

Zonal Isolation in Deepwater

22nd February 2017

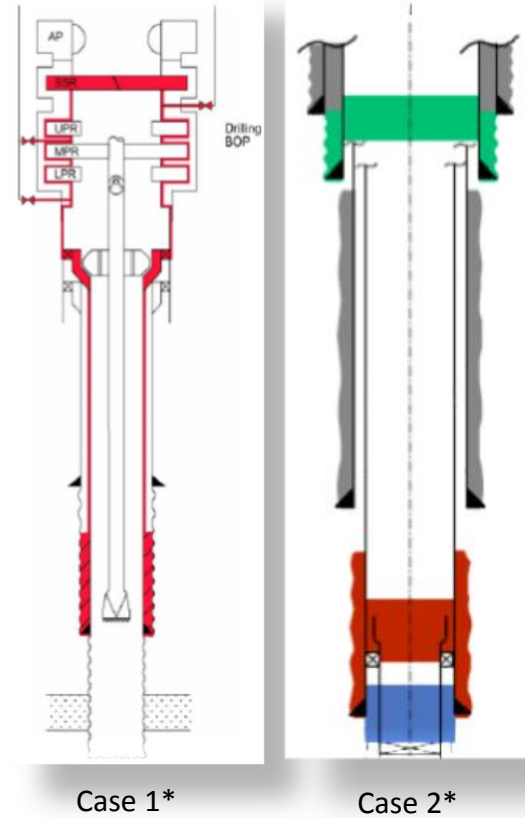


Agenda

- Why do we need zonal isolation
- Challenges
- Solutions
- Evaluation
- Conclusion

Cementing

- One element/component of well barrier envelope in all stages of Exploration & Production & Beyond
- Considered as the only barrier for long term isolation by most Governmental Agencies/Operators



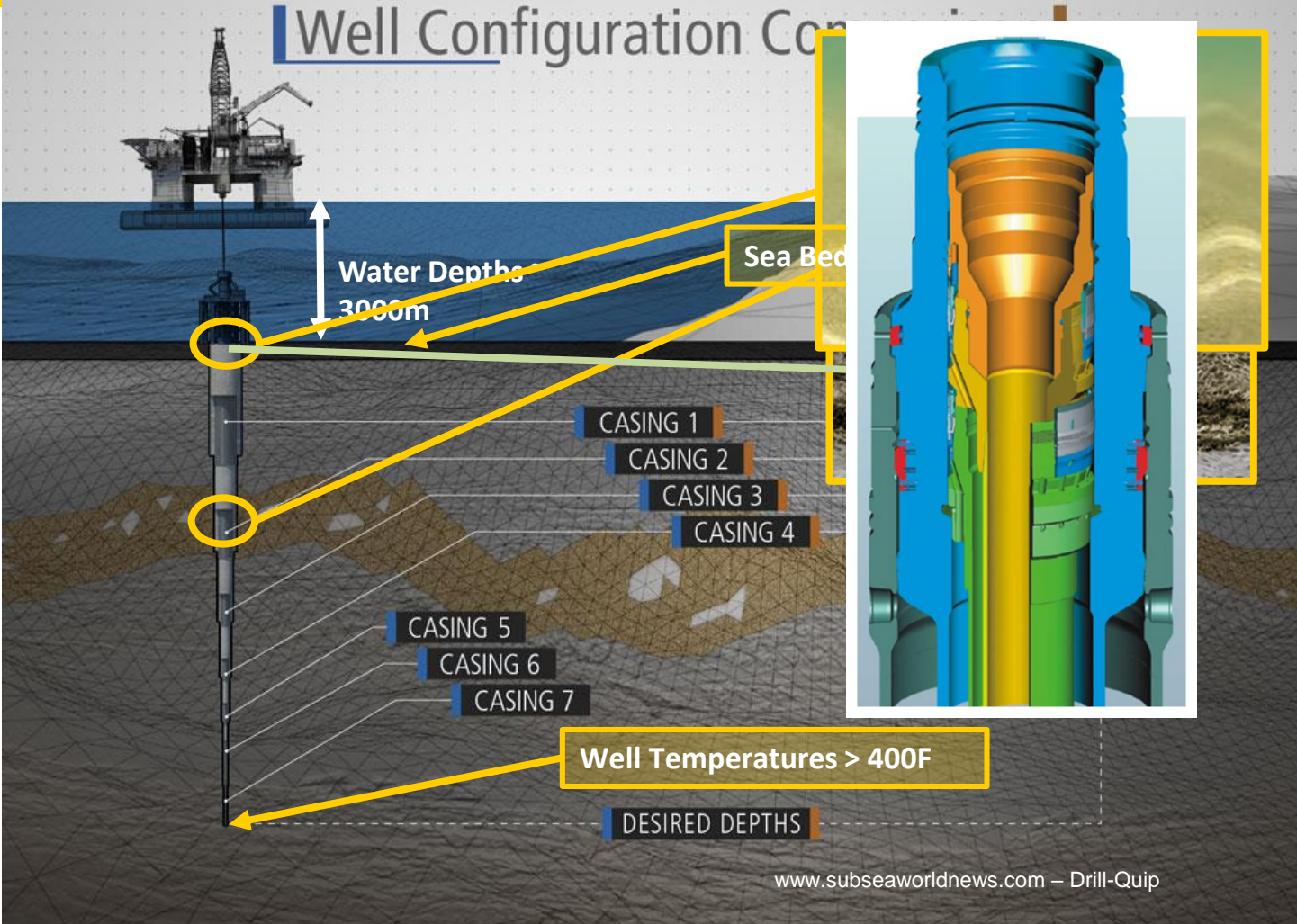
* Images - NORSOK 010D

What is the Appropriate Cement

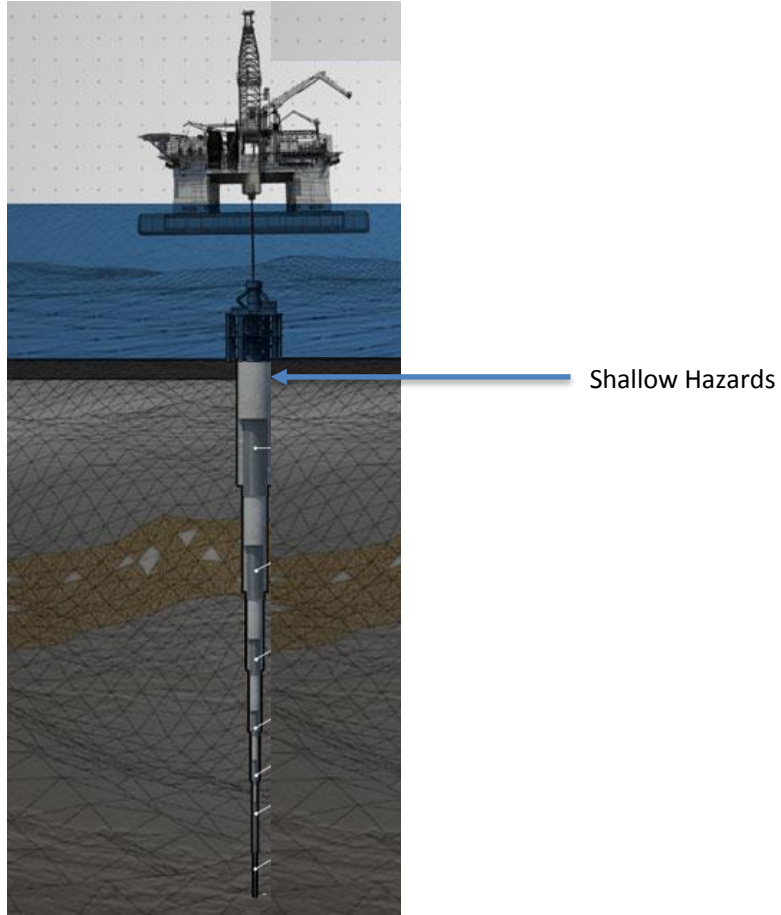
- ADAM: The first consideration is to match the glue to the properties of the materials you intend to join. Otherwise, you'll end up like my friends who try to repair their sneakers with wood glue. It never works: The properties of wood glue don't match the properties of sneakers (flexible). *
- Similarly cement needs to be designed based on what conditions it is expected to function in.



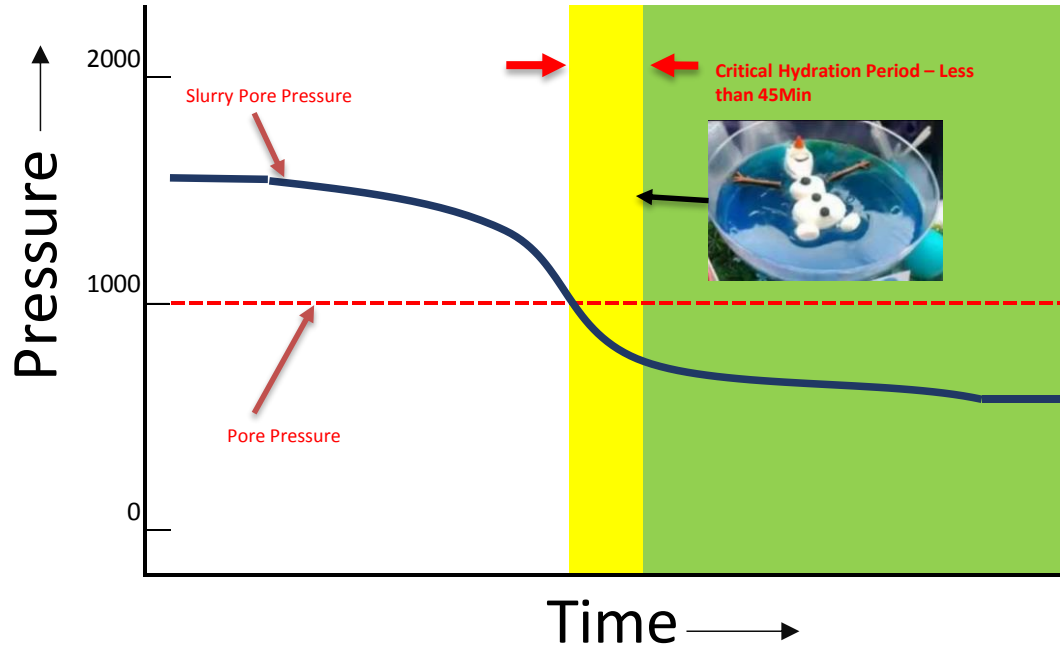
Well Configuration Components



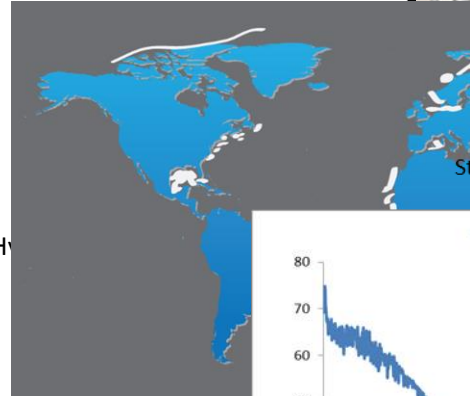
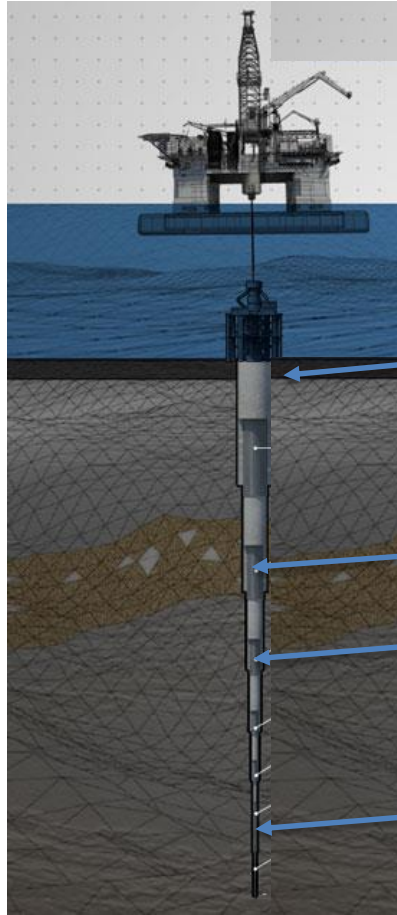
Bases of Design for Challenge's



Critical Hydration Period

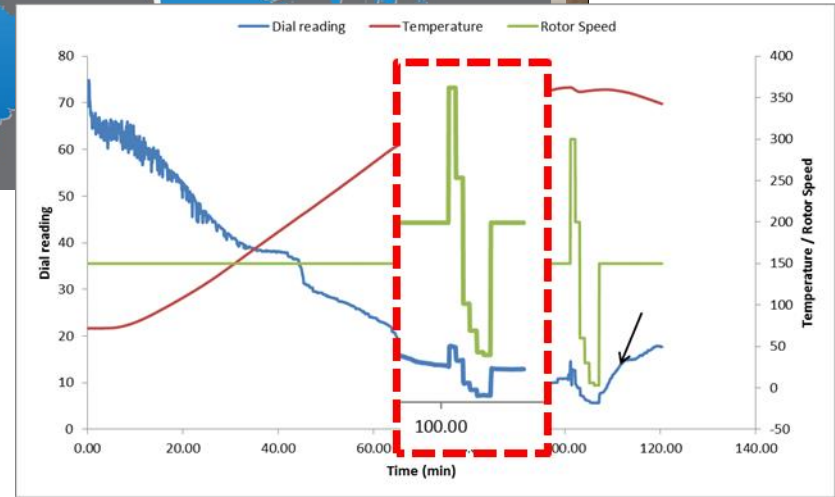


Bases of Design for Challenge's

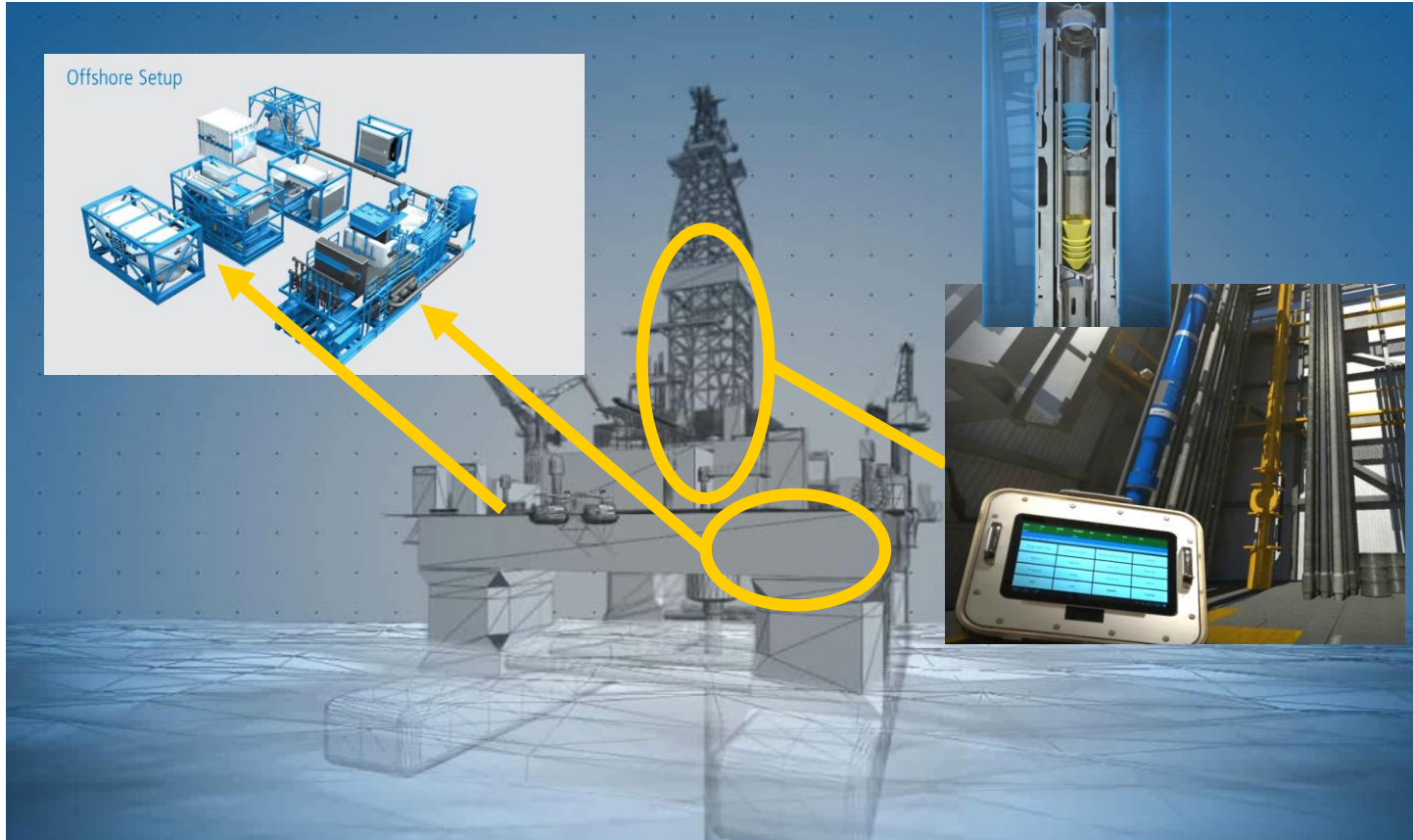


Stability of Fluids – Dynamic Settling Test

- HT
- Salt Formations
- Expandable Liners
- High Temperature/
High Pressure

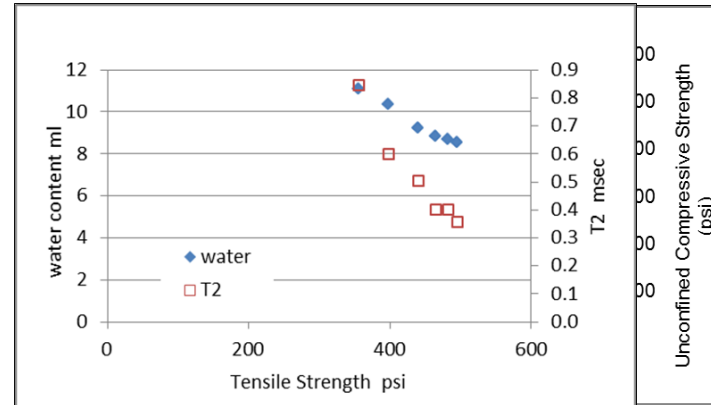
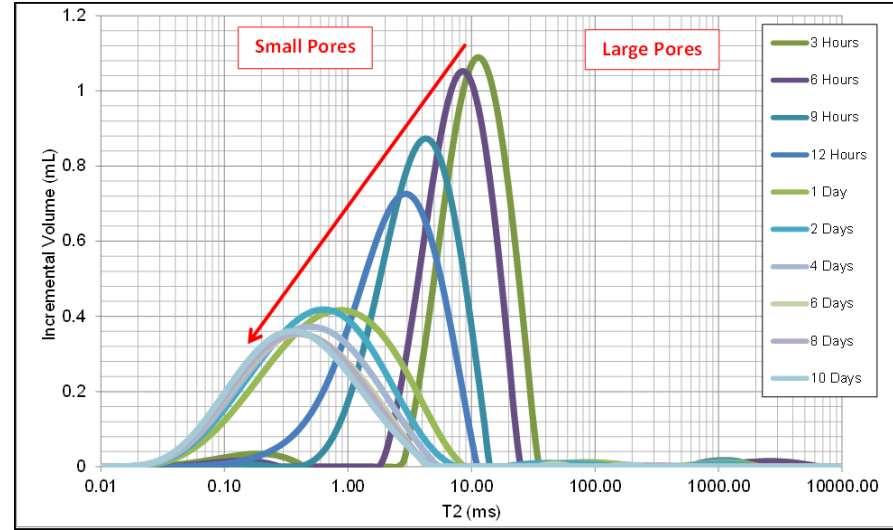


Deep Water Cementing



Evolution of Properties

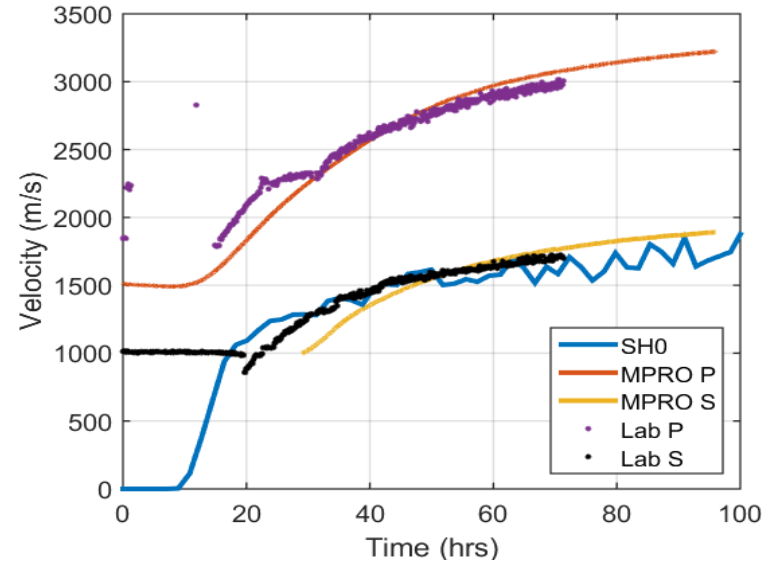
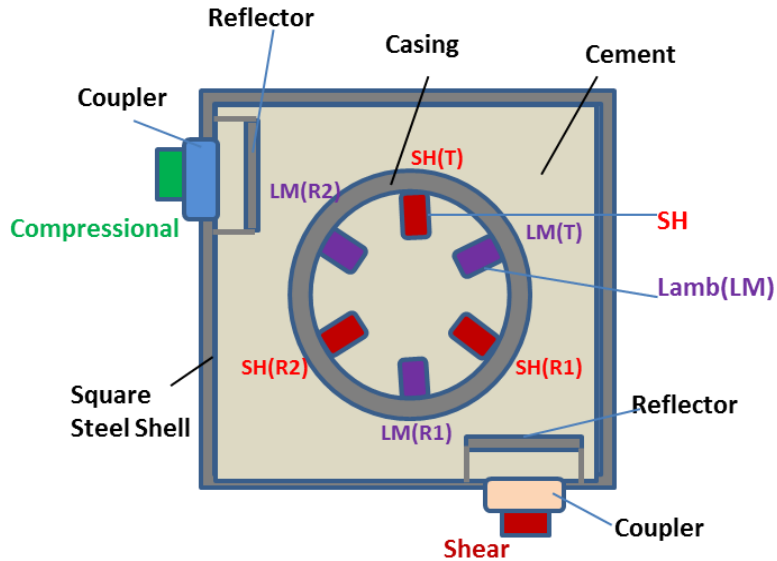
- Not Static
- Requirement need to be understood to model/report correctly



Evaluation

- Compressional Wave Based Tools
 - Omnidirectional Bond Logs
 - Cement Bond Logs/Variable Density Logs
 - Azimuthal Cement Evaluation
 - Attenuation depends on impedance of material
 - Tool response depends on acoustic impedance
 - Empirical data links impedance to compressive strength.
 - In foamed cements / exotic additives these empirical links can be inaccurate.
- Advanced Tools
 - Shear/Flexural Wave Based
 - Avoid confusion when dealing with special cements

Evaluation - InSitu



Evaluation

- Methods other than Bond Logs
 - Analysis of surface pressure
 - Formation Integrity Test (FIT/LOT)
 - Other tests: negative, positive press,
 - Temperature log
 - Tracers
 - Noise log

Ref. to API 10 TR1

Conclusion

- It is essential to understand the complexities to be able to design for them
- Today's engineering can address challenges presented.
- Understanding cement evaluation is essential for the end goal