

# 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**



**BRAGE monitor**

**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



**BRAGE monitor**

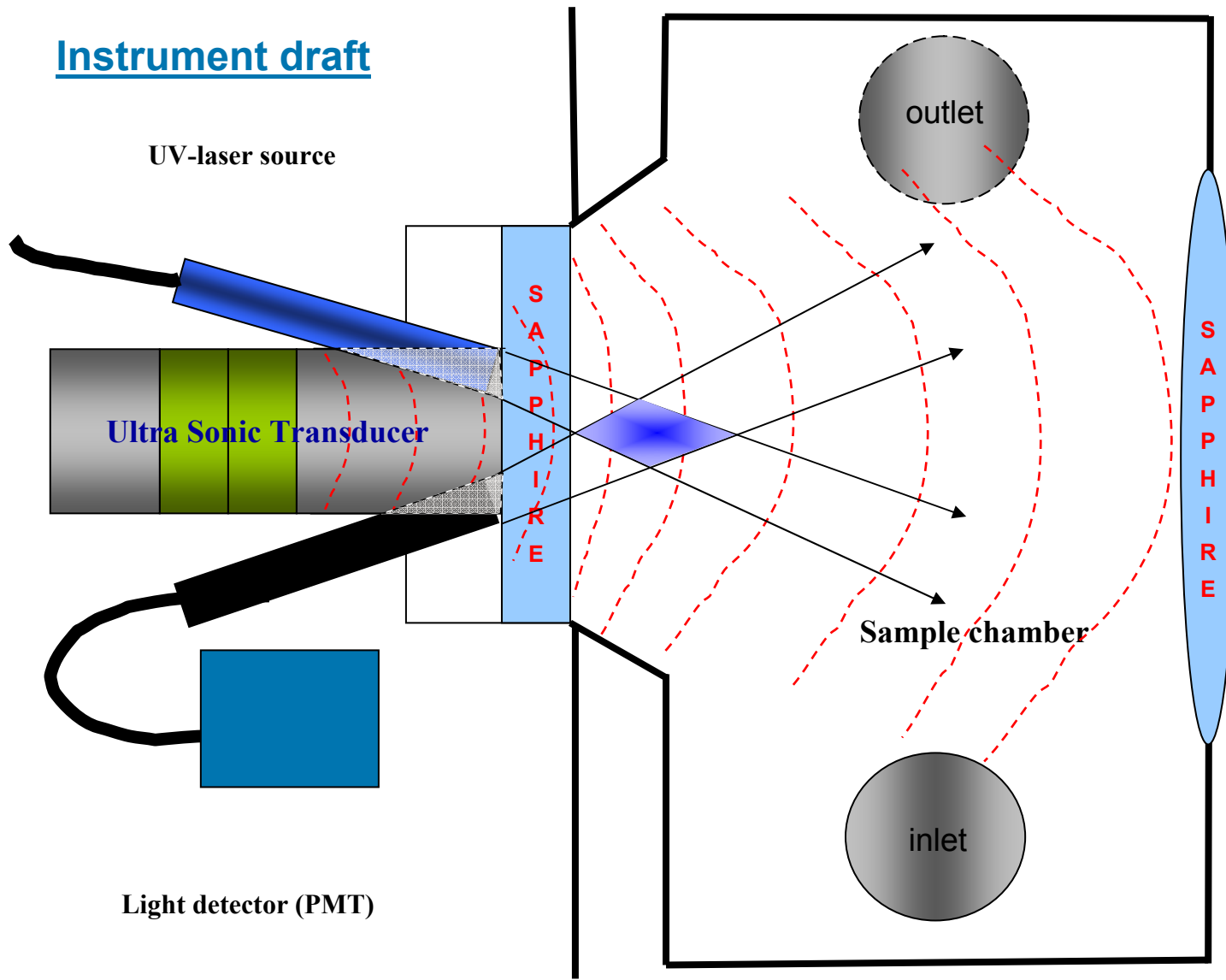
## On-line oil in water measurements for real time process control



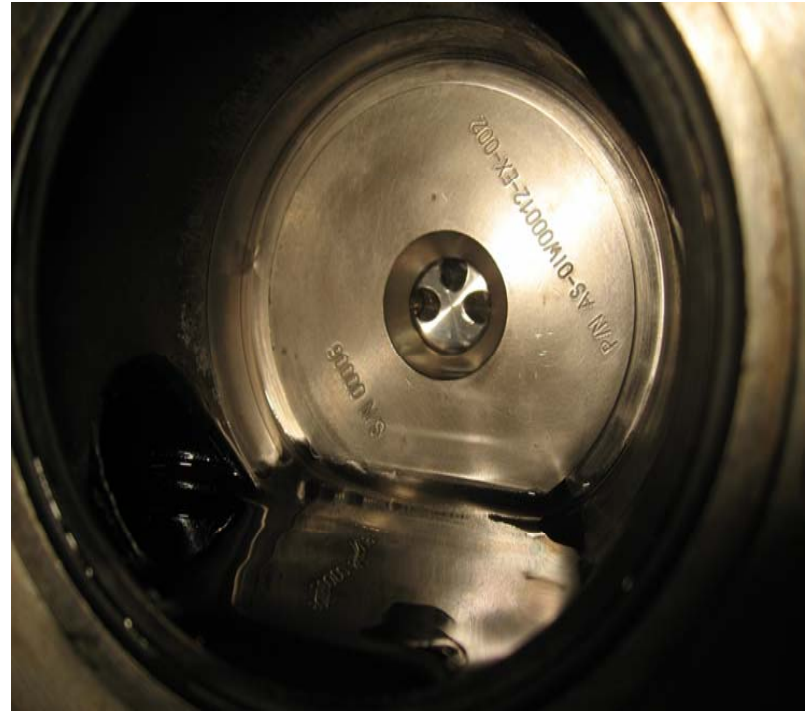
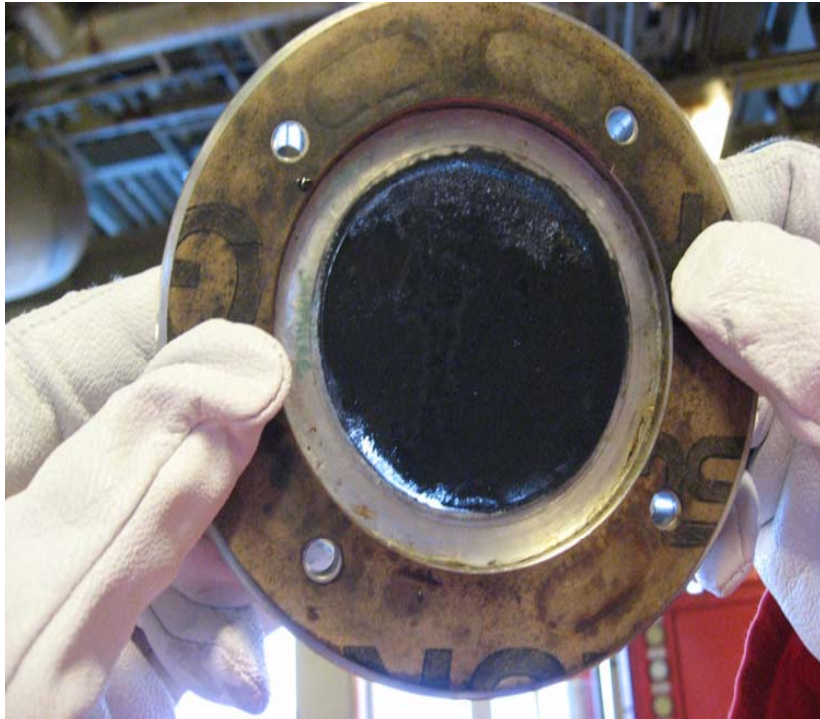
Light from the UV laser  
in the sample chamber

**Advanced Sensors OIW-EX1000 monitor at Brage**

# Instrument draft

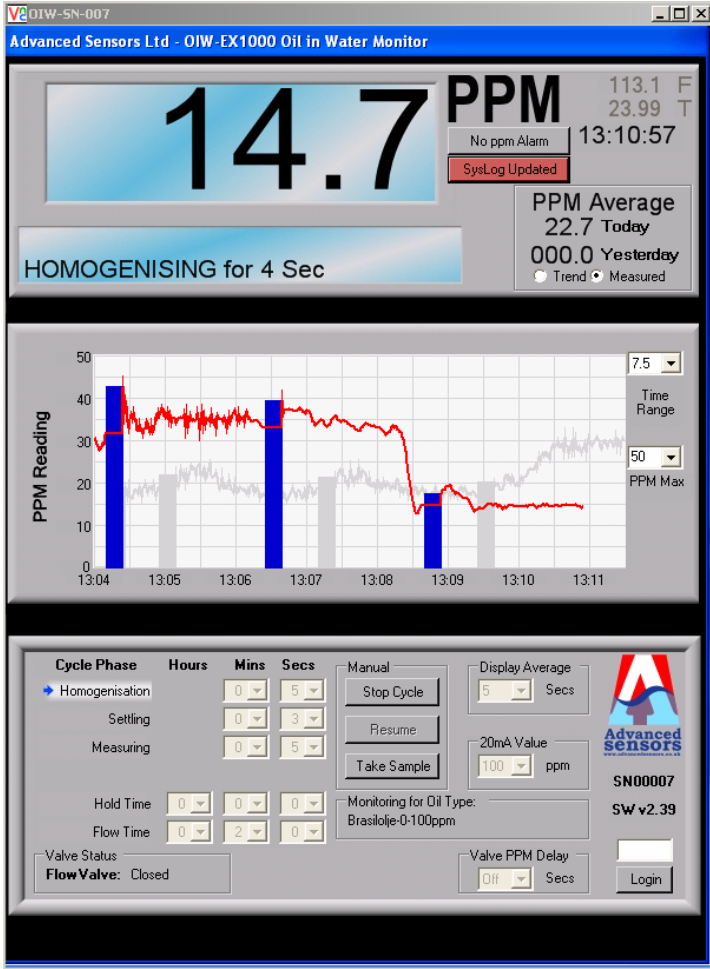
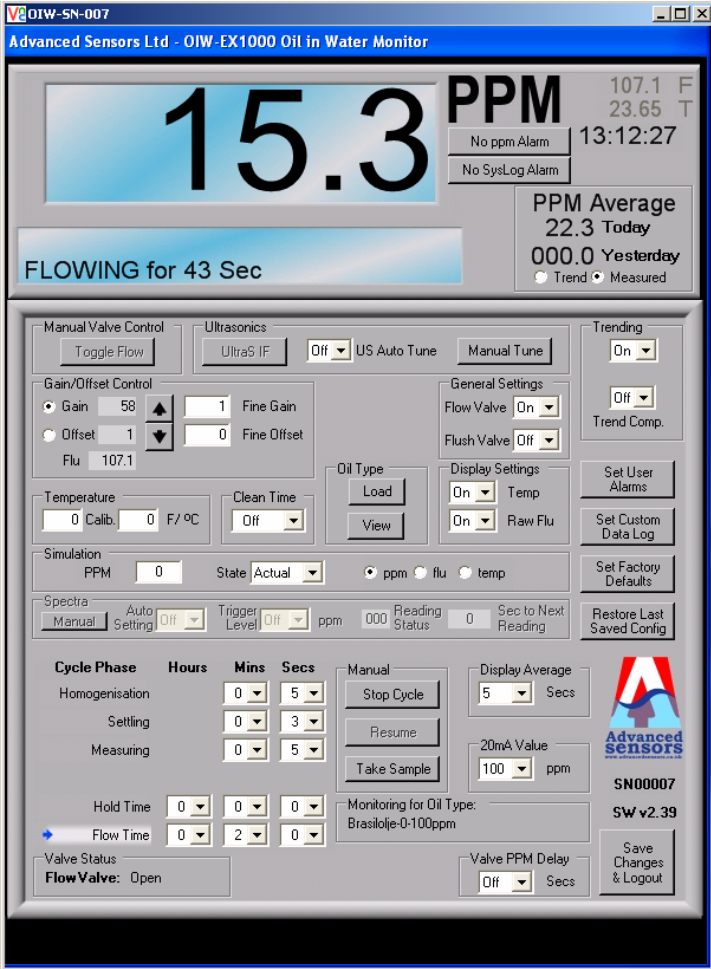


## Automatic Cleaning System in OIW-EX1000 Analyser

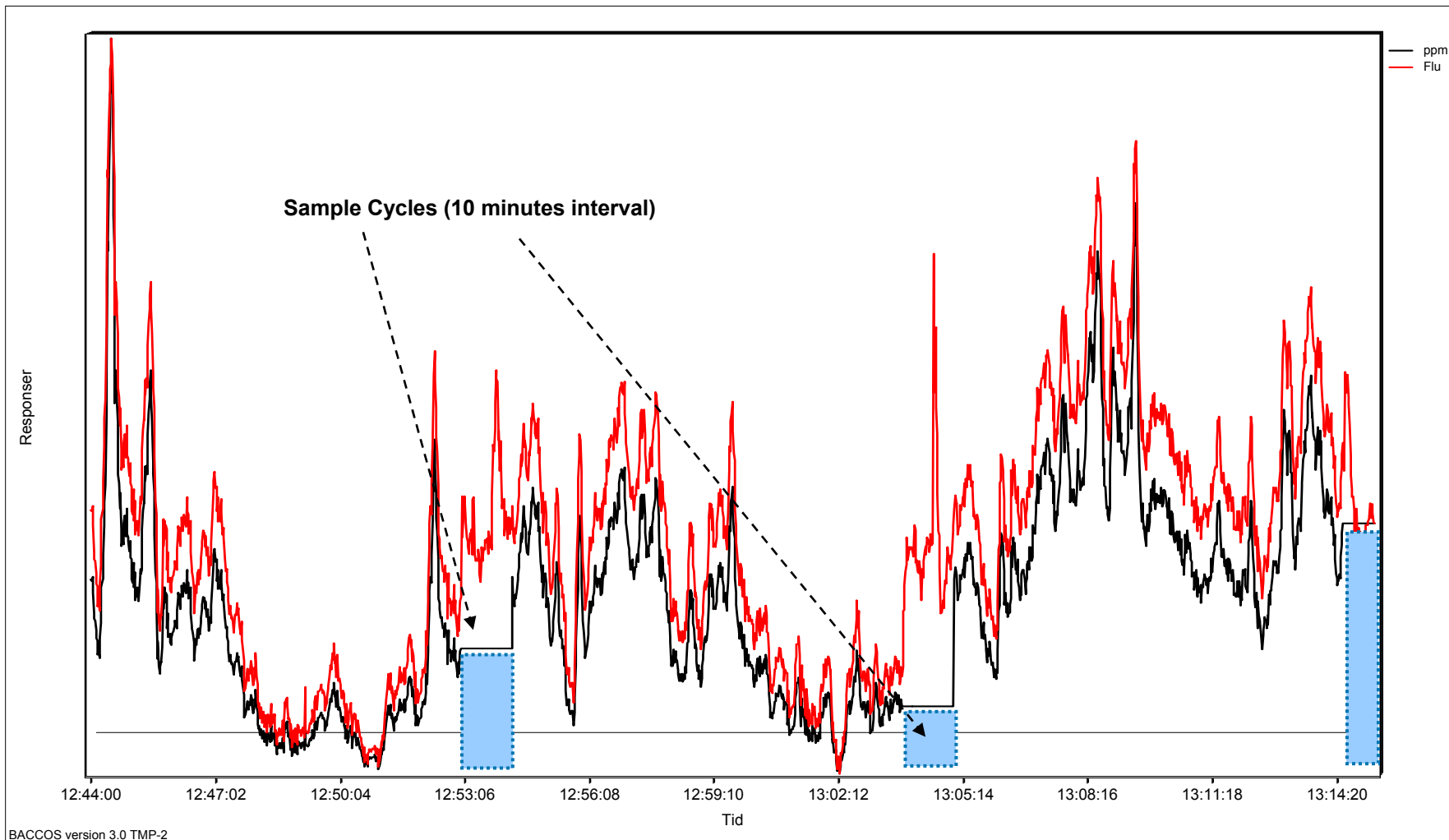


**Automatic cleaning system of the sapphire glass in front of the light probes based on ultrasonic wave generated by the transducer. Result after 30 days continuing measurements.**

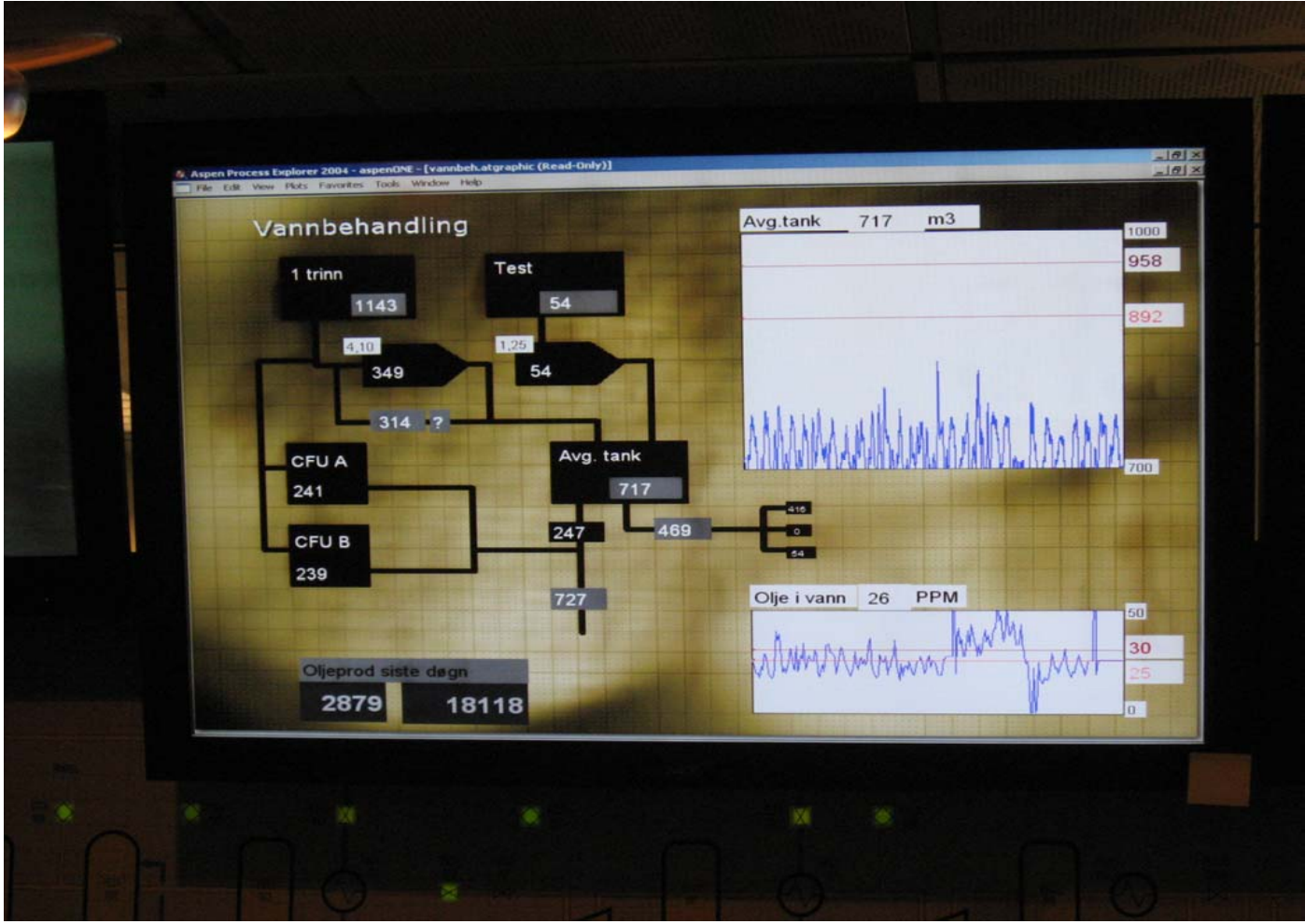
# On-line oil in water measurements for real time process control



# Data: oil fluorescence and predicted oil ppm [OIW-EX1000 Monitor at BRAGE]

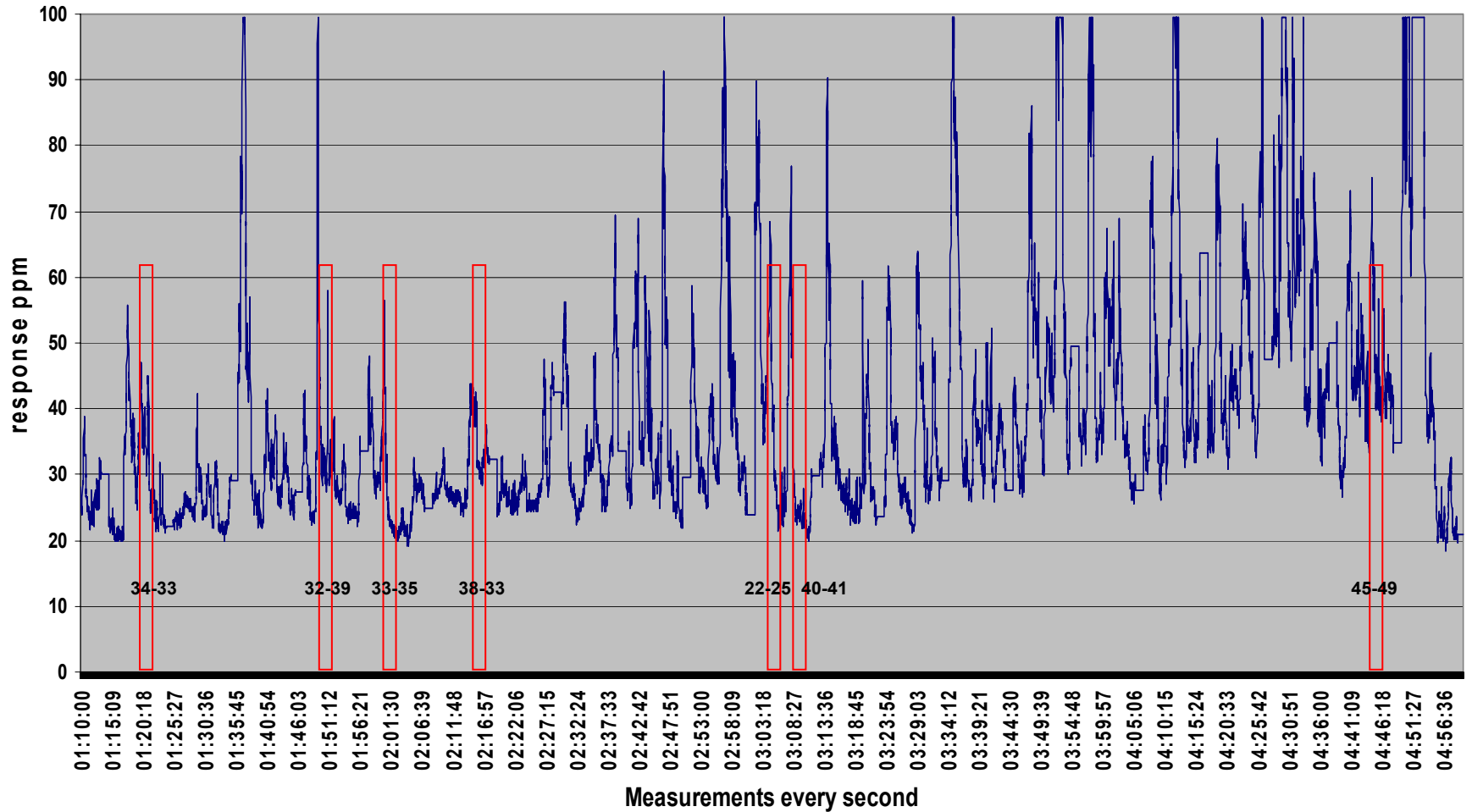


# On-line oil in water measurements for real time process control

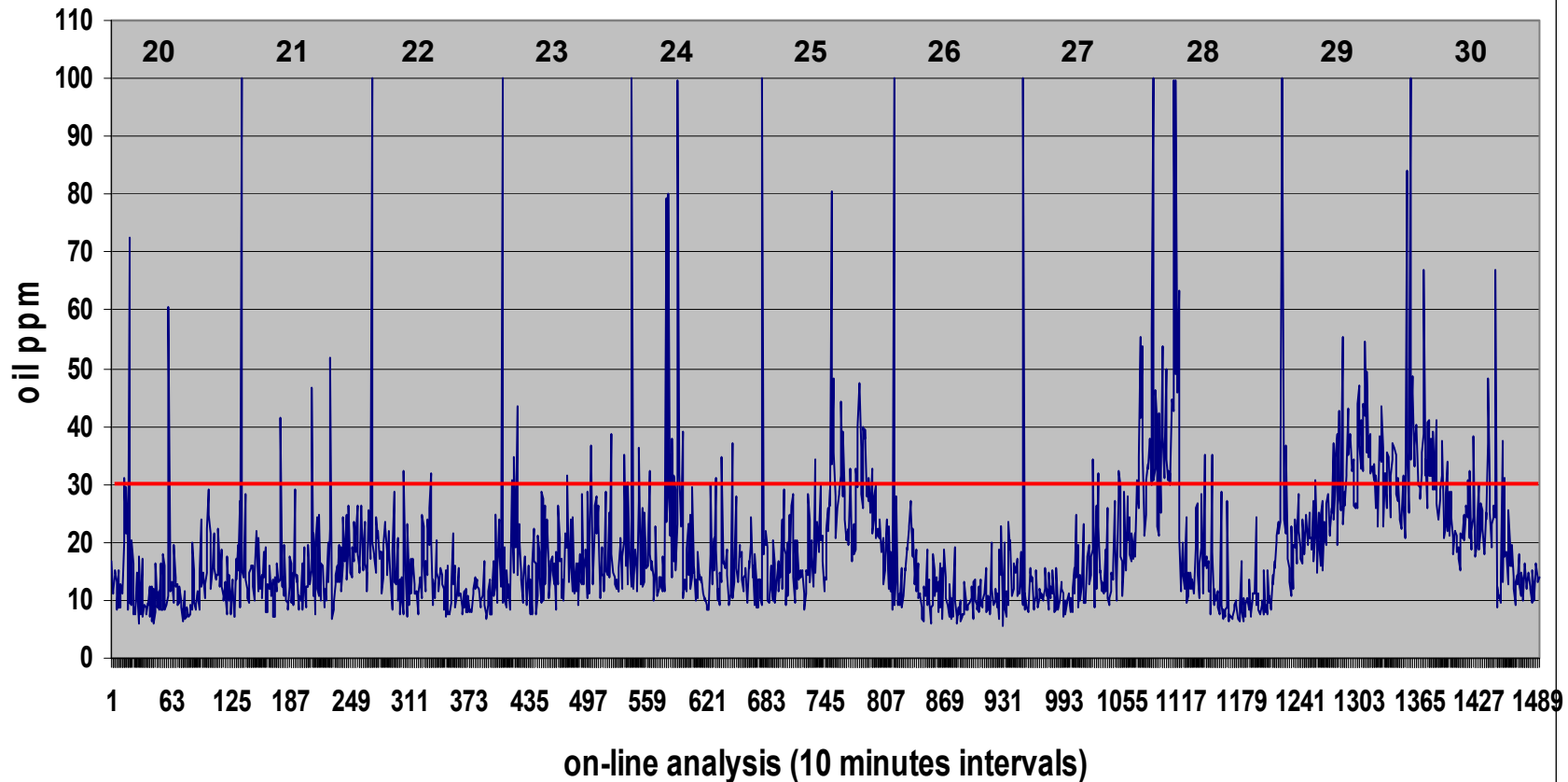


Monitor Screen at BRAGE Control Room

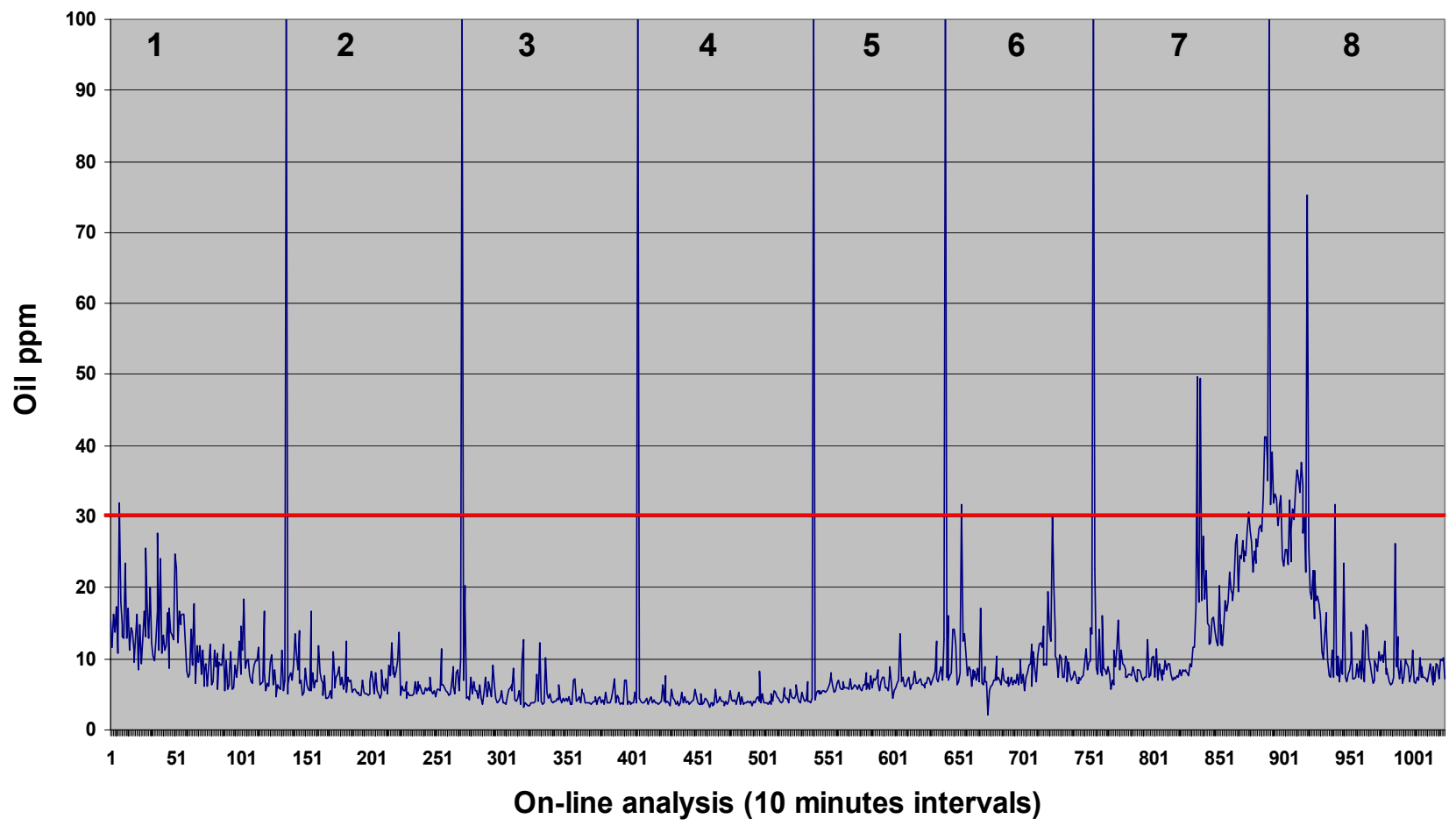
## 28. April, time 01:30 to 05:00



# Results 20-30 April



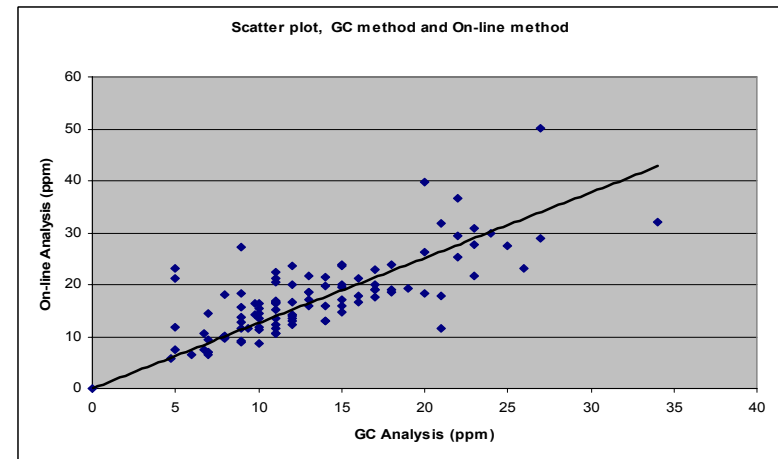
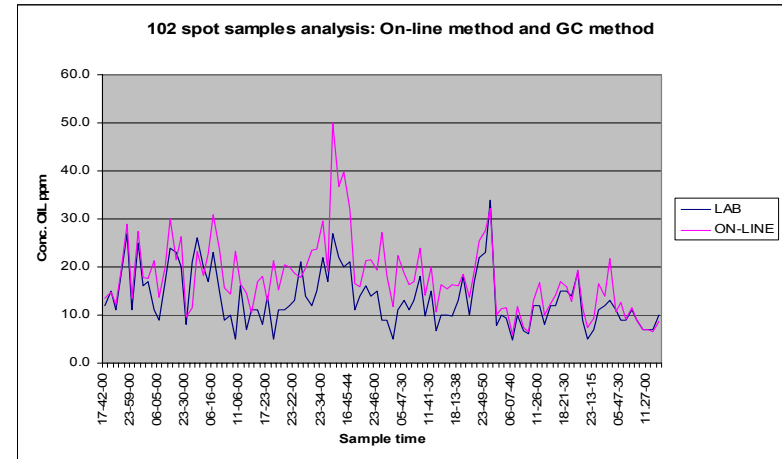
### Results 1-8 May

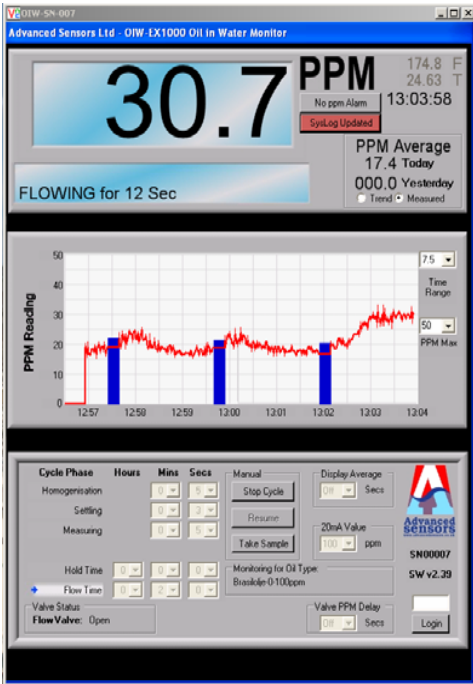


## Results from Brage

- 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

### Spot samples





# 24 hours report from BRAGE OIW-EX1000 Degassing Tank



## Daily online Oil-in-Water Monitor Report

Date: 2007-09-19.

RESULT for DEGASSING TANK and OIW-EX1000 Monitor (SN0011)

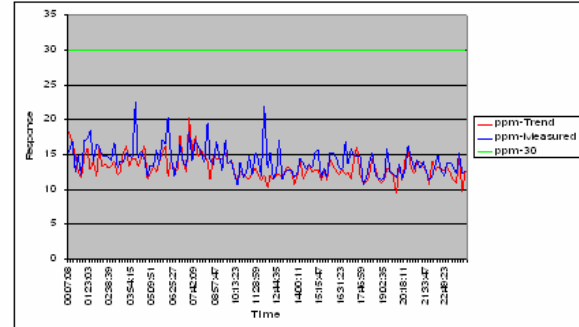
All data are collected from Data file: [SN0011\_19\_Sep\_07-00\_00\_Wed\_OIW\_Data.csv]

Oil concentration for reporting: 14 ppm

### Statistical data

Parameter	ppm-Measured	ppm-Trend	Difference [M - T]	ppm-All (sec)	Difference [M - All]	Water-Temp. °C (sec)
Average	14.2	13.2	1.0	13.4	1.2	75.2
Standard Deviation	3.1	1.7	0.4	1.8	-0.7	1.2
Measurements	133	133	0	81341	-	81341
Maximum	22.5	20.2	2.3	28.5	-4.0	74.4
Minimum	10.4	8.5	1.1	7.8	2.8	70.3
% > 30 ppm	0	0	0	0	-	-
% > 75 ppm	0	0	0	0	-	-

Plot diagram, all measurements of ppm-Measured and ppm-Trend



### Spot samples analysed

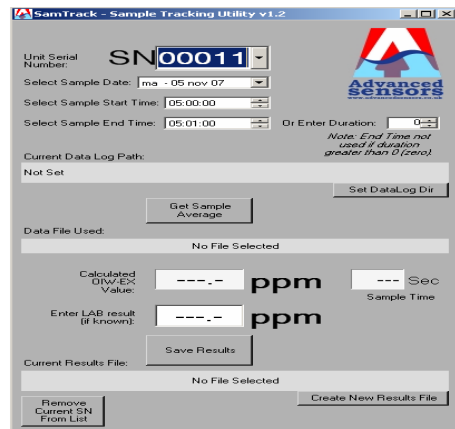
Time sampling	Monitor result in ppm	Est Method result in ppm	Diff (Monitor - Est method)
20:20:20 - 20:31:20	12	8.5	3.5
22:31:30 - 22:32:20	12	11	1

### COMMENTS:

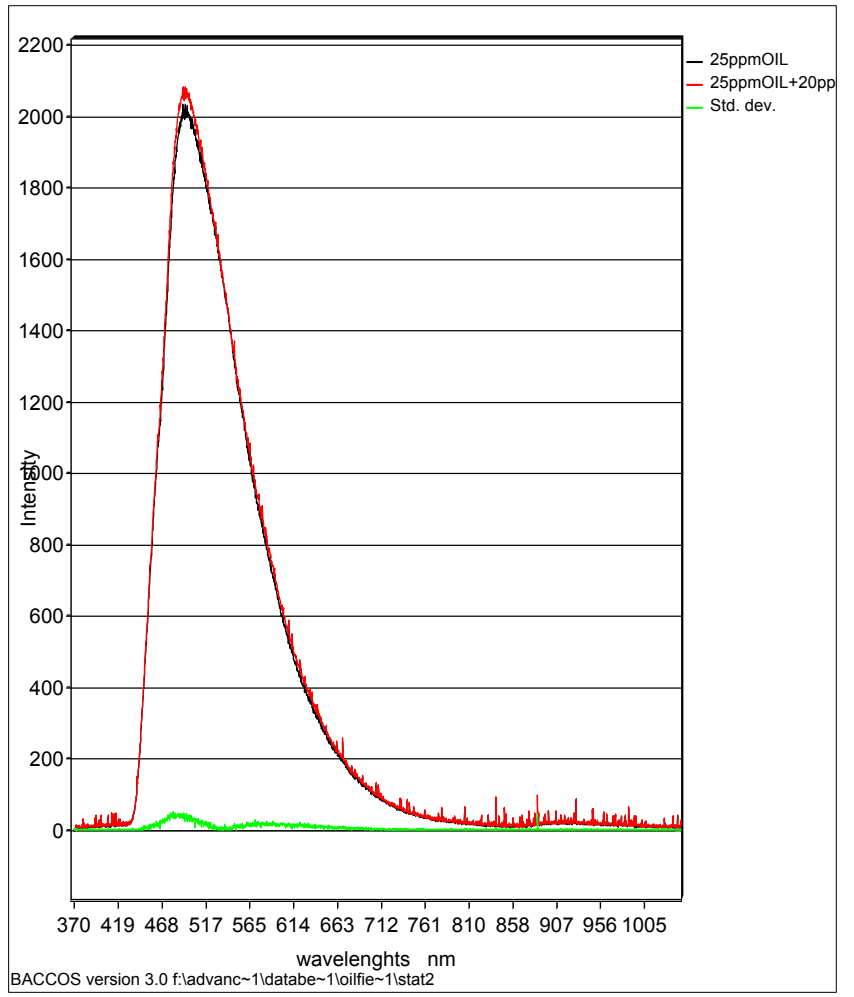
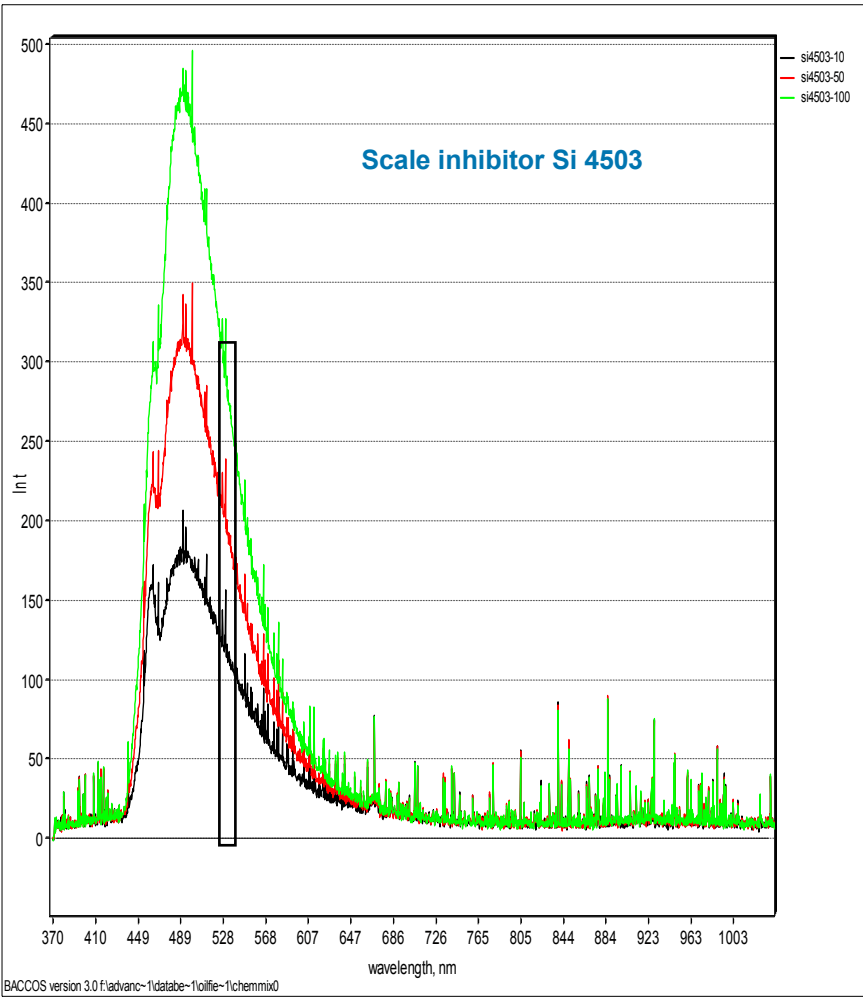
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APPROVED: (Yes/No): \_\_\_\_

Date/Name: \_\_\_\_\_  
 Date/Name: \_\_\_\_\_



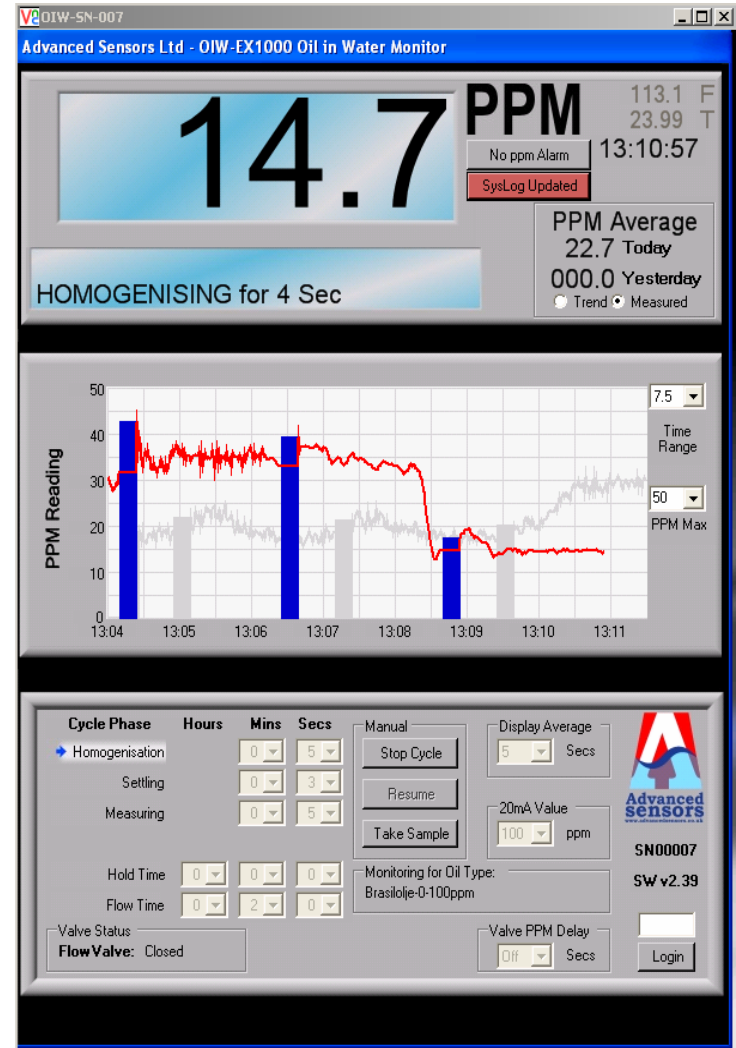
# Analysis of oil field chemicals in produced water (Full Scan Spectrometer)



# 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

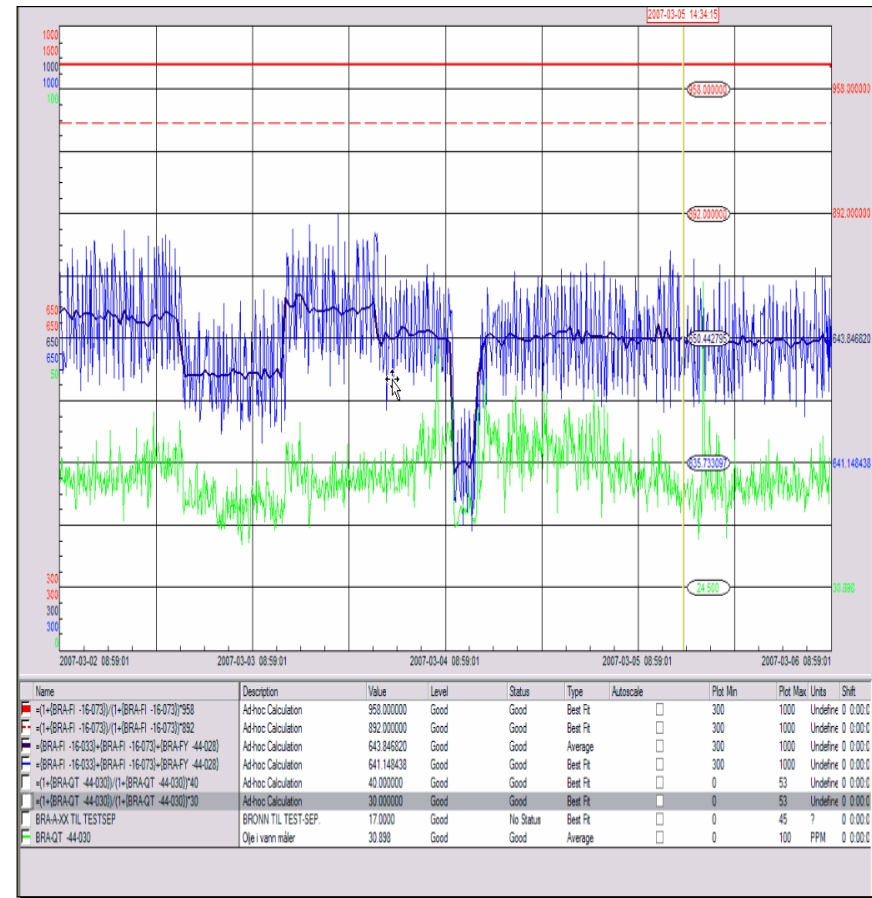
## PRODUCTION

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

