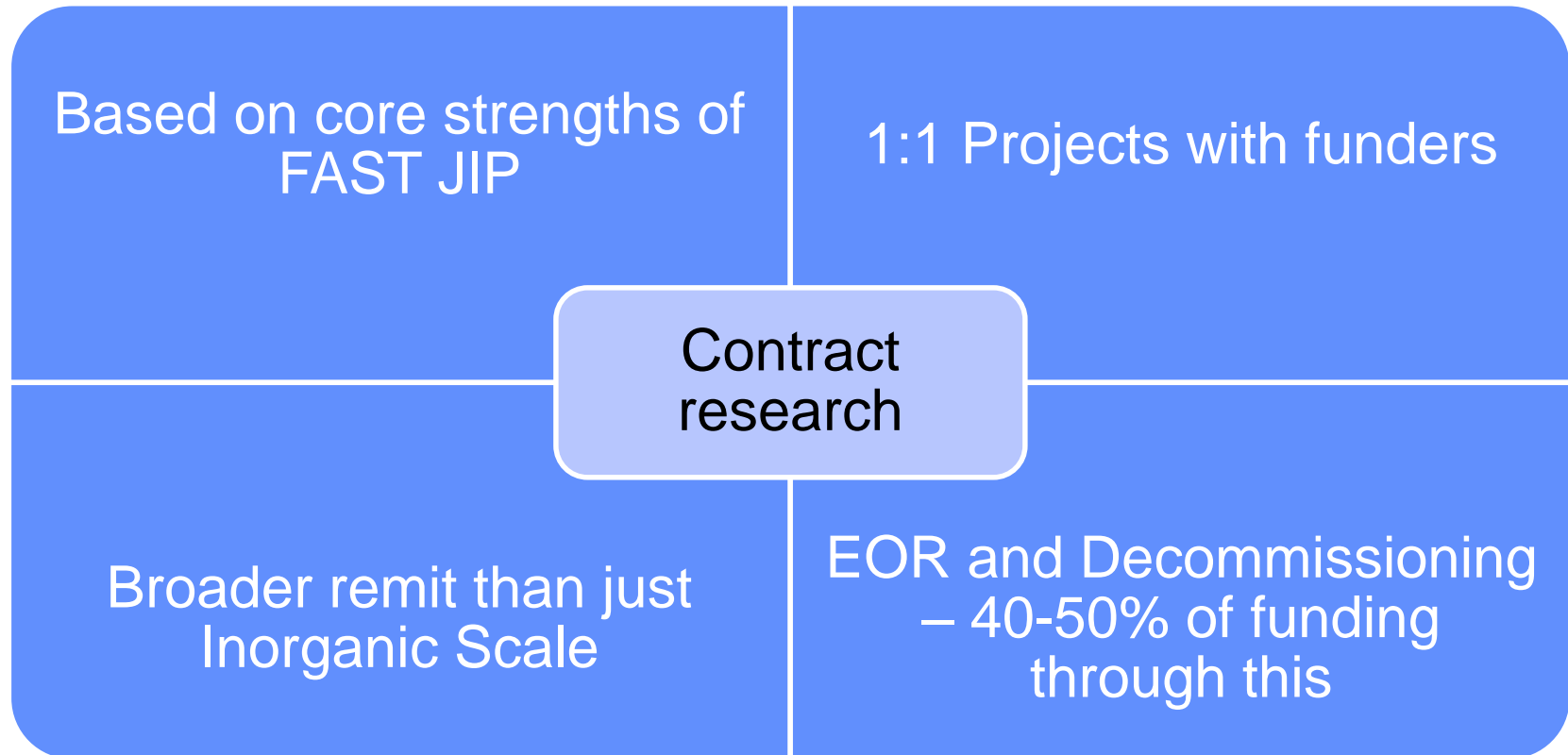


FASTrac Contract Research and Consultancy

Mike Singleton

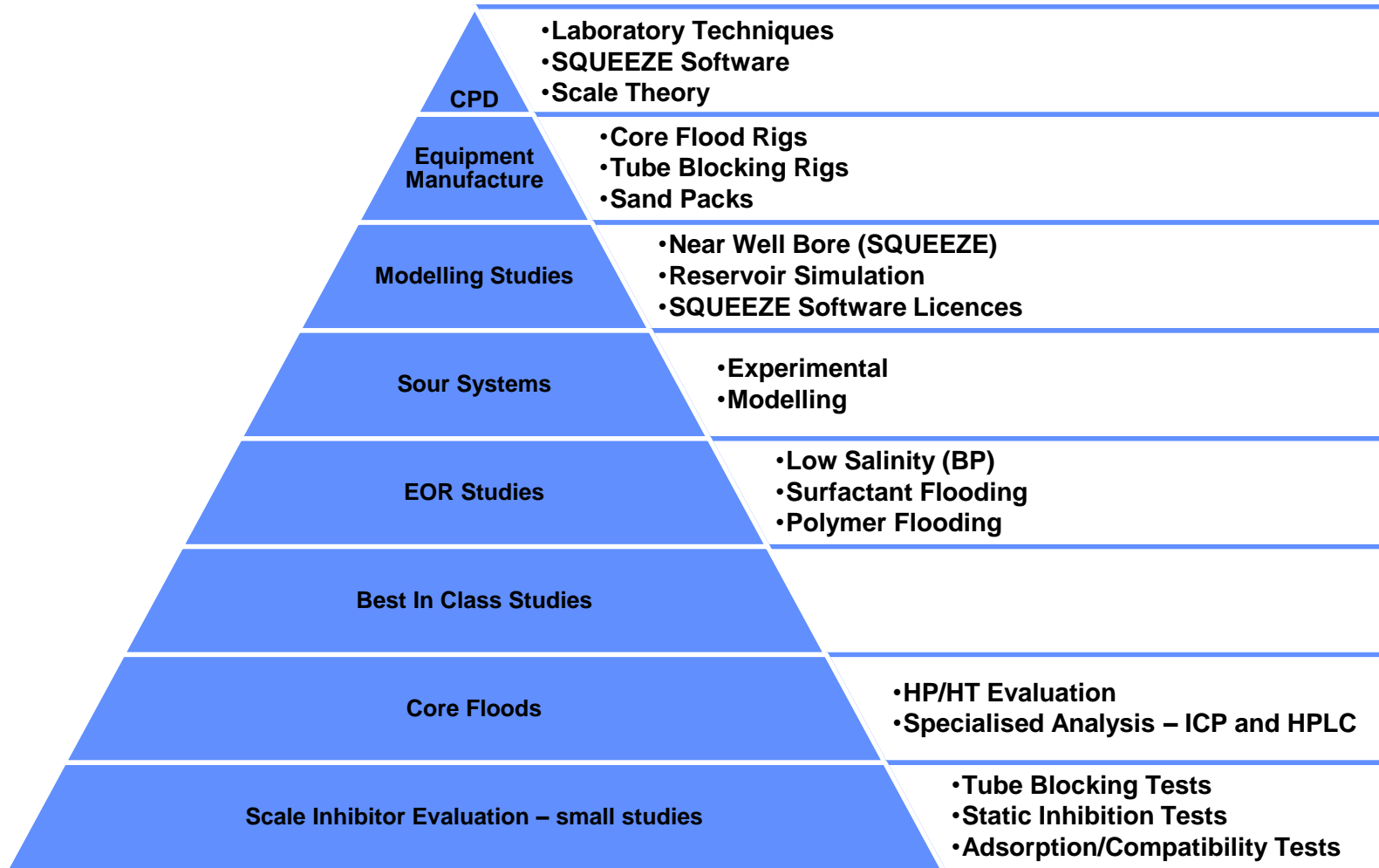
FASTrac

Flow Assurance and Scale Team research and consultancy

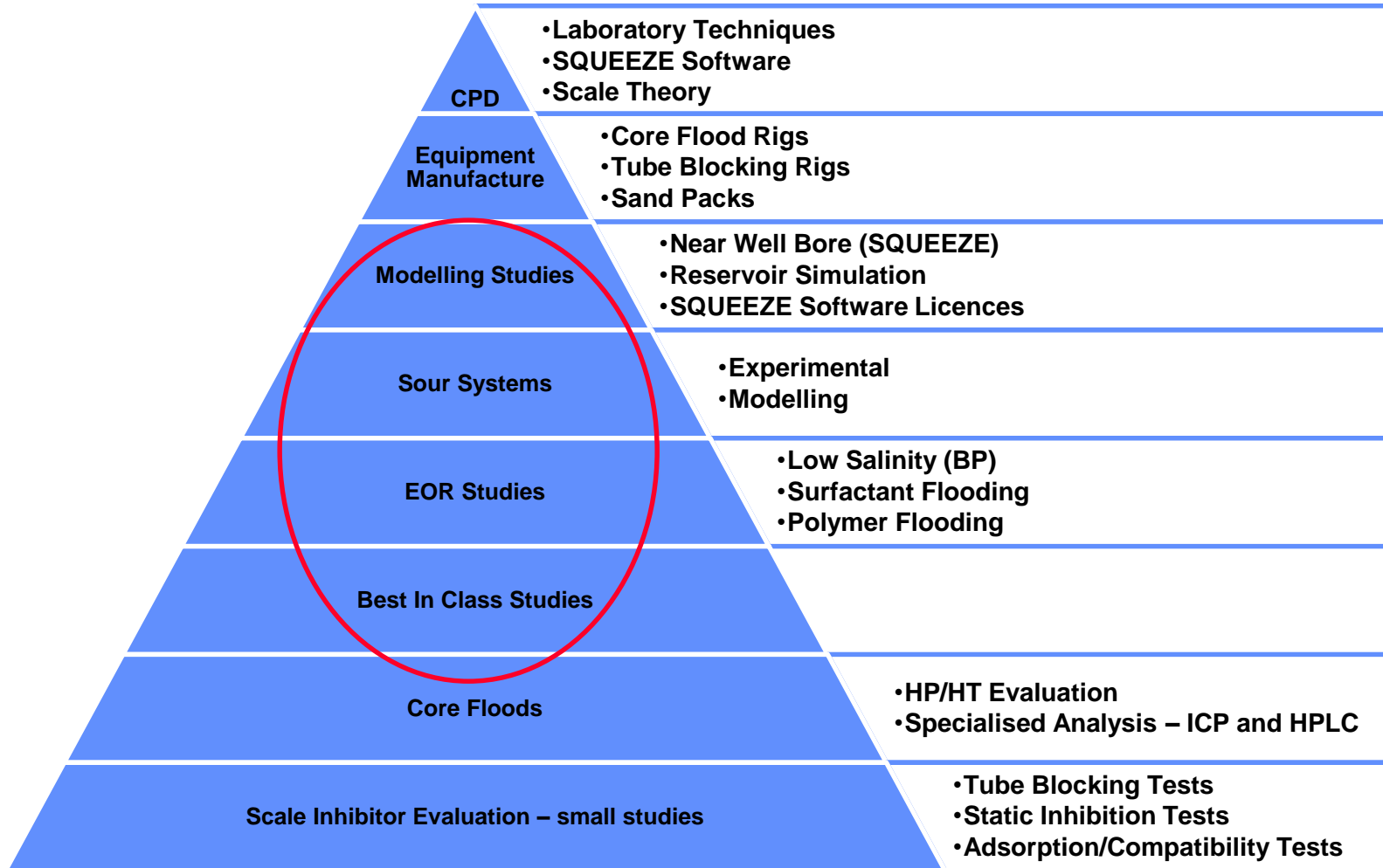




>300 Projects/Studies since 2005



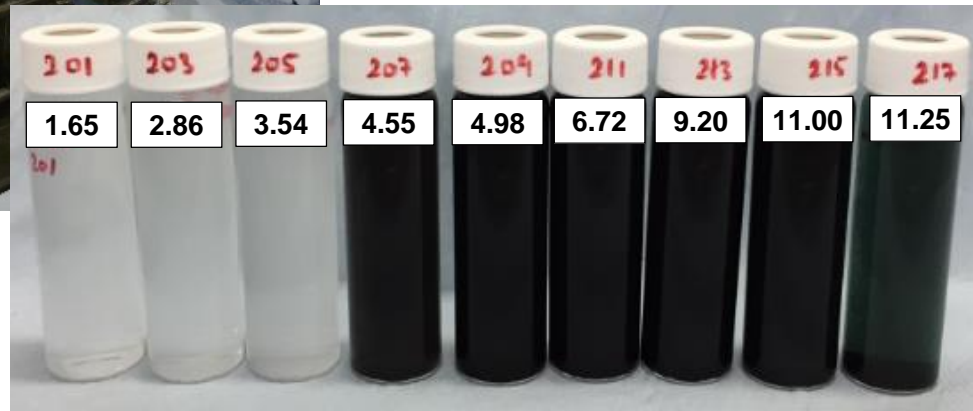
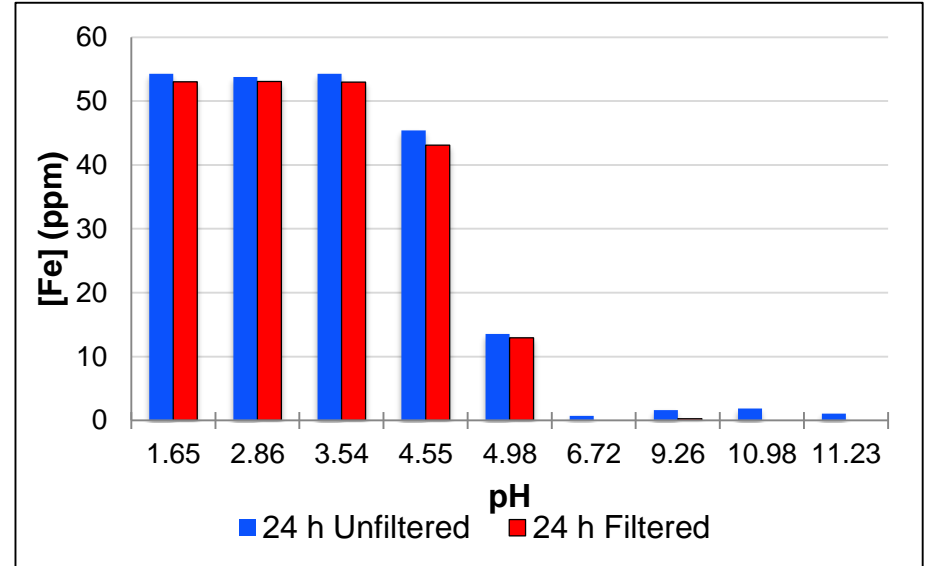
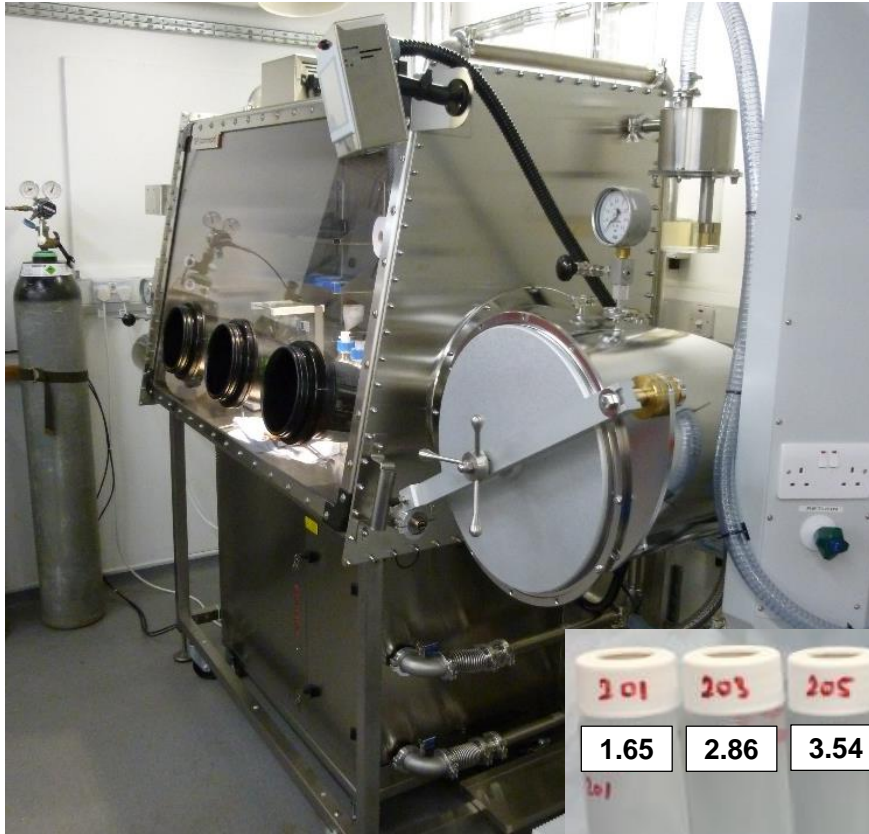
>300 Projects/Studies since 2005



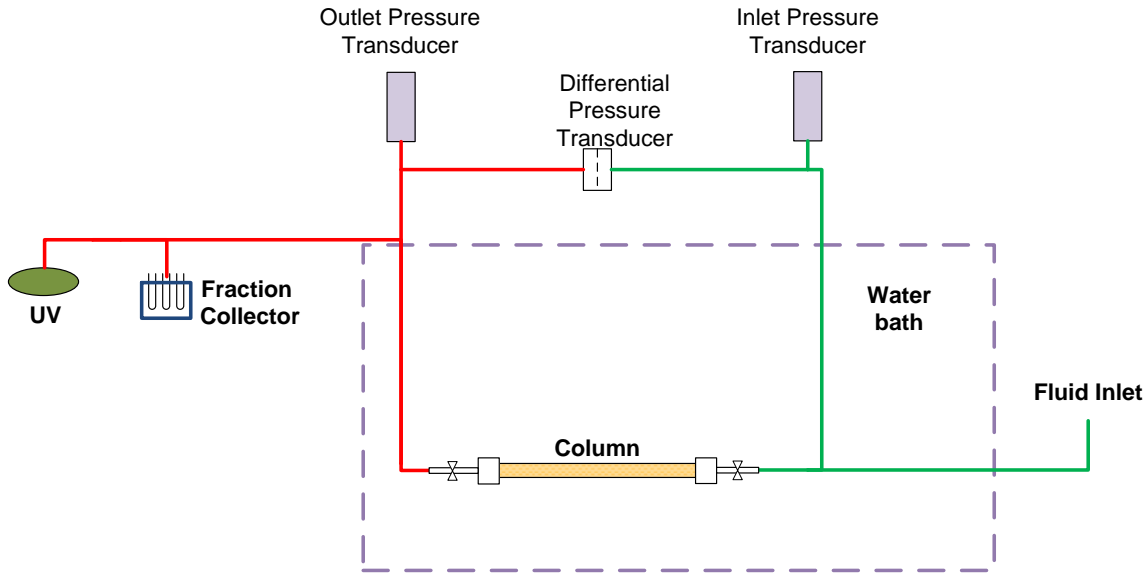
Modelling Studies

- **Isotherm Derivations**
- **Near Well Squeeze Treatment Design and Optimisation**
- **Reservoir Simulation Studies**
 - Scale risk management
 - Impact of injection water composition
 - reduced salinity or reduced sulphate
 - EOR processes
 - Well placement

Souring: Sulphides of Fe, Zn and Pb



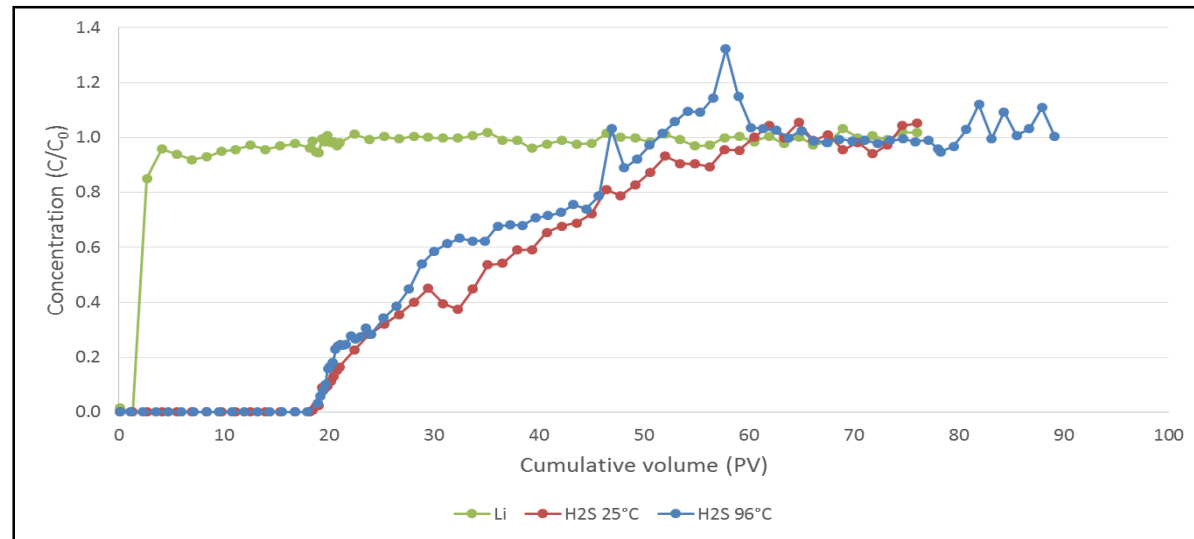
Souring: Pack/Core Floods



Compatible materials for rigs

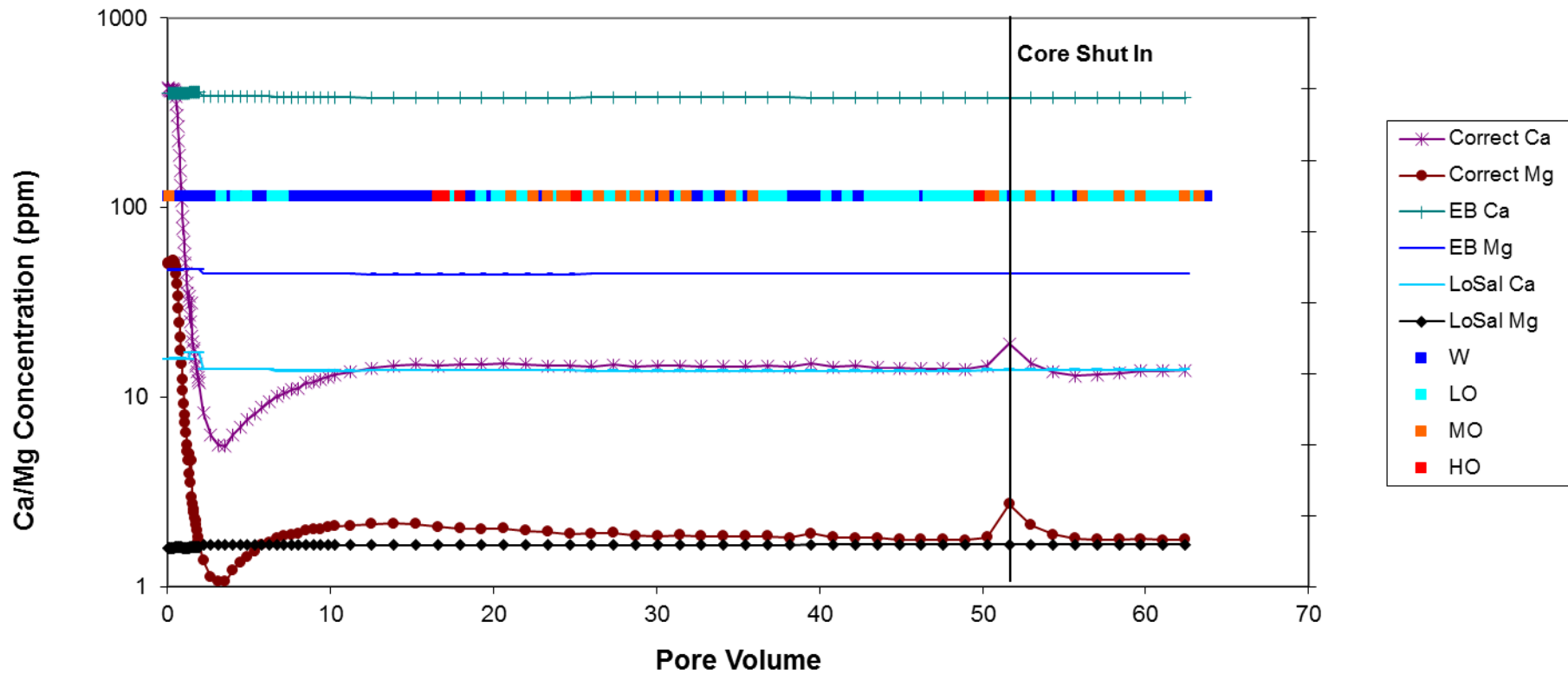
H₂S Propagation/Scavenging

Translation through to
Consolidated Core



EOR – Low Salinity Water Flooding

FT-BP-LOSOR-3: Ca/Mg Ions and Oil Appearance vs. Pore Volume



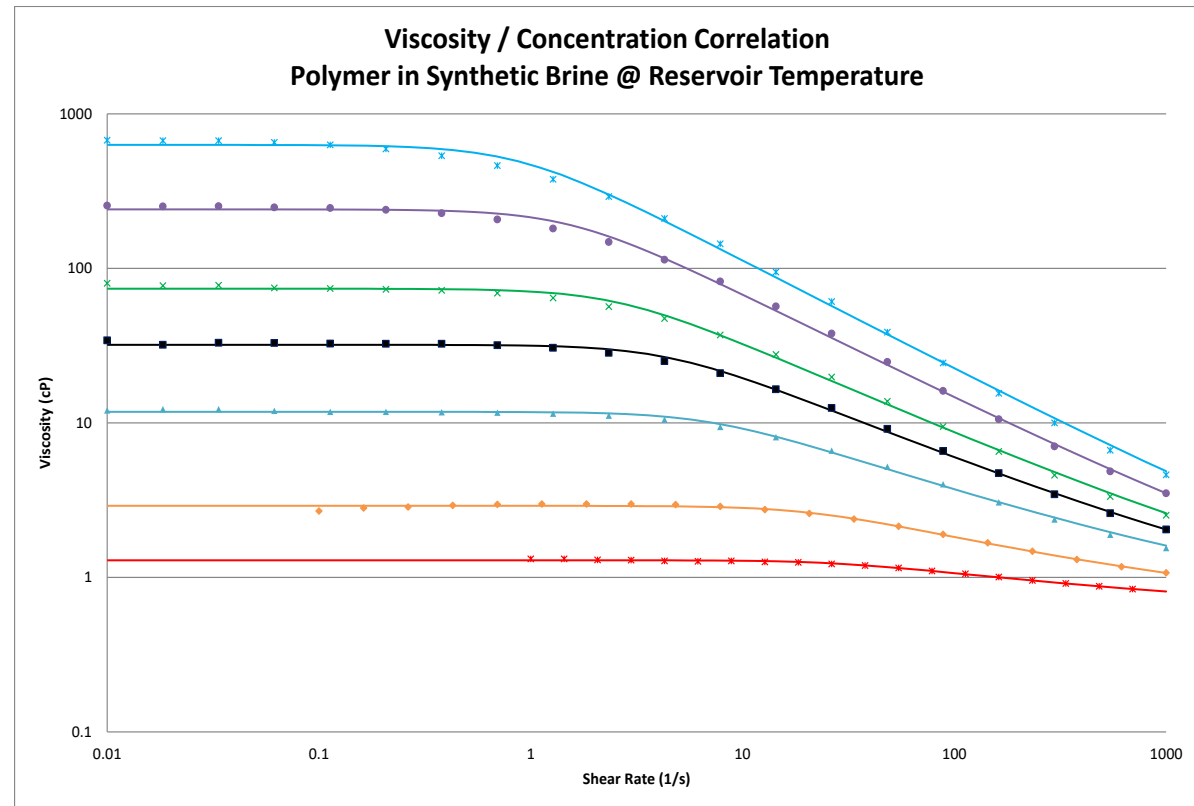
EOR – Polymer Flooding

- **Rheology**
- **Thermal Stability**
- **Flow Through Porous Media**

Bulk Rheology

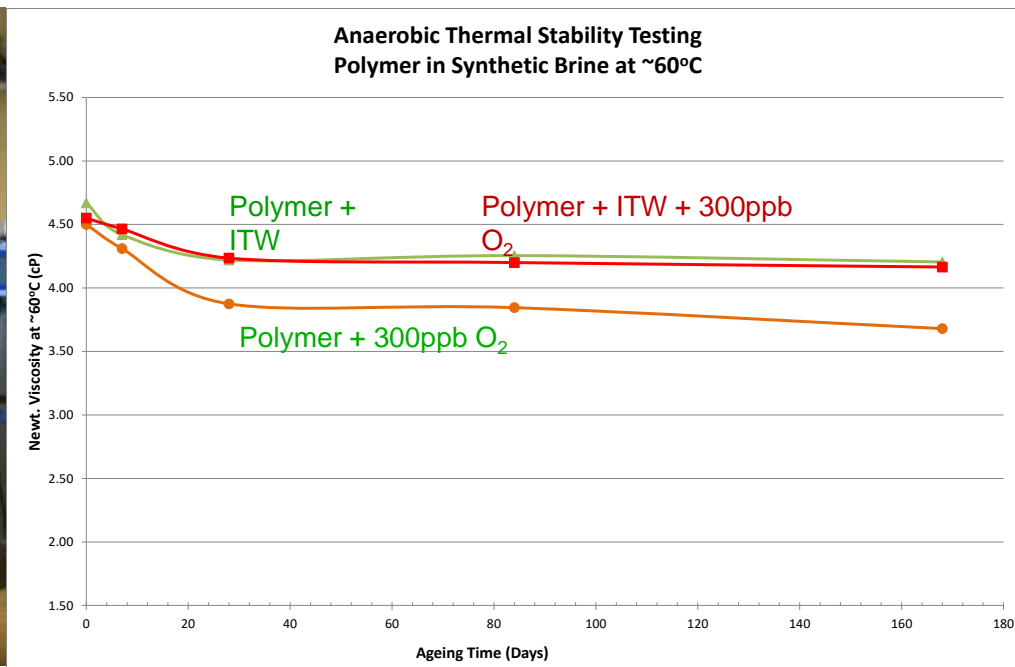


- Anton Paar MCR302 Rheometer
- Low viscosity measurements – DG42XL geometry



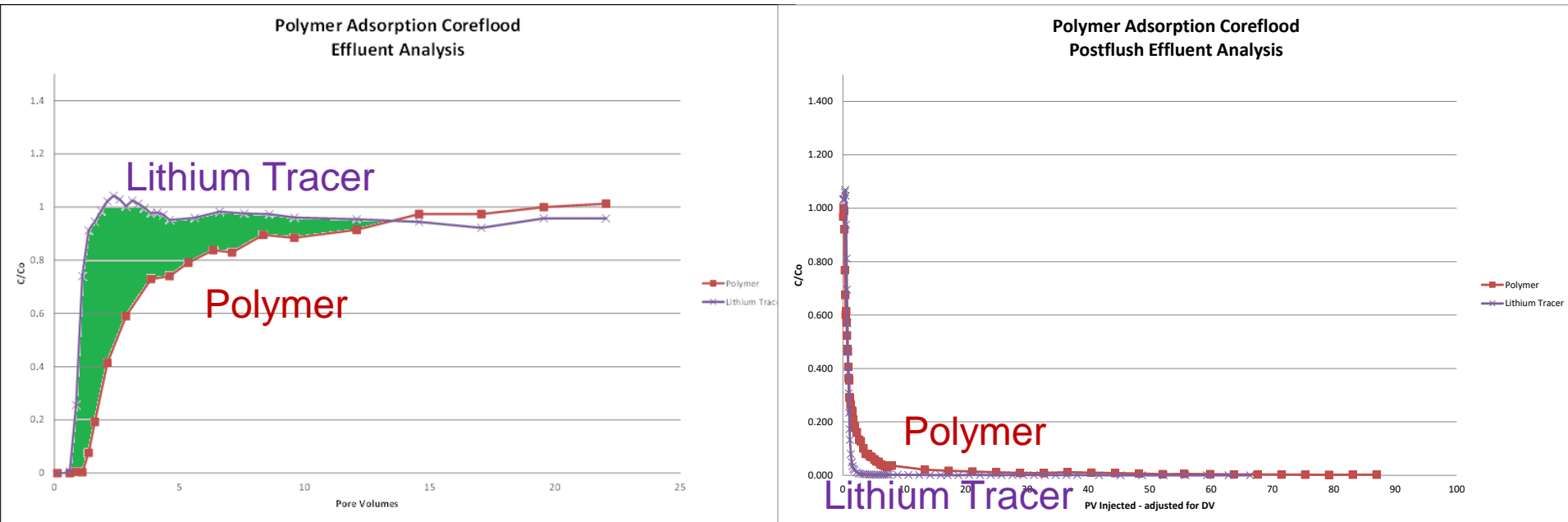
Carreau Model - $\eta = \eta_{\infty} + (\eta_0 - \eta_{\infty})[1 + (\lambda\dot{\gamma})^2]^{(n-1)/2}$

Thermal Stability Testing



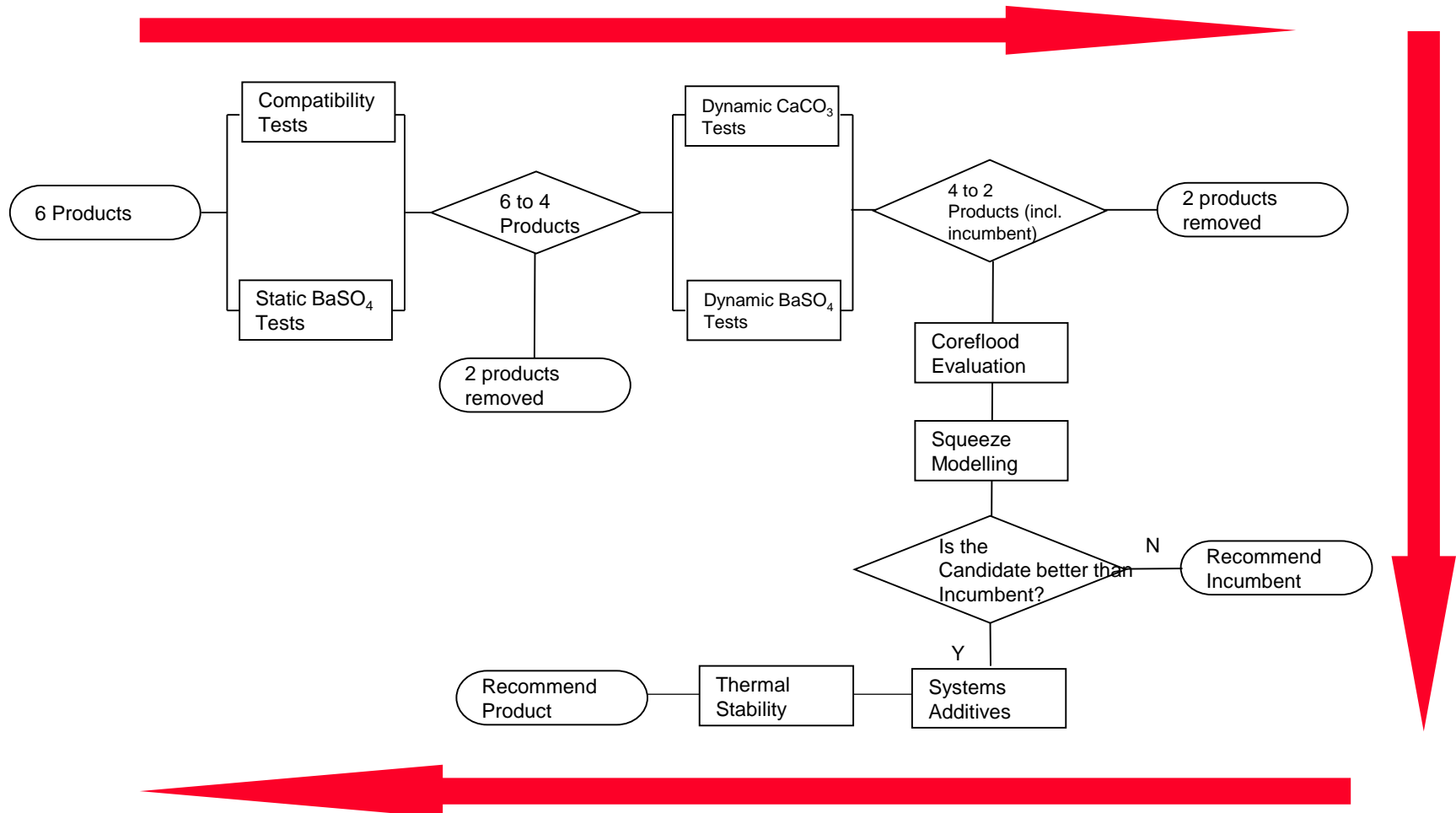
- Jacomex Anaerobic Chamber – Custom unit for HWU specifically for EOR polymer testing
- <1ppb O₂ via two-stage purifier
- All polymer preparation and thermal aging performed inside glovebox
- Degradation assessed through viscosity – Anton Paar MCR302
- Option to assess Hydrolysis via C13 NMR

Coreflood - Dynamic Adsorption



- Retention – Reversible adsorption, irreversible adsorption and Inaccessible Pore Volume (IPV)
- With a single polymer injection / postflush cycle – Retention
 - Mass balance – “maximum retention” for specific concentration
- Injection of a second cycle allows for determination of the IPV
 - Irreversible adsorption satisfied during first polymer injection

Best In Class Study: Process

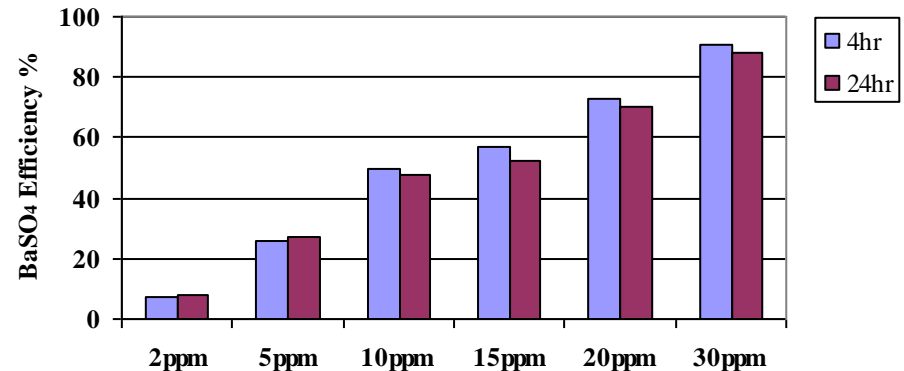


Static Efficiency Tests

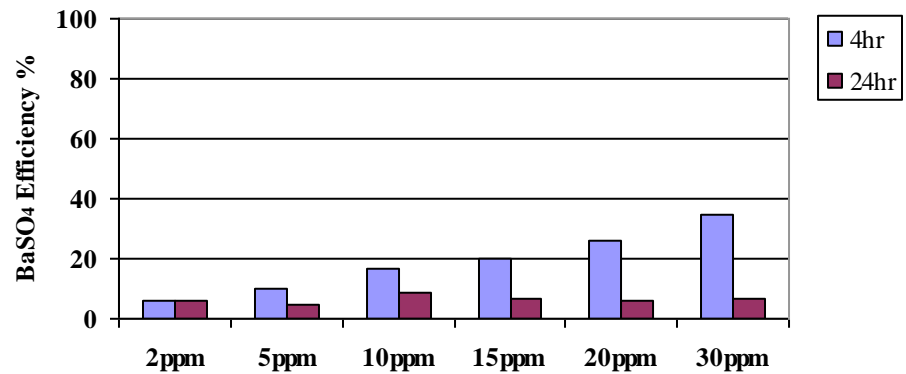
- Ability to Rank Inhibitor Products
- Mix SW (anions – SO₄) and FW (cations – Ba)
- Sample 4 and 24hrs after mixing
- Analyse for Ba
- Calculate % Inhibition Efficiency

$$\frac{\text{Ba (sample)}}{\text{Ba (theo)}} \times 100$$

Determination of MIC for SI-1 against BaSO₄ formation
for a 60:40 mix of LSSW3:FW4 at pH4.0

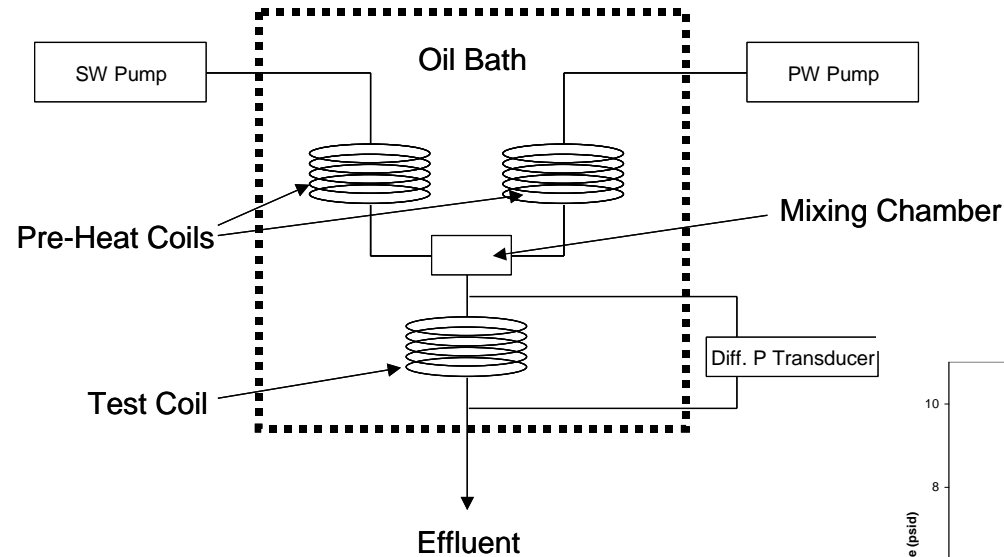


Determination of MIC for SI-2 against BaSO₄ formation
for a 60:40 mix of LSSW3:FW4 at pH4.0

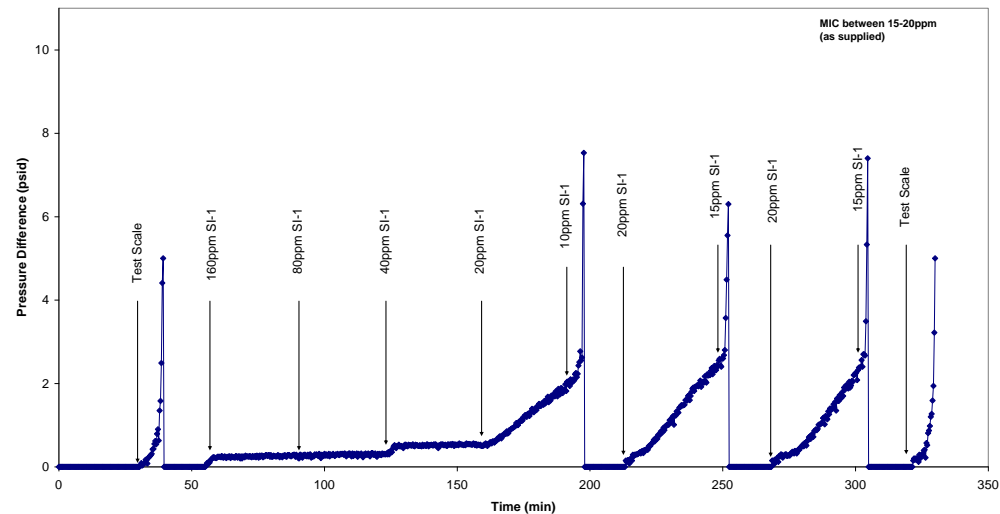


Dynamic Testing

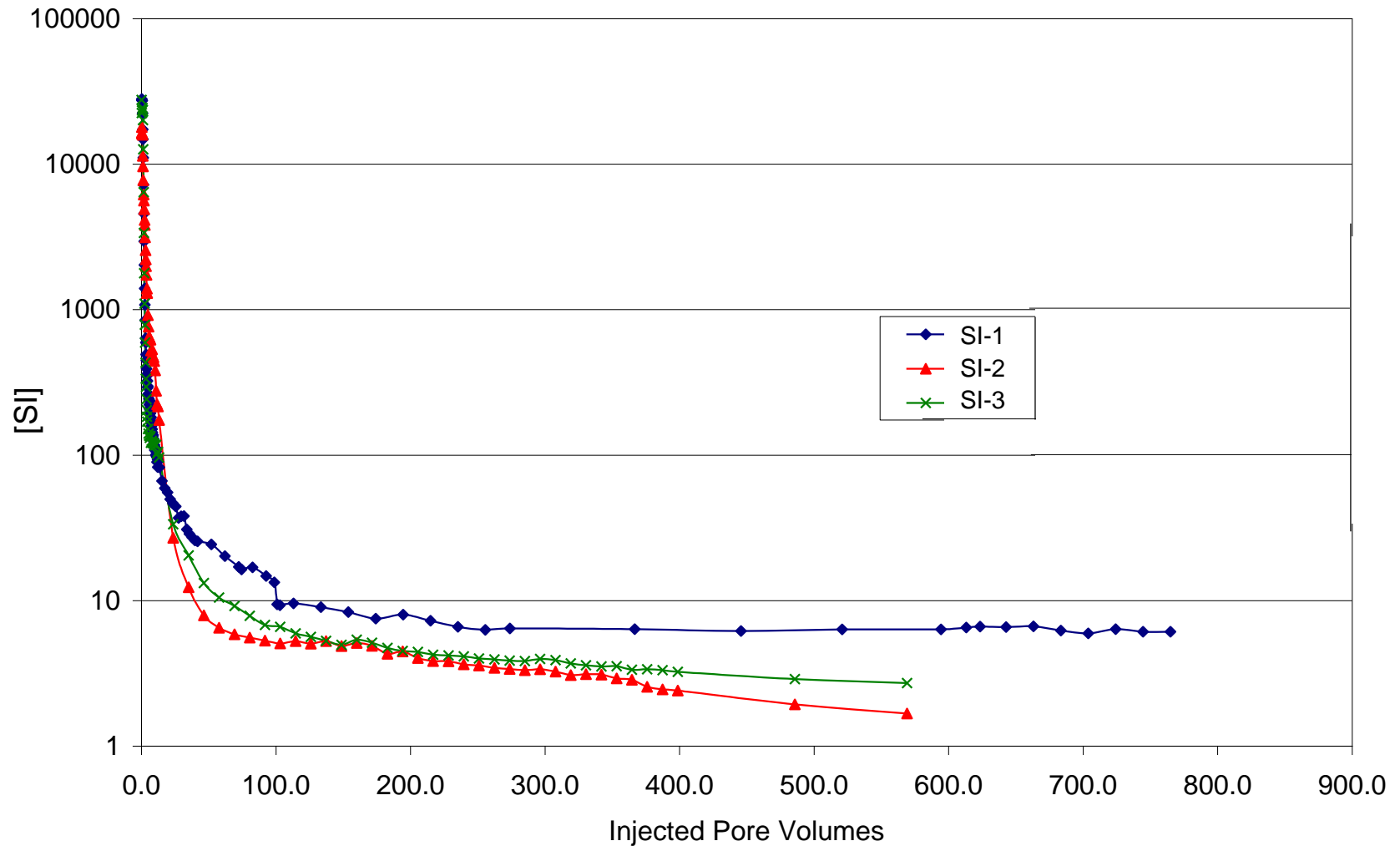
- Mix 2 brines at Field T and P
- Run test without Inhibitor (TestScale) and also at various dosages
- Record Differential Pressure Across Coil



Differential pressure profile obtained for downhole SI-1 against calcium carbonate scale
Formation Water with Elevated Calcium, Split to Anions and Cations 50:50mix, pH-7.7,
120°C, 200psi, [SI]=ppm as supplied in mix



Coreflood Evaluation



FASTrac Capabilities

