Fondu
Plaster**



Chemically Bonded Phosphate Ceramics





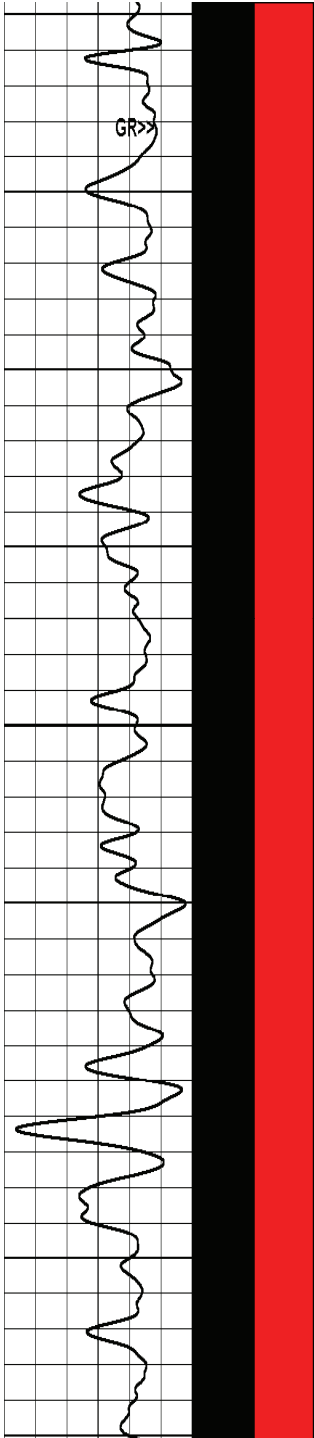
Development

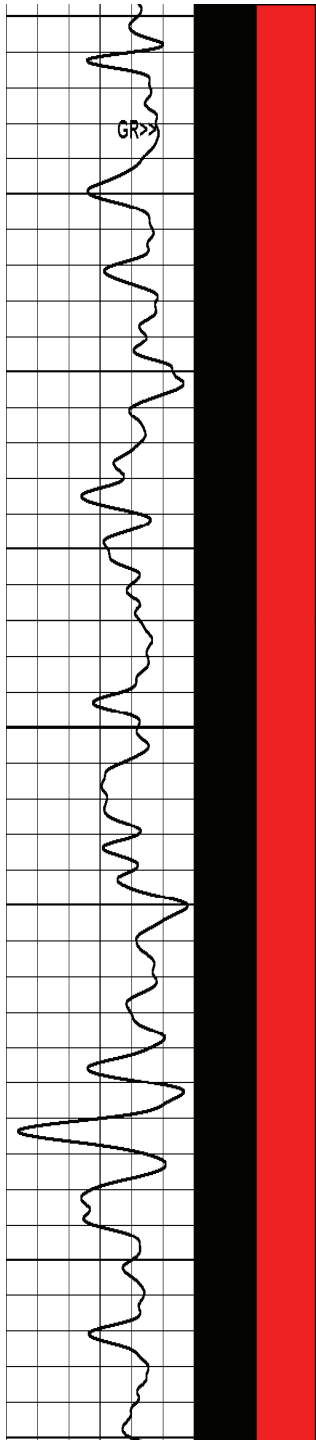
ARGONNE NATIONAL LAB
Developed for
Nuclear waste containment

Development

Argonne saw benefits in:

- Good mechanical properties
- Unleachable
- Does not degrade over time
- Neutral PH
- Incorporate organics



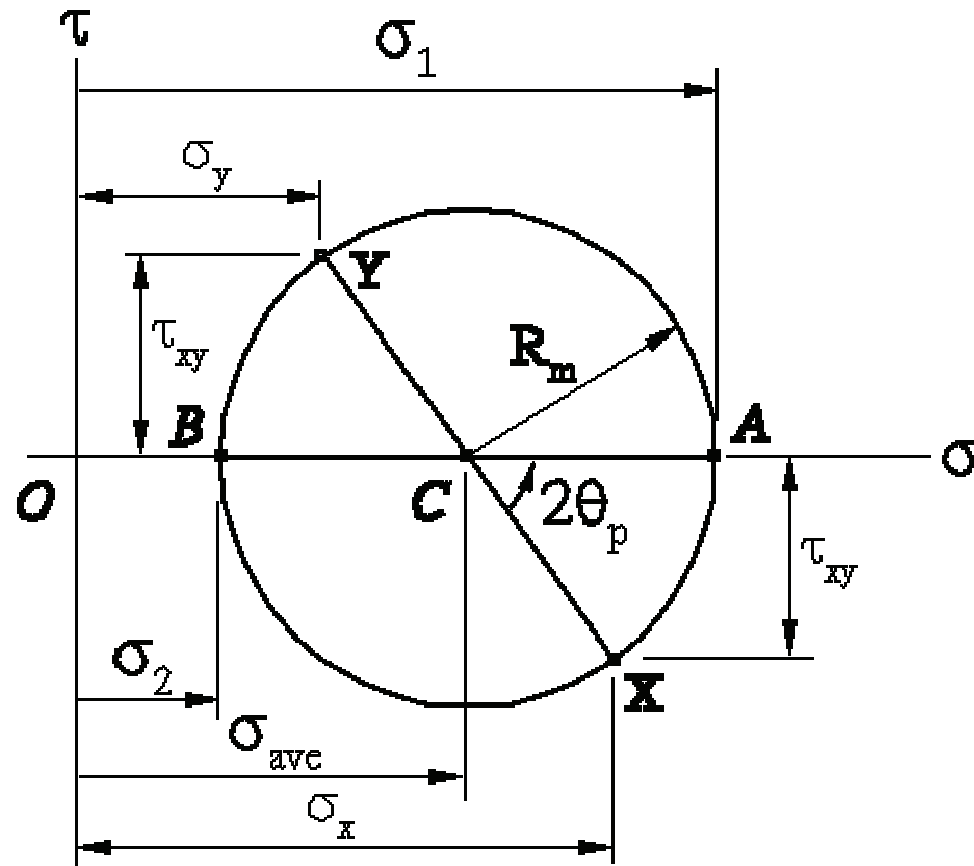


What we saw

Benefits in:

- Good mechanical properties
- Does not degrade over time
- Quick setting
- Incorporate organics (OBM)
- Covalent internal bond

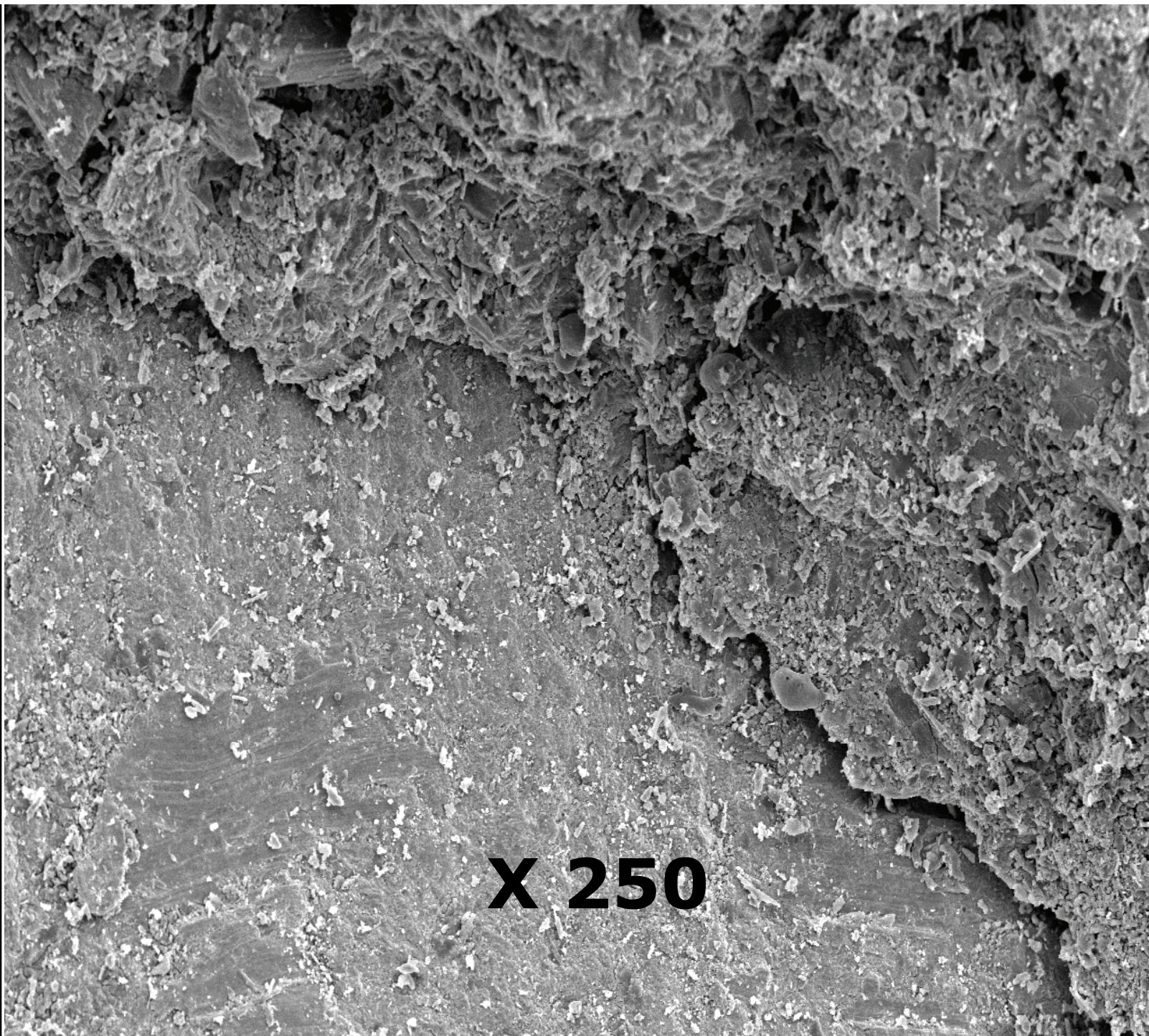
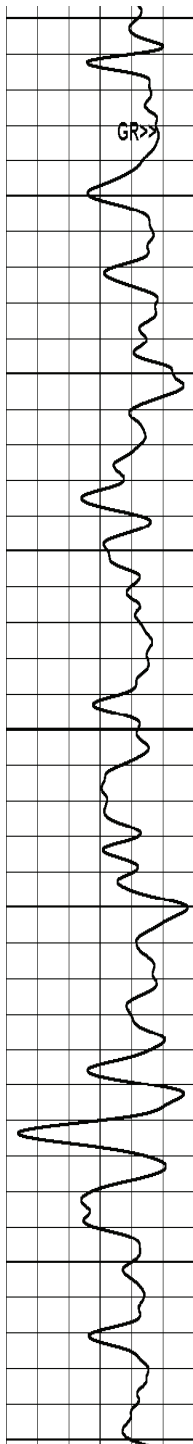
Mechanic Properties

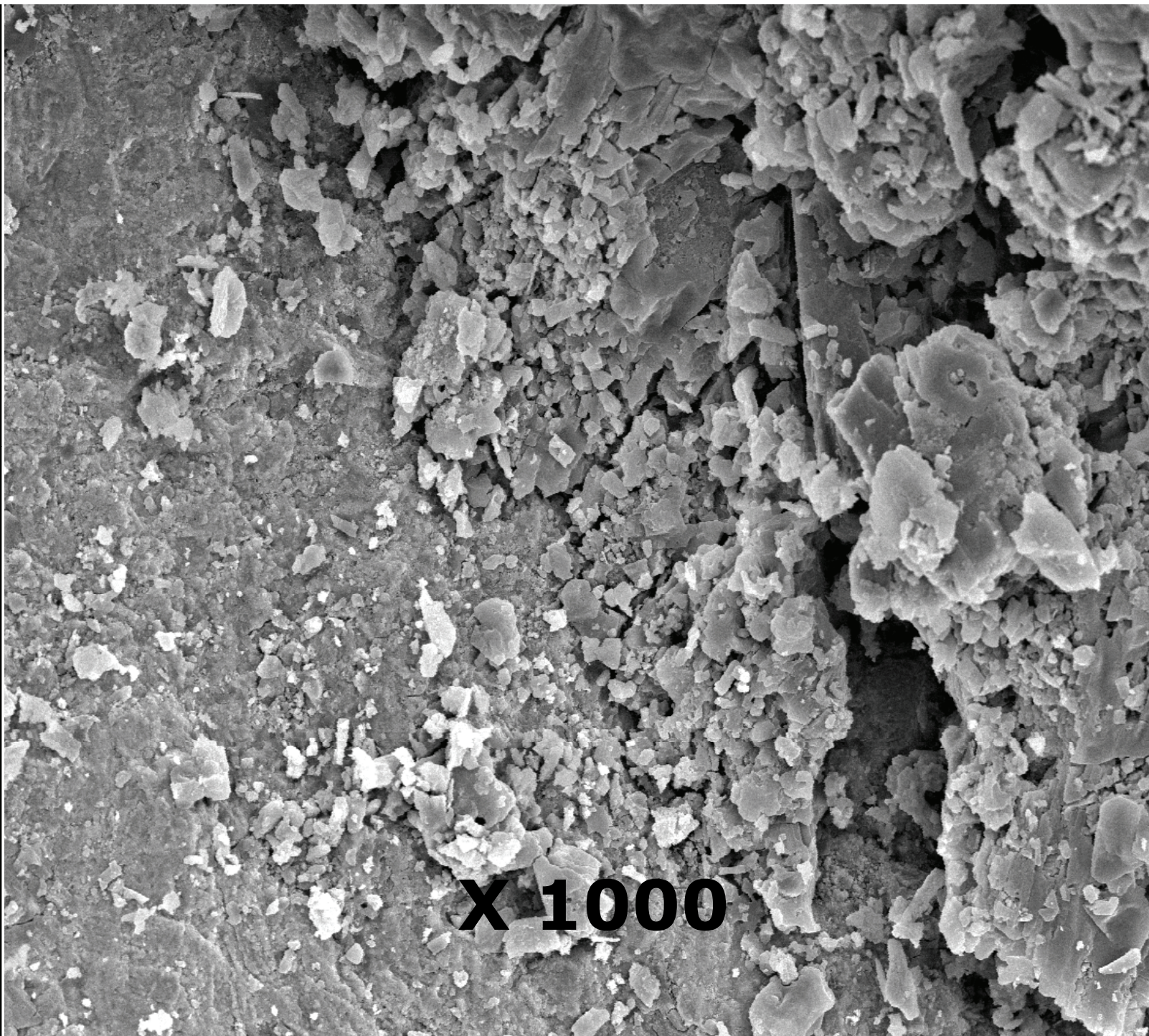
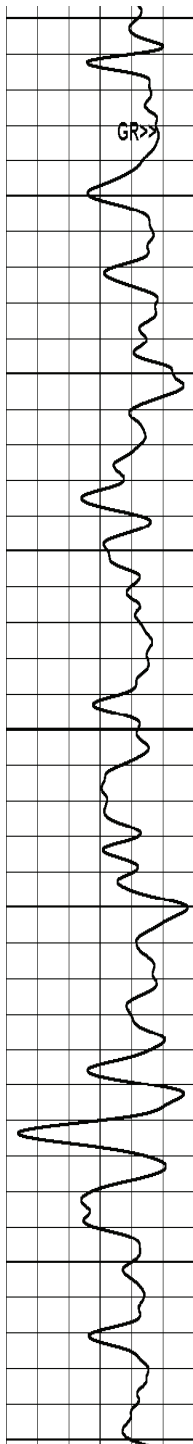


Bond Testing

**Bond tests between 20⁰ C and 315⁰ C are
Typically 3 – 5 times higher then Portland.**

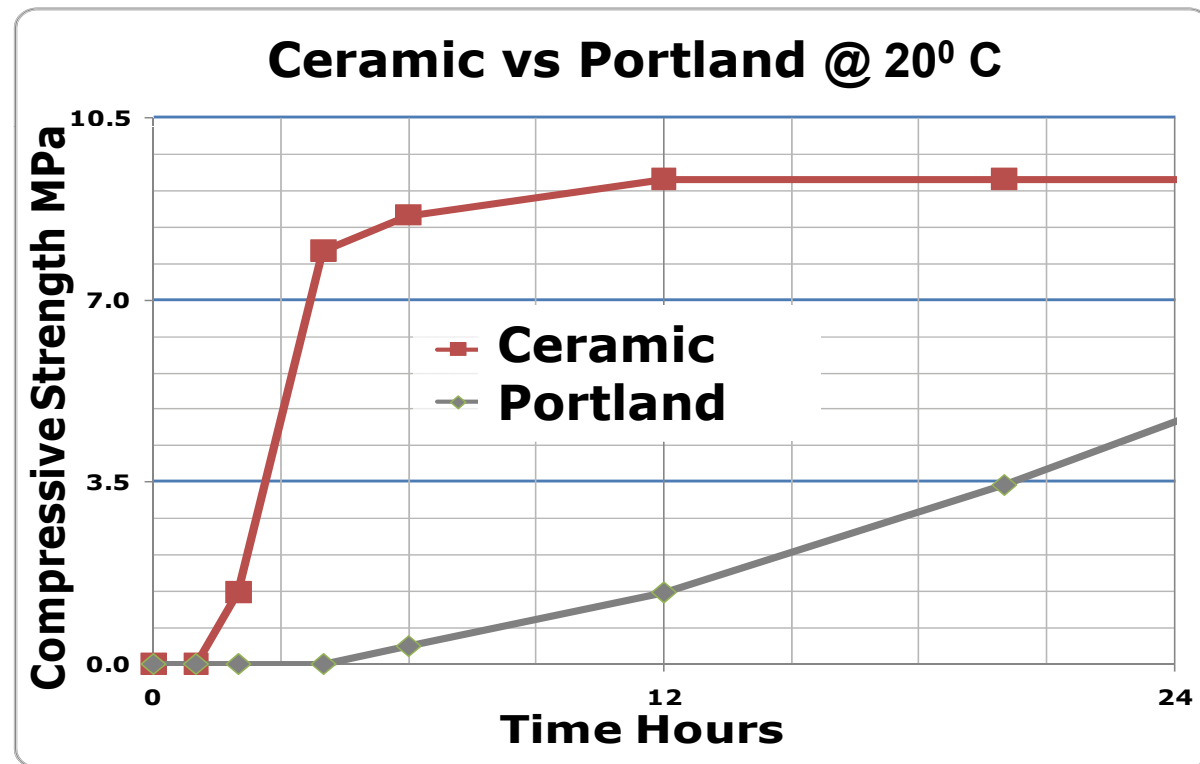


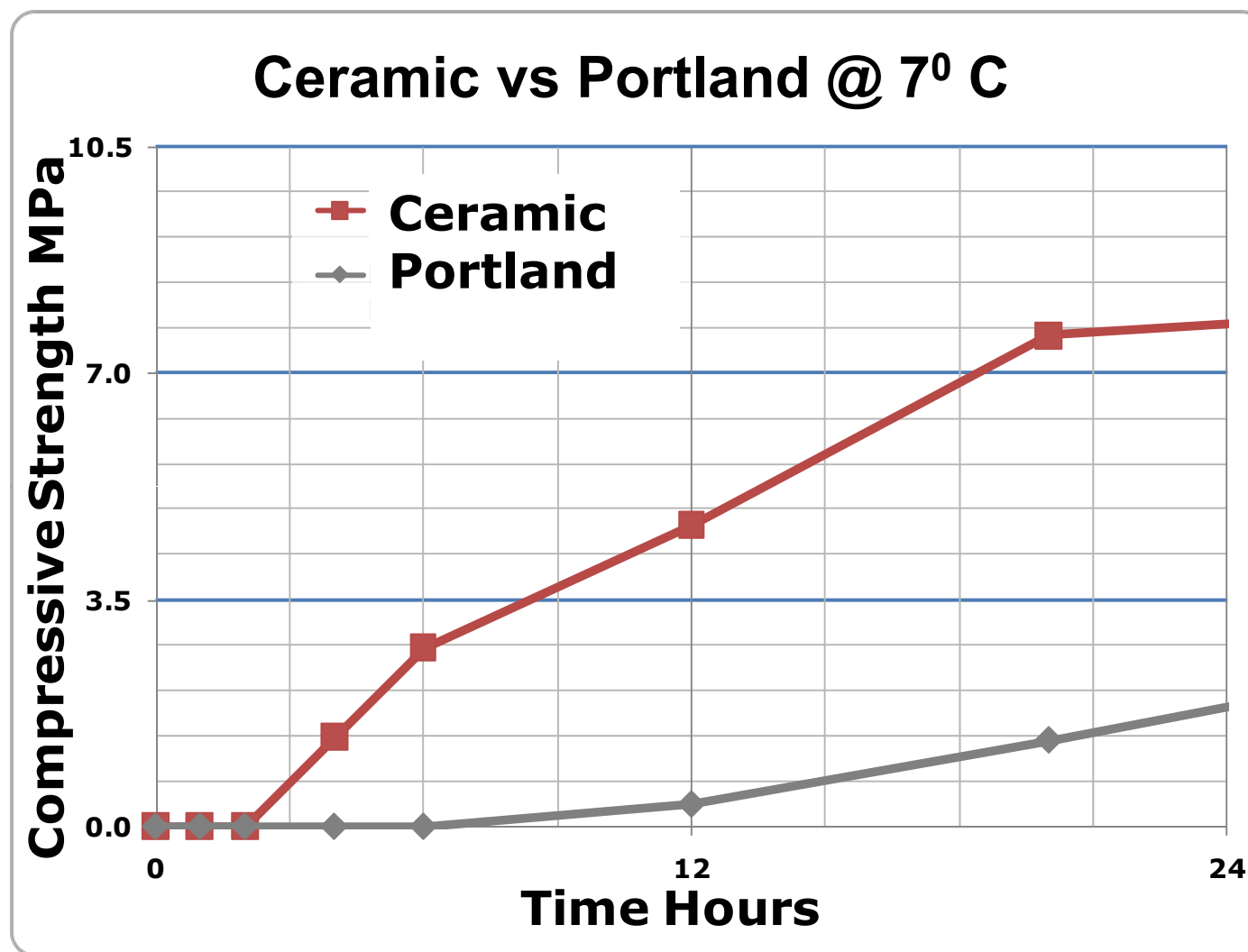
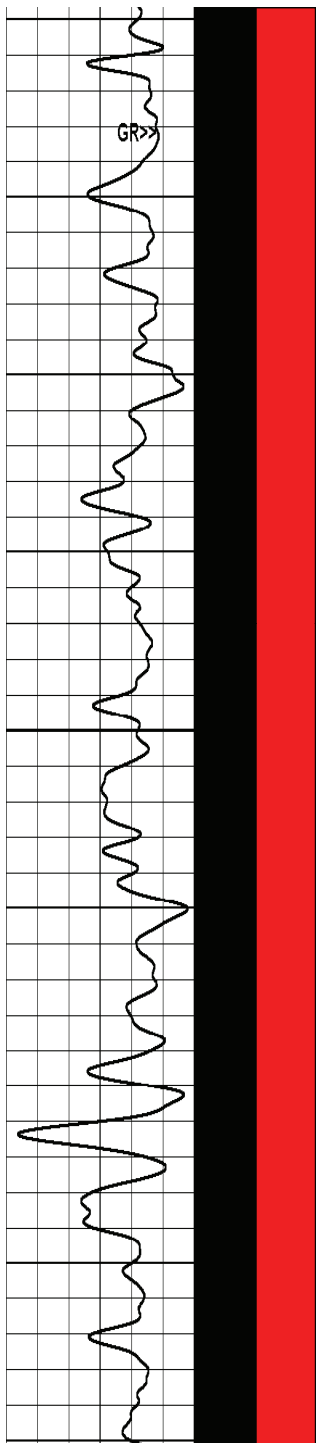




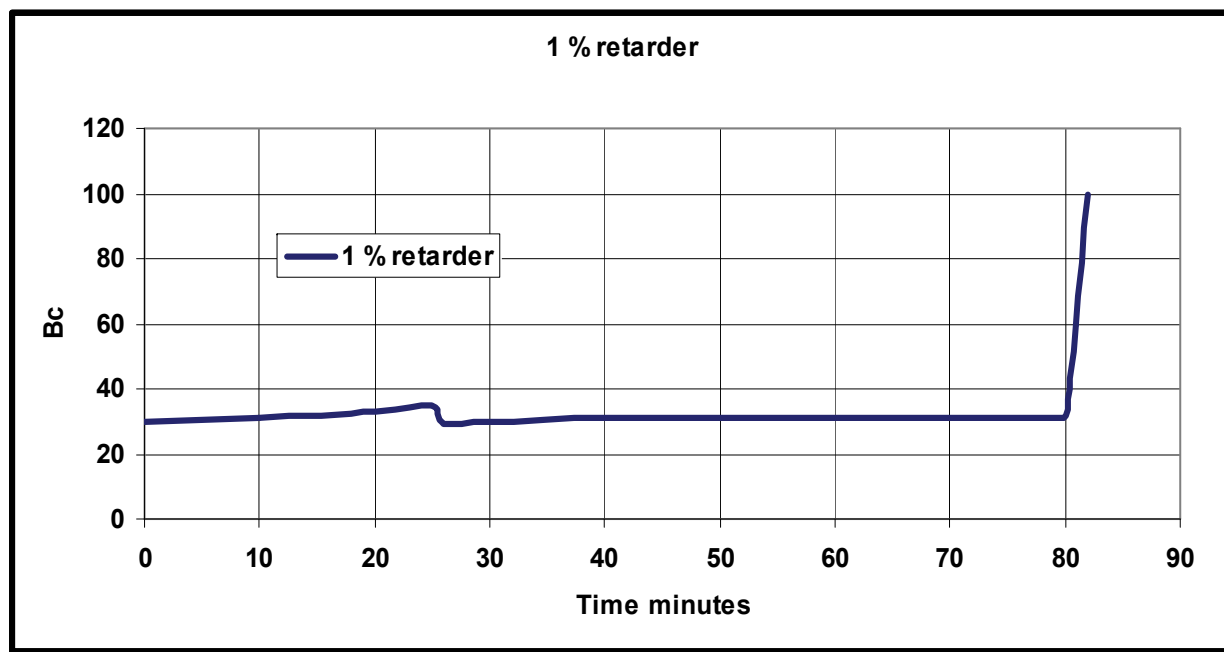
Strength

- Most of the strength is obtained in first few hours
- Slightly expanding

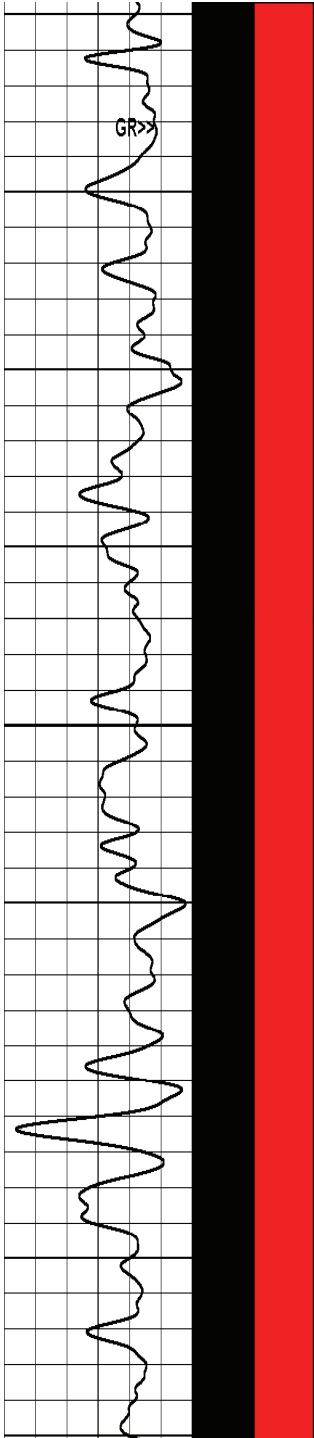




Thickening time example

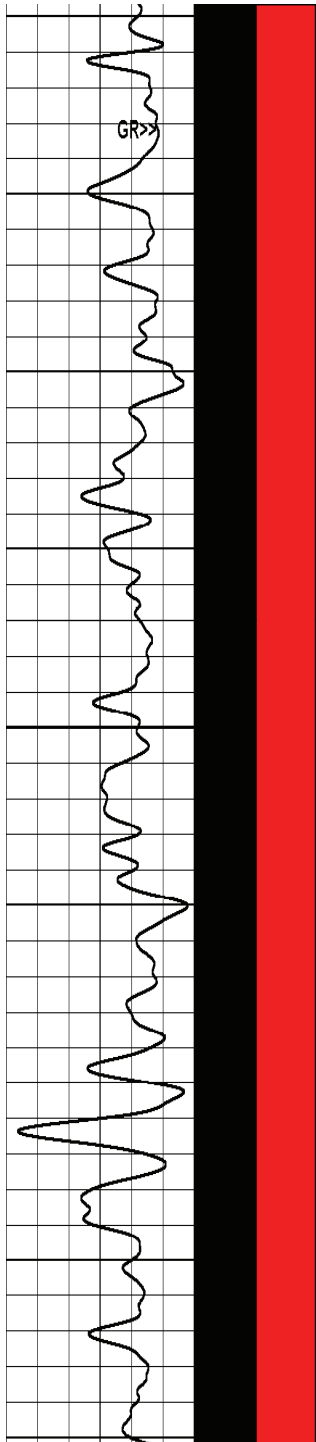


32 Bc to 100 Bc in 2 minutes
Bearden units of consistency

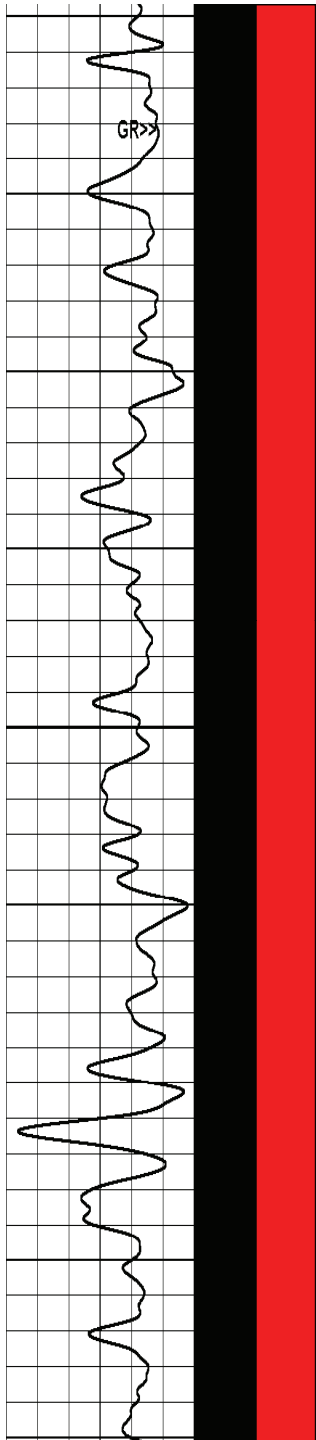


Other Properties

- Concentrated filter cake
- Compatible with most common drilling fluids and Portland cement
- Temperature independence
- Broad PH application



Latex Permeability
Flyash
Porosity Fondue Silica
Portland Tension
Silicafume Solubility
Metakaolin Ceramics
Beads Fibers
Bentonite Zeolite

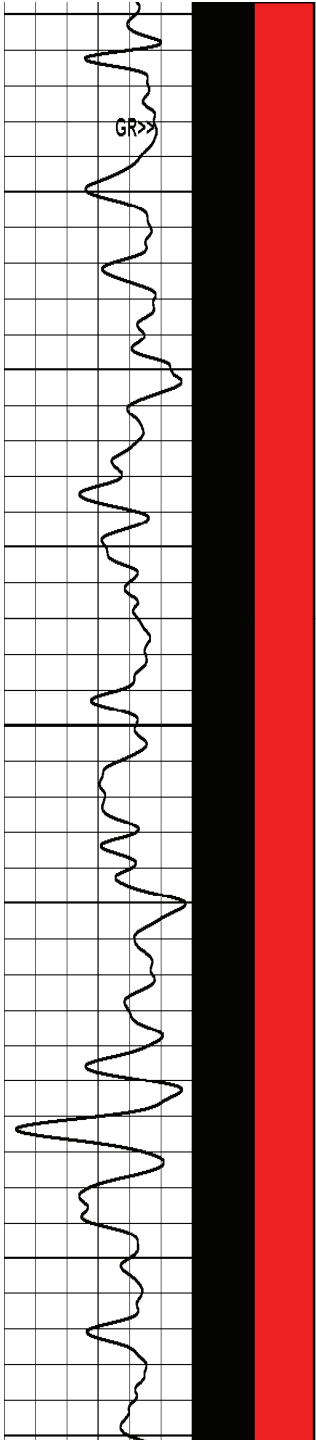


Where have we been

~100 remedial jobs completed

- Gas migration
- Casing repair
- Water conformance
- Vent repairs

Thickening time extended (6 hrs)



Where are ceramics going

Primary work

Thermal

Permafrost

Injection wells

Do "YOU" have a question?

