Use of on-line monitoring for oil discharge reporting

Experiences from BRAGE Platform

Arne Henriksen, Principal Engineer StatoilHydro
Project History

• Project 2005 --> 2007 (HYDRO projects)
  – Qualify on-line Oil in Water Analyser
  – Establish "the Best Practise" for process control (trend measurements) and discharge to sea (reporting to SFT)
  – Co-ordinate ongoing activities for on-line oil in water measurements in Hydro
  – Project owner: Gunnar Breivik, HMS
  – Steering group (Bergen): Jostein Toft, (Toril Utvik), Ståle Teigen, Geir Engvoldsen
  – Project group (RCP): Arne Henriksen, Jørn Paus, + +
  – Brage platform: Yngve Tvedt, Hans Kåre Borge, Laboratory, ++

2005

From 13 analysers 3 were selected for testing in test rig in Porsgrunn
Turner Design, Teledyne Analytical Instruments and Advanced Sensors

2006 --> 2007

- Joint Venture Project
  Research Centre Porsgrunn, Advanced Sensors Ltd. and Brage platform
- Develop and qualify the on-line OIW-EX100 analyser for reporting oil discharge to sea
On-line Analysis for oil concentration in produced water

Conclusion remarks given at last year conference

On-Line Analyser at Offshore Platform will be Qualified and Approved in 2007 by the Authority for reporting oil discharge to sea
Qualification of OIW-EX1000 analyser at BRAGE

Manual sampling

On-line Analysis
OIW-EX1000 Analyser at BRAGE

UV Fluorescence Analyser measures oil concentration in produced water

On-line Analyser installed after the Degassing Tank

Qualification program is in progress for SFT reporting oil discharges to sea

Intranet connection to the monitor from Research Centre in Porsgrunn
On-line oil in water measurements for real time process control

Light from the UV laser in the sample chamber

Advanced Sensors OIW-EX1000 monitor at Brage
UV-laser source

Ultra Sonic Transducer

Sample chamber

Light detector (PMT)

outlet

inlet
Automatic Cleaning System in OIW-EX1000 Analyser

Automatic cleaning system of the sapphire glass in front of the light probes based on ultrasonic wave generated by the transducer. Result after 30 days continuing measurements.
On-line oil in water measurements for real time process control
Data: oil fluorescence and predicted oil ppm [OIW-EX1000 Monitor at BRAGE]

Sample Cycles (10 minutes interval)
On-line oil in water measurements for real time process control

Monitor Screen at BRAGE Control Room
28. April, time 01:30 to 05:00

Measurements every second

response ppm

- 34-33
- 32-39
- 33-35
- 38-33
- 22-25
- 40-41
- 45-49
Results 20-30 April

oil ppm

on-line analysis (10 minutes intervals)
On-line analysis (10 minutes intervals)

Oil ppm

Results 1-8 May

StatoilHydro
Results from Brage

• Test period 12. March to 15. April
  – Mean deviation between GC method and on-line method: - 4.2 mg/l (std dev. 5.0 mg/l) for 102 spot samples

• ”Monthly reporting” 12. March – 15. April
  – Spot samples and same time period on-line
  – GC method (average of 4 spot samples): 13.5 mg/l
  – On-line analysis (spot sampling time): 17.7 mg/l
  – On-line analysis (mean over 24 hours): 17.8 mg/l
24 hours report from BRAGE OIW-EX1000 Degassing Tank
Analysis of oil field chemicals in produced water (Full Scan Spectrometer)

Scale inhibitor Si 4503
Advantages on-line Analyser

Environment

- Oil discharge analysis for all 24 hours
- Operator can handle quickly to process disturbance and minimise oil to sea discharge
- Platform can use the analysis for SFT reporting
- Reduction in Lab work at the platform
Advantages on-line Analyser

**PRODUCTION**

Real-time analysis can give
- better process control
- process optimization
for achieving
- higher oil production
- without increased oil discharges

Potential for analysis of
- higher oil concentration
- oil field chemicals

Control Plot from OPIS [BRAGE]
read at the platform or onshore
Goal for the future

On-line analysis approved by SFT for reporting of oil discharges to sea

Full time monitoring of oil discharges to sea

Real-time on-line analysis of oil components in separation processes for
- better process control
- reduction of oil field chemicals
- higher oil production
- lower oil discharges
- sub sea installation