# Guidelines for material compatibility and corrosion testing to qualify workover and completion fluids

WP13 meeting, 10. September 2008

StatoilHydro

# Introduction

- Operators have a need for a unified test approach for oilfield brines
- Oilfield brines defined as:
  - Completion, Drilling and Workover Fluids
- The test method shall:
  - enable fair comparison between brines
  - ensure that all corrosion risks are known before use
- Workgroup has had participants from:
  - BP, ENI, Total, Shell, StatoilHydro
- Test document has been sent to major brine suppliers for comments

# Two stages of testing

- Screening test, to be performed by brine supplier
  - PURPOSE:  Establish a maximum recommended temperature of use to avoid chemical breakdown and unwanted corrosion
- Qualfication test, to be performed together with end user
  - PURPOSE: Establish the suitabiltiy of the brine for a specific environment and materials
- Two test environments included in both stages;
  - $N_2$/inert atmosphere
  - actual $CO_2$/$H_2S$ atmosphere ($H_2S$ may be omitted in screening test)

# Screening test - supplier

- Separate thermal stability test for 90 days
- ”low-tech” corrosion tests, 30 days;
  - weight loss, U-bends and tensile specimens
- Use of generic/typical materials and operational parameters
- Proposed materials are:
  - Low alloy steel (110ksi preferred)
  - 13Cr (typically L80)
  - SMSS 13Cr (typically 13Cr/5Ni/2Mo, 110 ksi preferred)
  - 25Cr superduplex (125 ksi preferred)
  - Super-austenittic 28 Cr (125 ksi preferred)
  - Ni alloys (Alloy 718, 125 ksi preferred)

# Screening test – proposed acceptance criteria

- Chemical stability;
  - (No) chemical degradation (pH and chemical analysis)
  - No significant change in pressure

- Corrosion tests;
  - < 0.025 mm/yr (1mpy) for CRAs
  - No pitting or cracking
  - No loss in ductility on tensile samples

# Qualification testing – supplier and end user

- Corrosion testing as for screening, plus :
- Operational parameters and material selections are field specific
- Duration is 30 days for halides, 60 days for organic salt based brines
- Corrosion tests include SSC/SCC testing, either;
  - 4PB, C-ring or Constant Load.
  - DCB is an option if end user agrees
- Crevice corrosion tests may be included
- Hydrogen samples for measuring H-uptake in metals

# Qualification test – proposed acceptance criteria

- Use the same acceptance criteria as for screening tests;
  - < 0.025 mm/yr (1mpy) for CRAs
  - No pitting or cracking
  - No loss in ductility on tensile samples
- plus :
  - No crevice corrosion
  - Acceptable hydrogen uptake
  - No loss in ductility on tensile samples

# What's next?

- The Operators suggest to produce an EFC document
- The Operators will use EFC doc as a requirement to suppliers
- This will in time provide test results which will enable a fair comparison of products
- Corrosion risks may then be evaluated objectively and reduced.