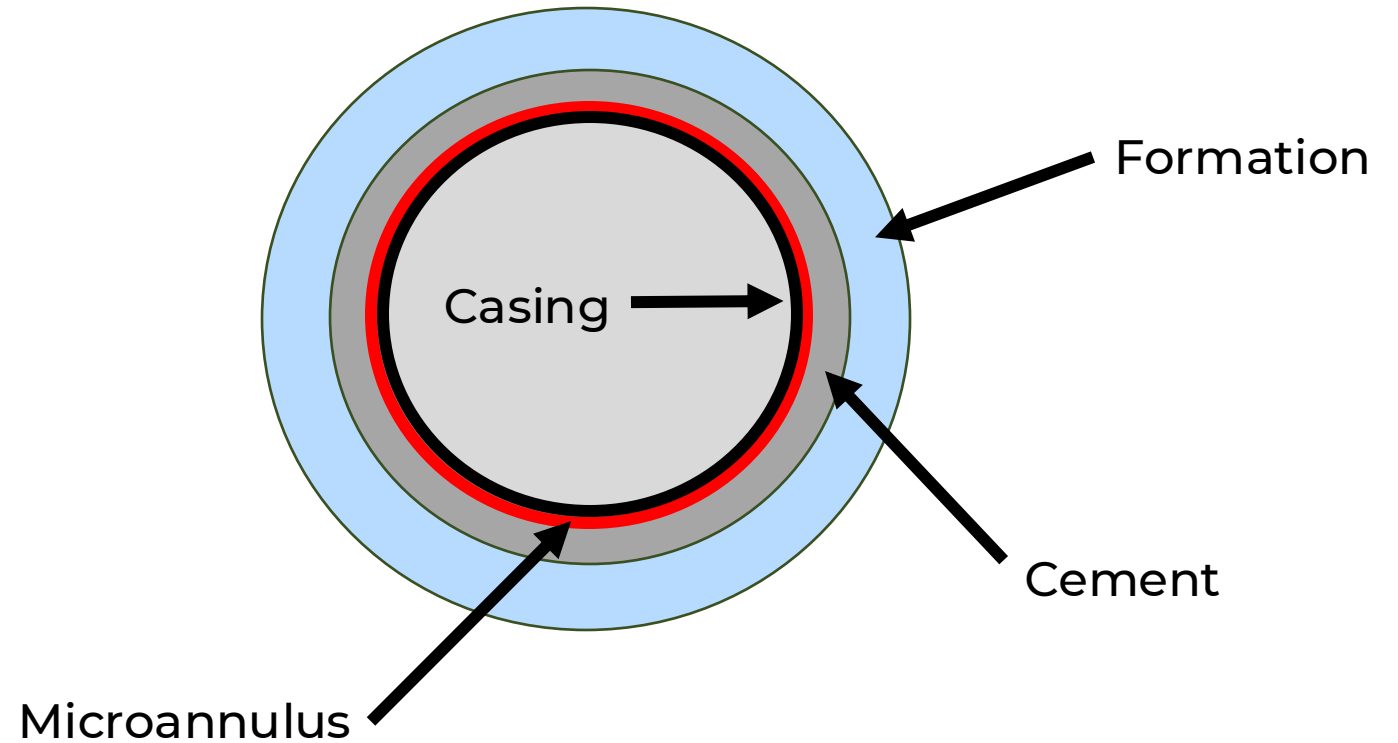


Micro annulus and barrier integrity

Ellen Strøm - Vår Energi

Microannulus

- Cement provides
 - Zonal isolation
 - Mechanical support
 - Isolate fluids from casing
- Risks
 - Sustained casing pressure
 - Crossflow
 - Leak to surface

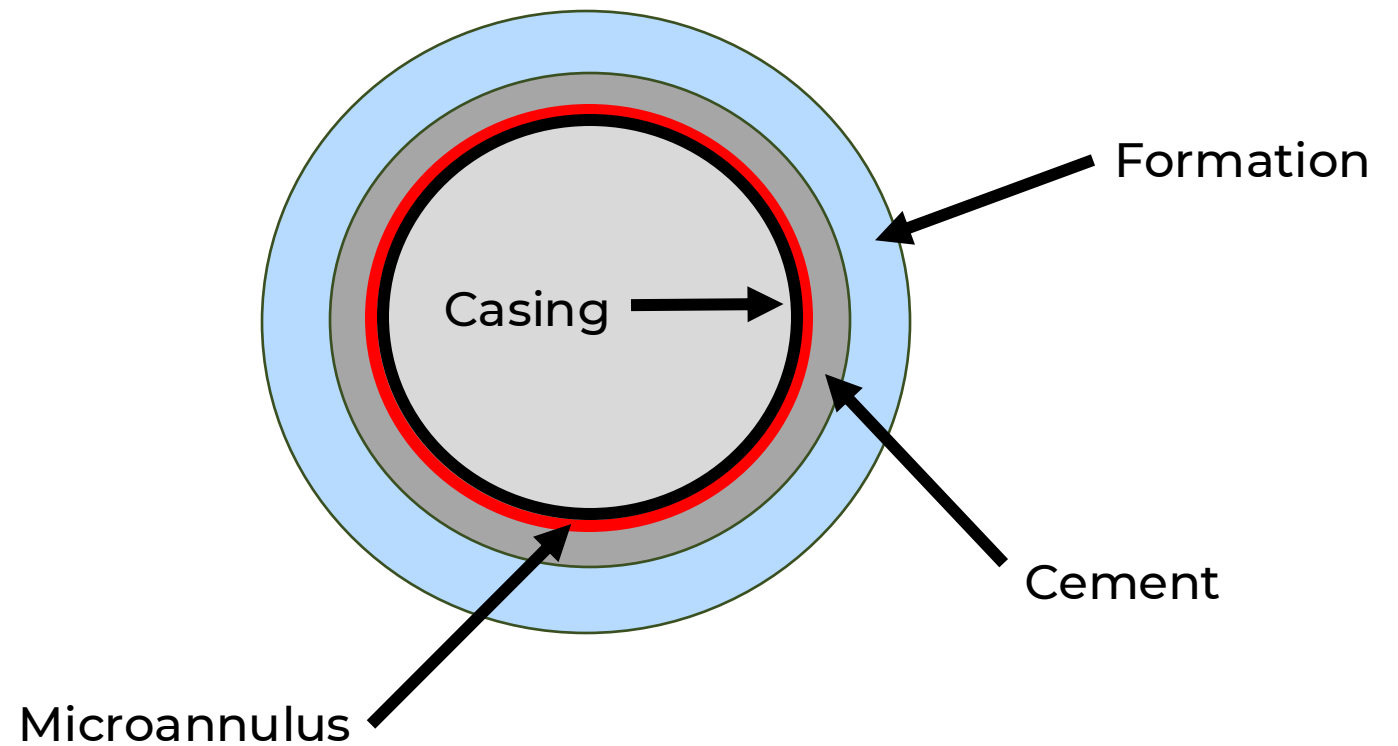


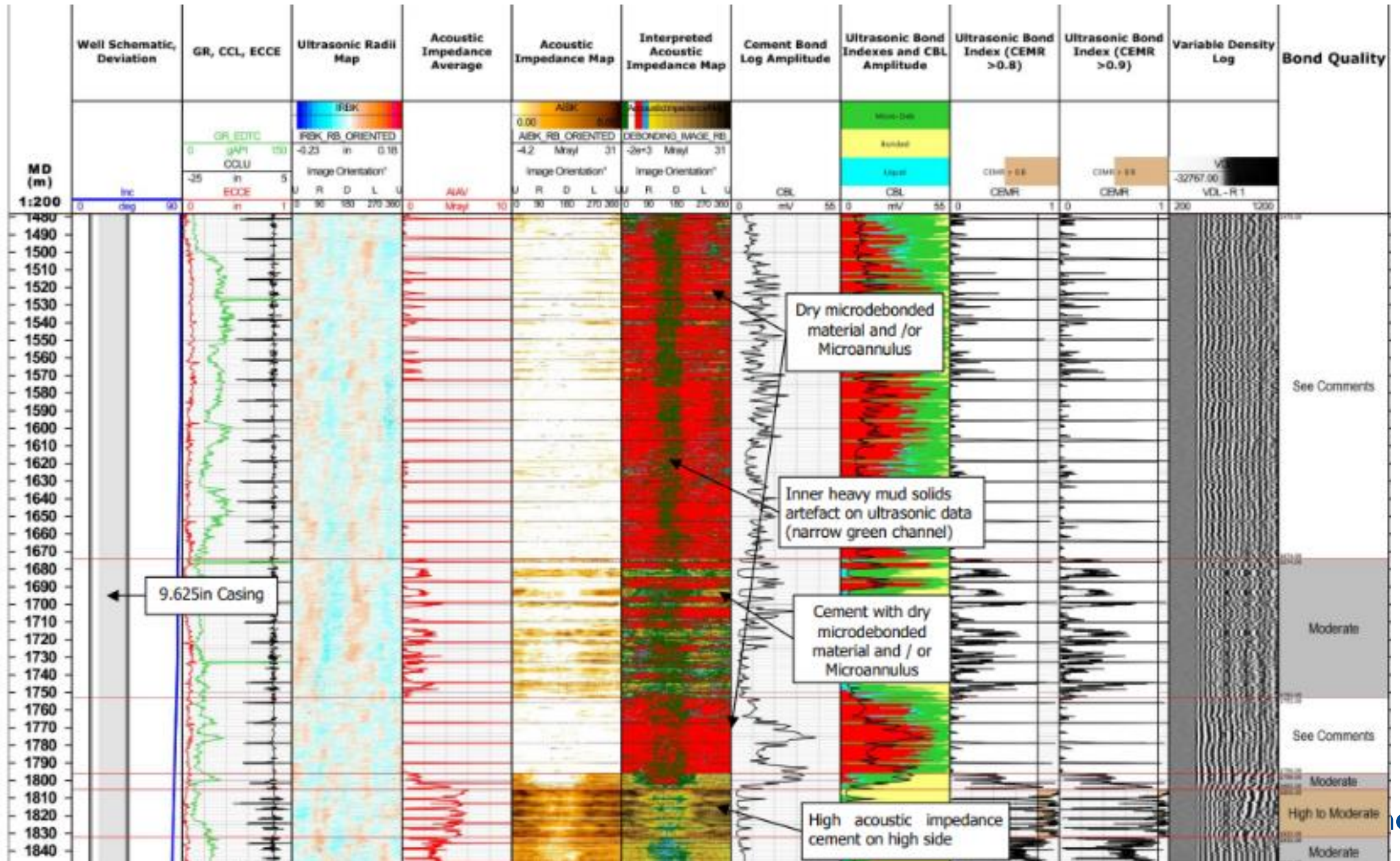
Logging

- Ultrasonic tools
 - Good azimuthal resolution
 - Sensitive to dry microannulus
 - Can detect through wet microannulus
- Sonic tools
 - Poor azimuthal resolution
 - Can detect through dry microannulus
 - Sensitive to wet microannulus

Microannulus

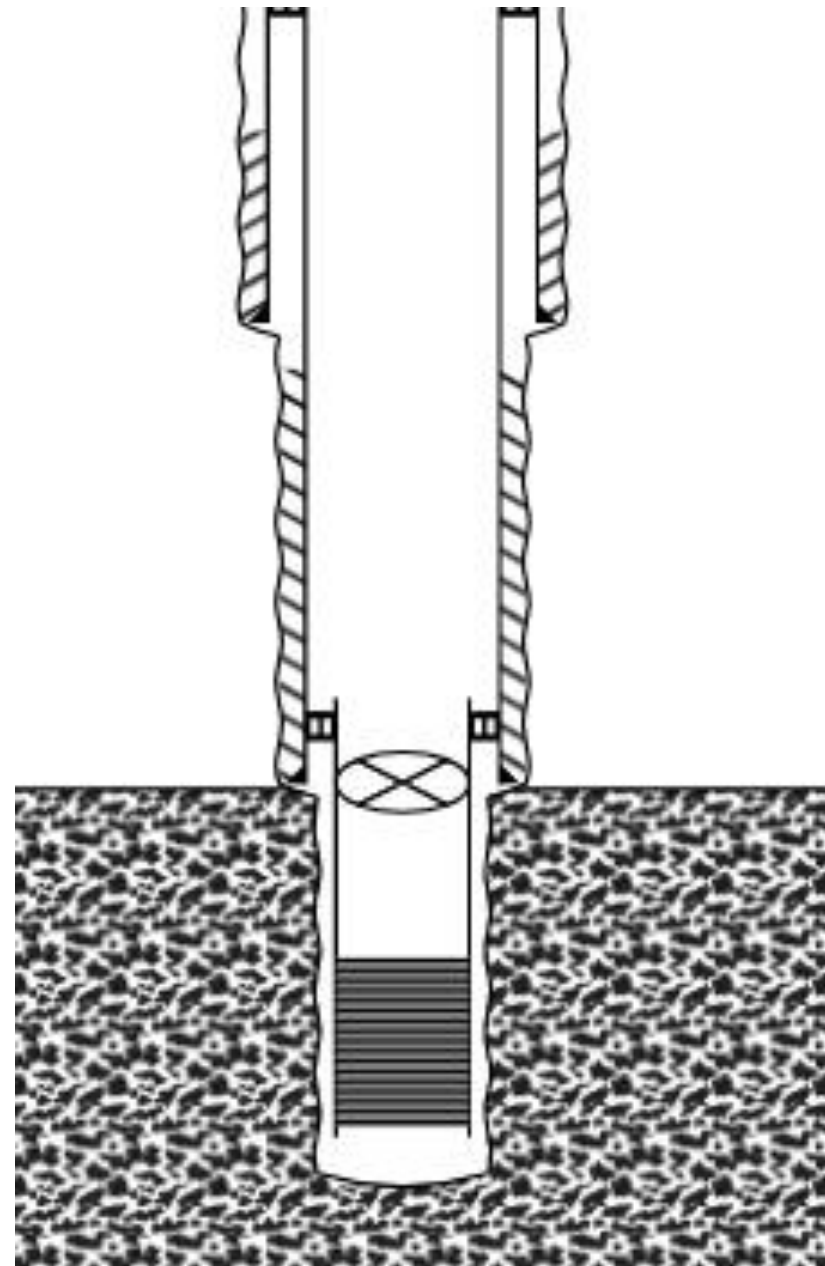
- Cement provides
 - Zonal isolation
 - Mechanical support
 - Isolate fluids from casing
- Risks
 - Sustained casing pressure
 - Crossflow
 - Leak to surface
- Causes
 - Pressure changes?
 - Temperature changes?
 - Cement recipes?
 - Formation specific?
 - Casing varnish?





Microannulus

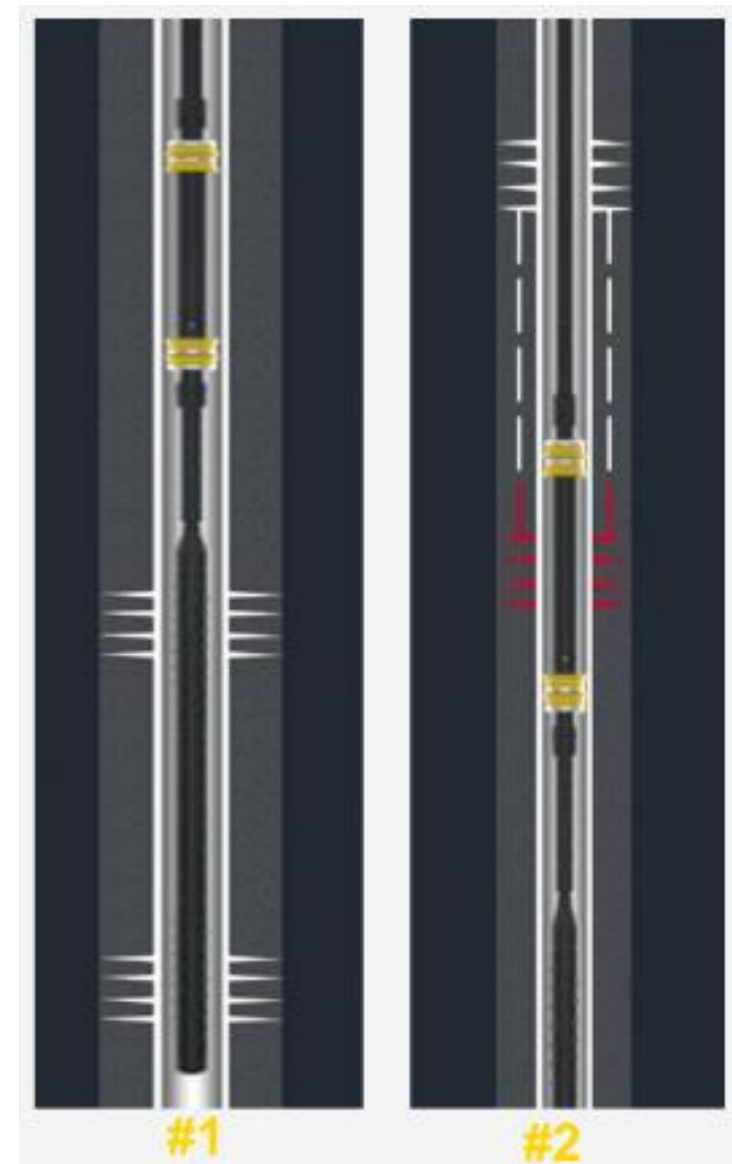
- Dry microannulus
 - Zonal isolation?
 - Is it microannulus that seals?
 - Do we have seal lower down?
 - Need to test
- Picking the test interval
 - Microannulus along whole interval
 - Assess cement quality in interval
 - Annular barrier below, know flowpath
 - Test pressure: XLOT?



Testing of microannulus

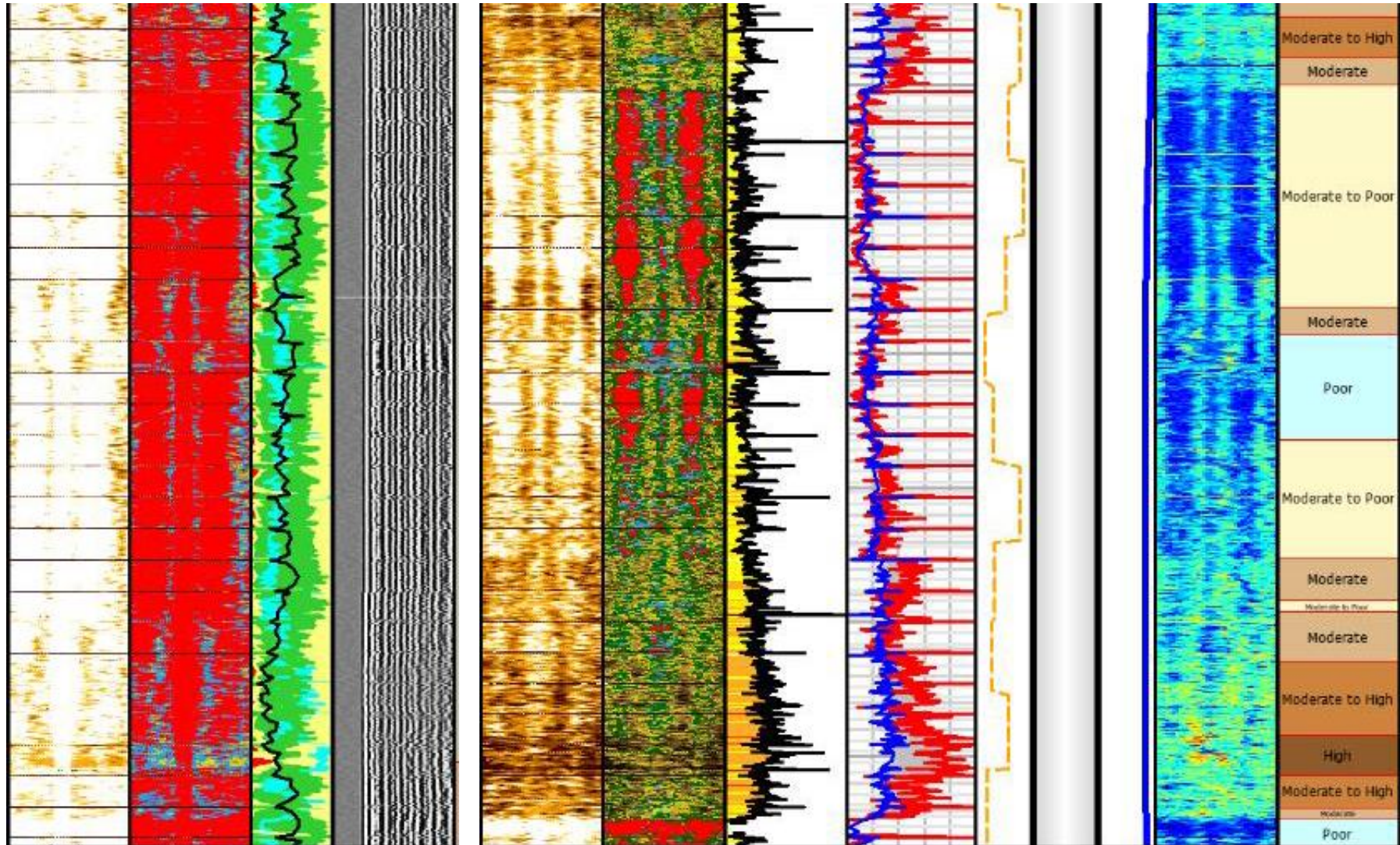
Example of how to test a microannulus

- Pick testing interval
- Perforate top and bottom of test interval
- RIH and straddle lower perforations
- Pump down string
- Observe well behaviour



Archer Stronghold Defender System

Re-log of well



Where are we now?

- Re-assessing wells where the microannulus compromises the barriers
- Cementing, older wells vs new wells
- Log where we can
- Test where we can
- Compaction? Creep?