

Use of on-line monitoring for oil discharge reporting

Experiences from BRAGE Platform

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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

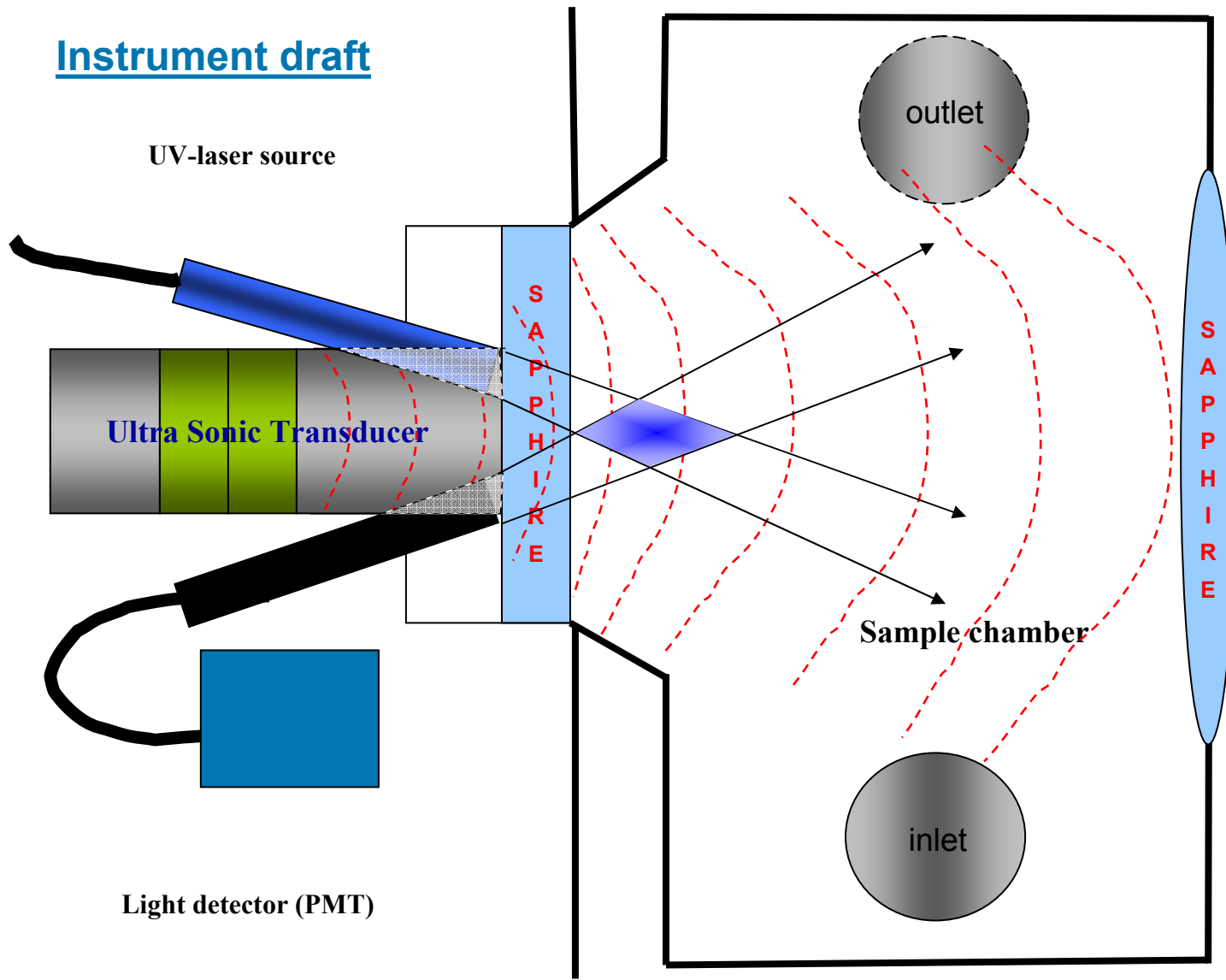
On-line oil in water measurements for real time process control



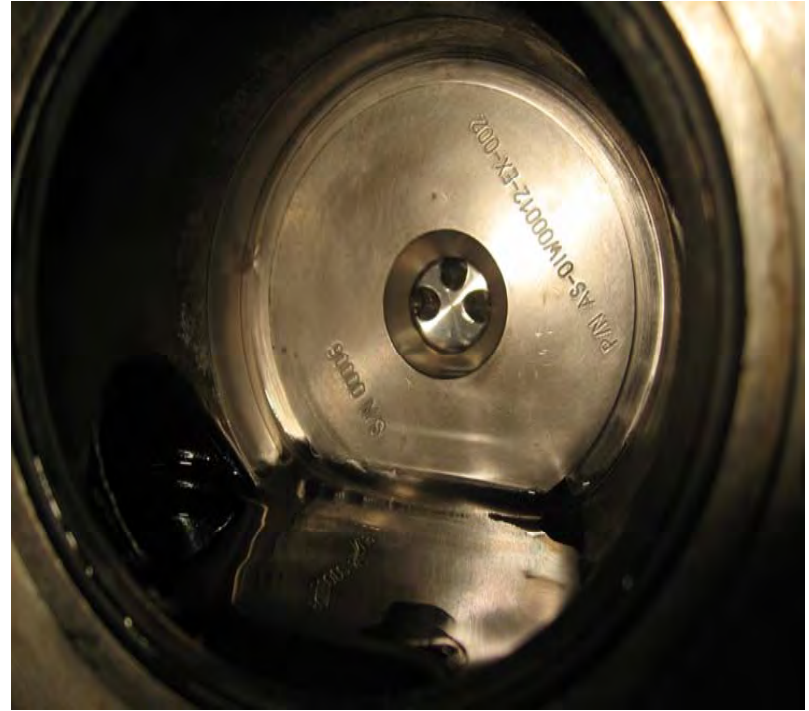
Light from the UV laser
in the sample chamber

Advanced Sensors OIW-EX1000 monitor at Brage

Instrument draft

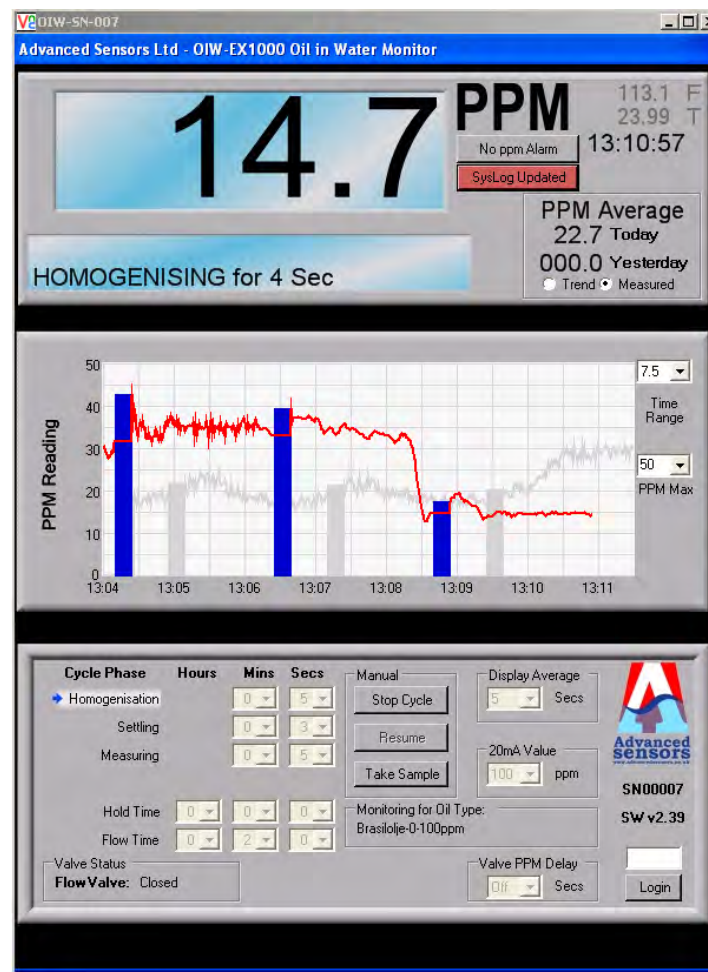
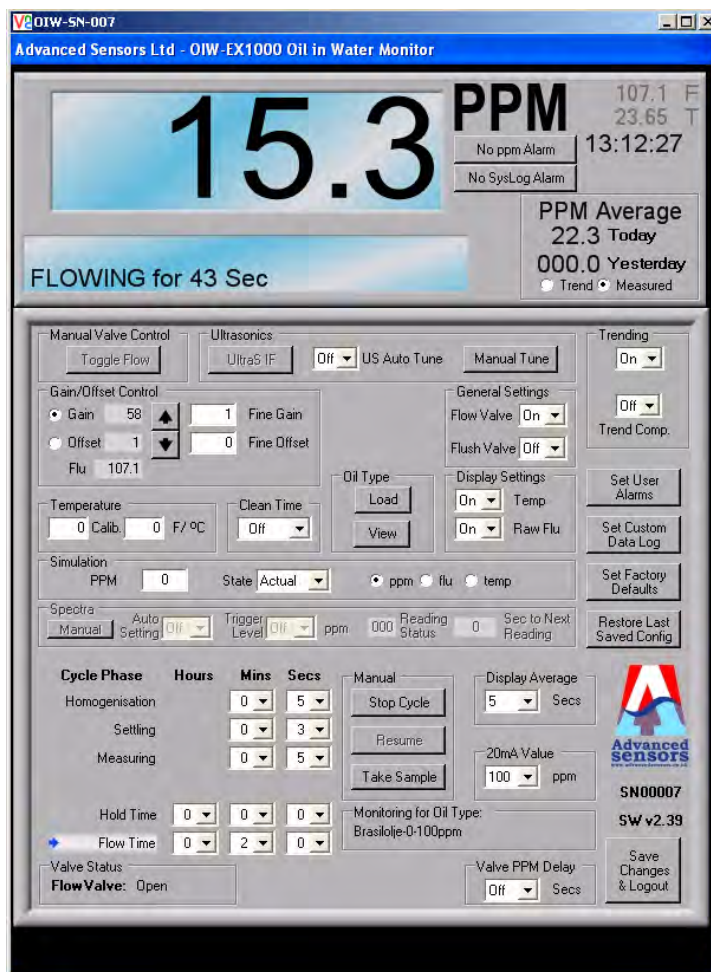


Automatic Cleaning System in OIW-EX1000 Analyser

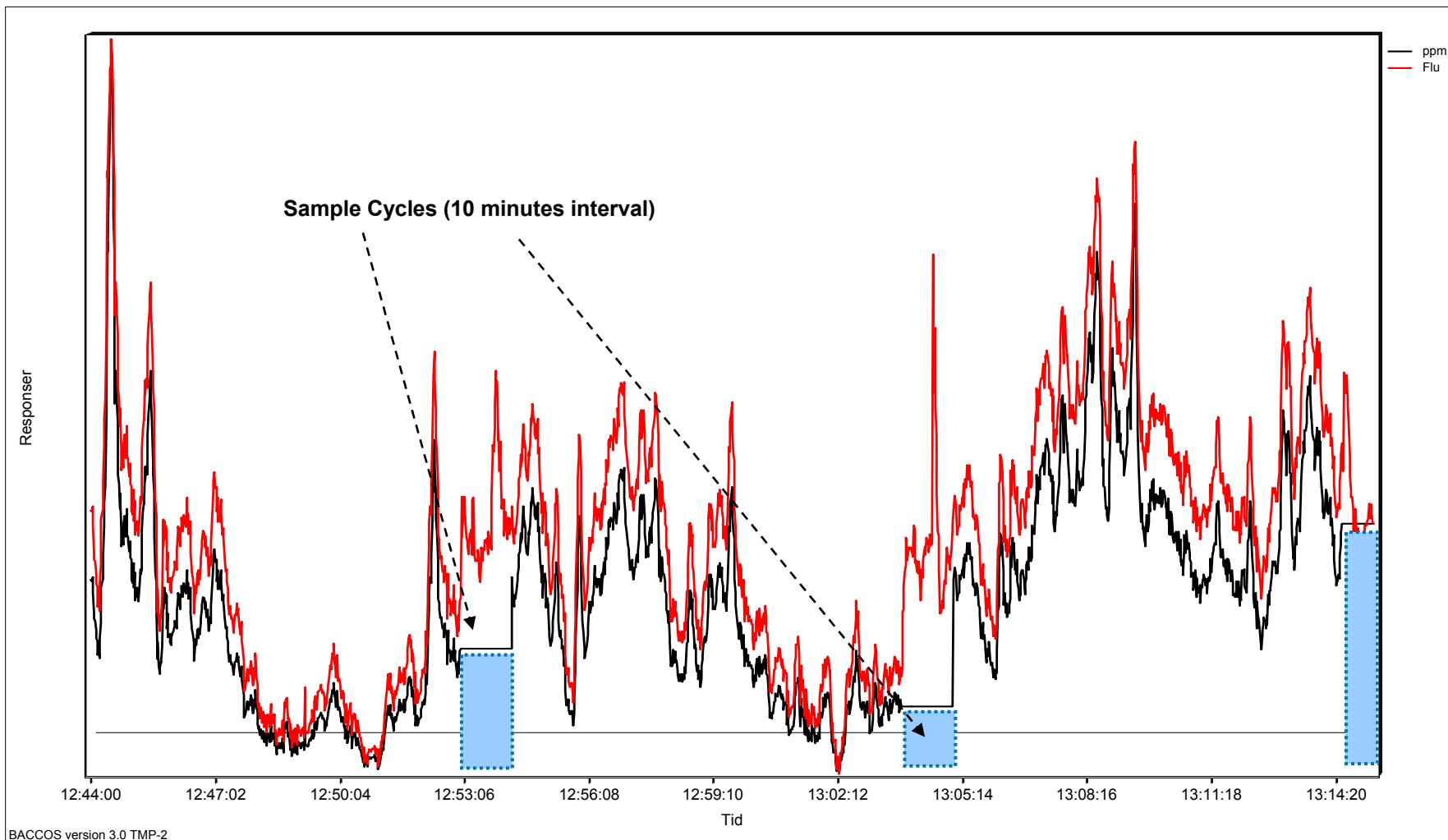


Automatic cleaning system of the sapphire glass in front of the light probes based on ultrasonic wave generated by the transducer. Result after 30 days continuing measurements.

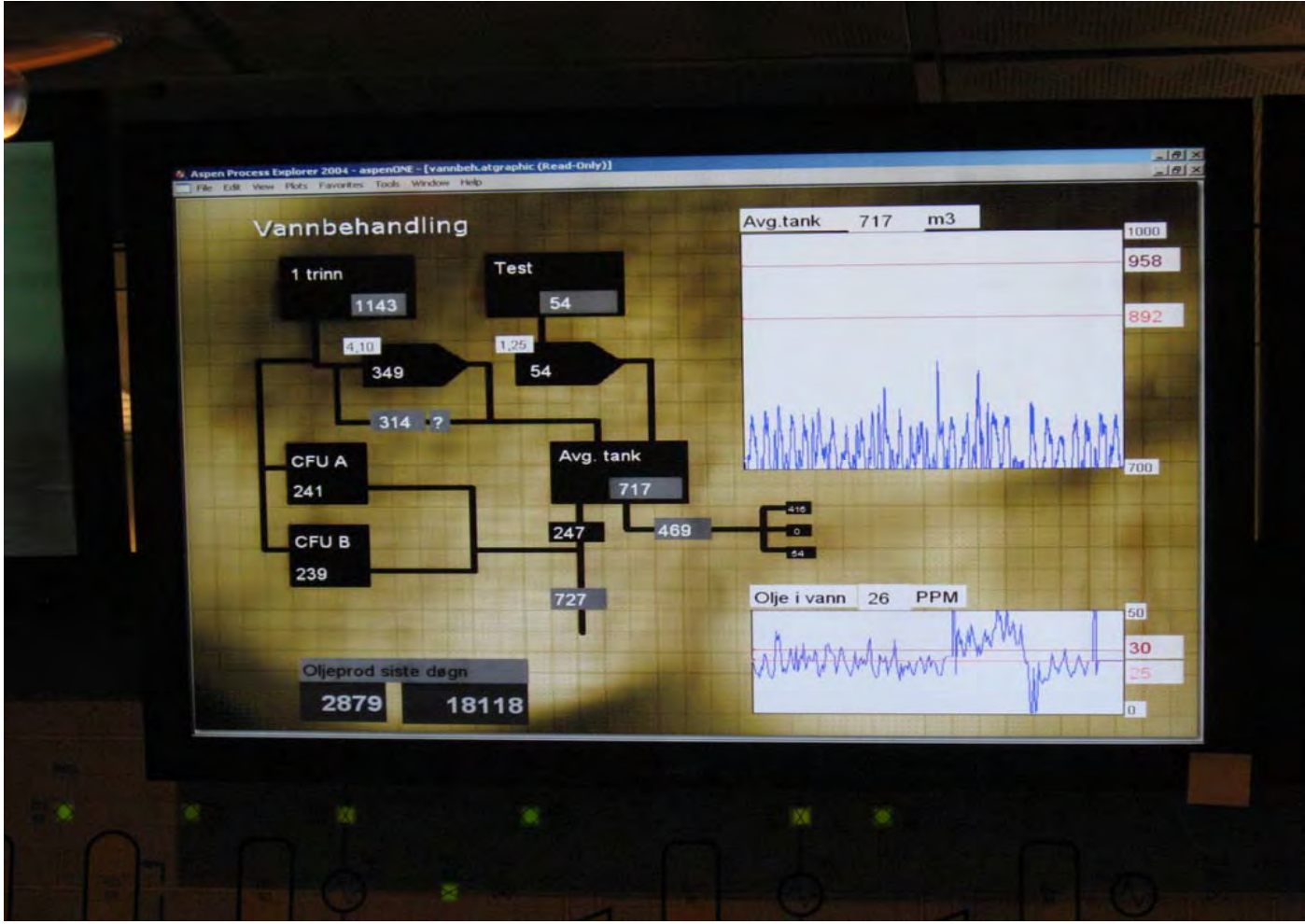
On-line oil in water measurements for real time process control



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

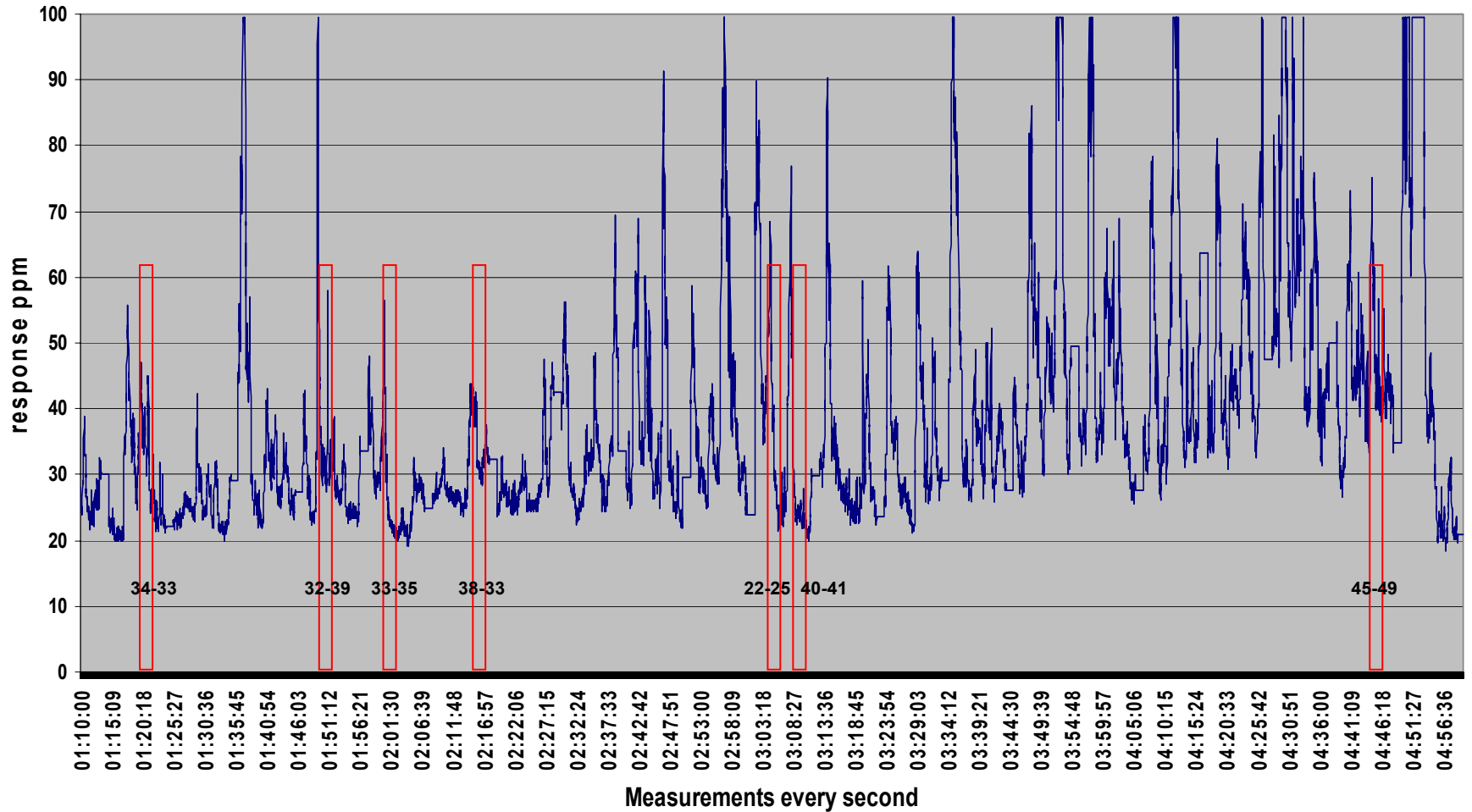


On-line oil in water measurements for real time process control

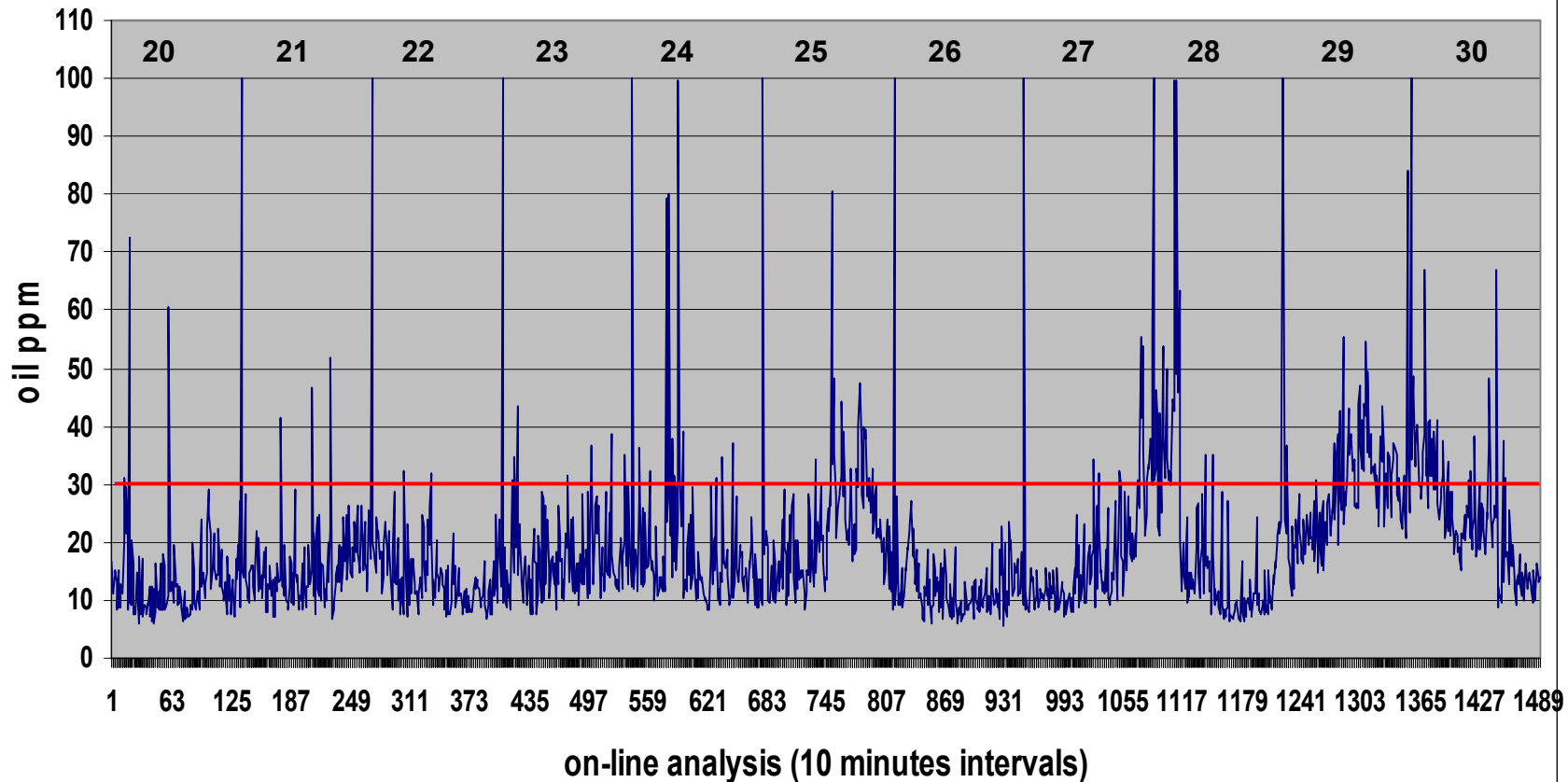


Monitor Screen at BRAGE Control Room

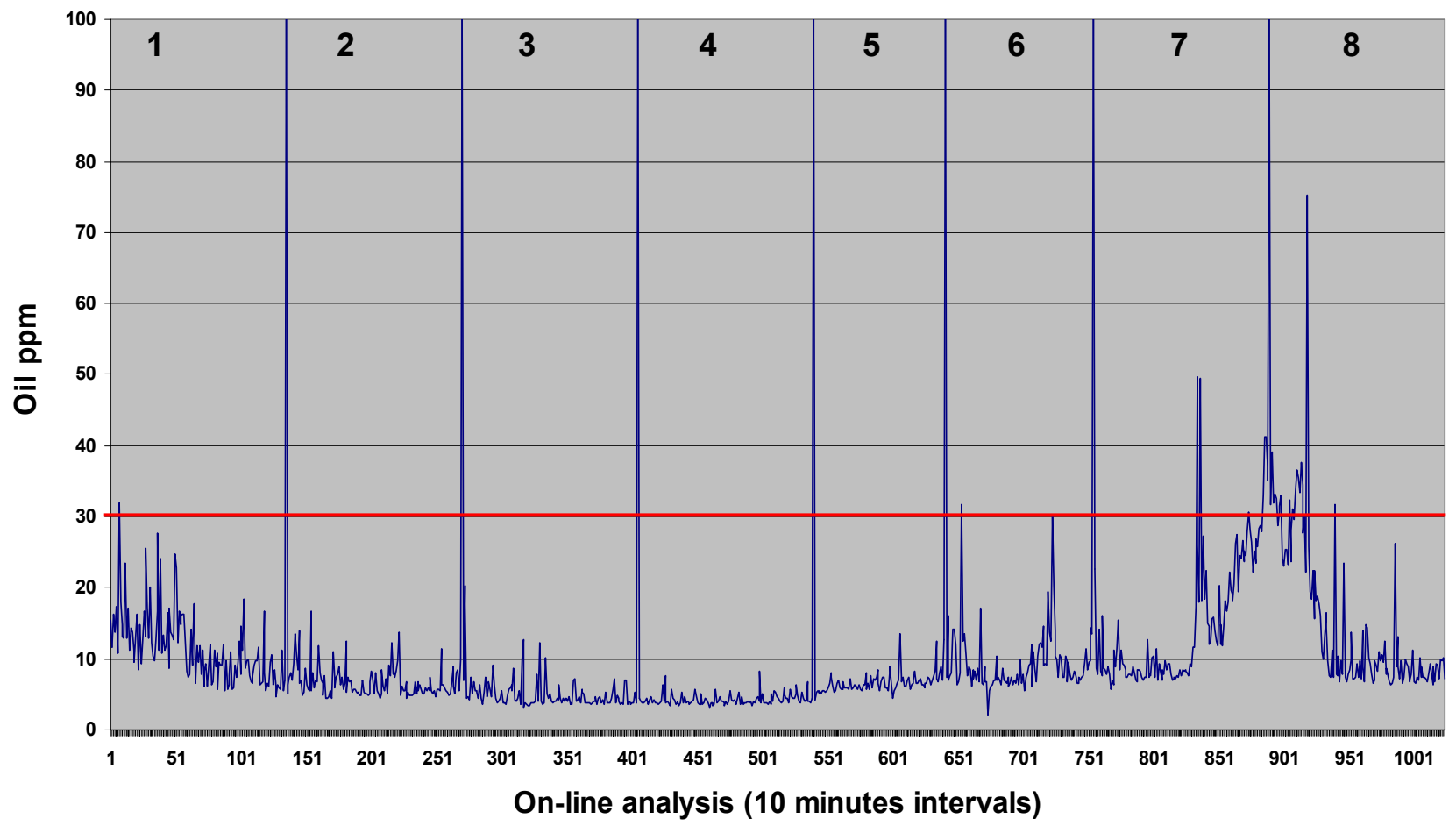
28. April, time 01:30 to 05:00



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

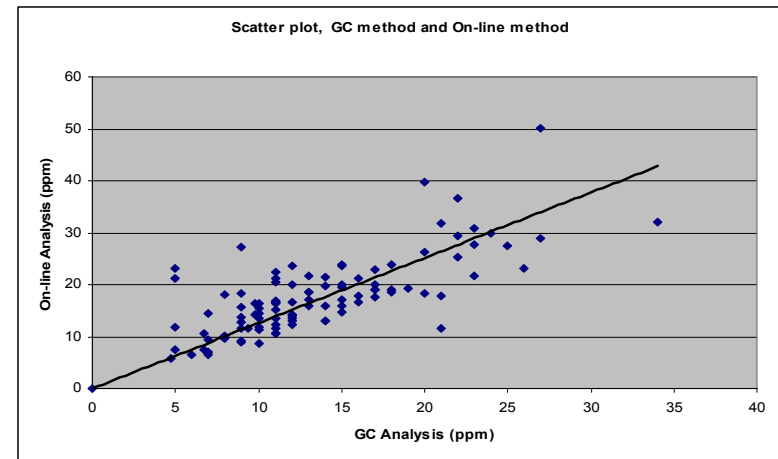
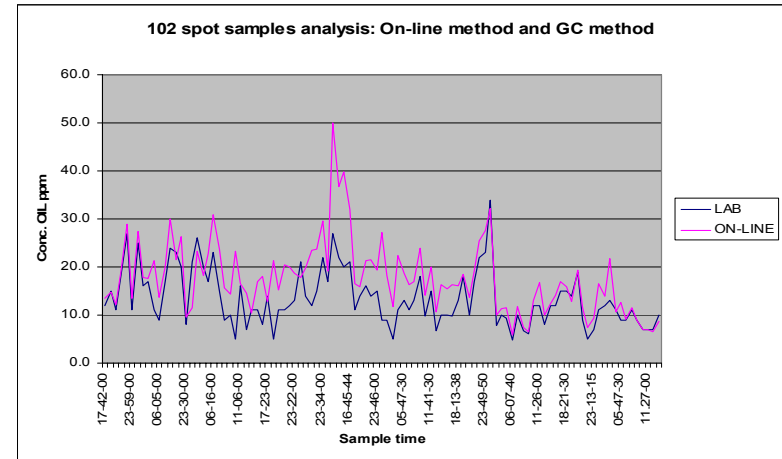
- ” Monthly reporting” 12. March – 15. April
 - Spot samples and same time period on-line

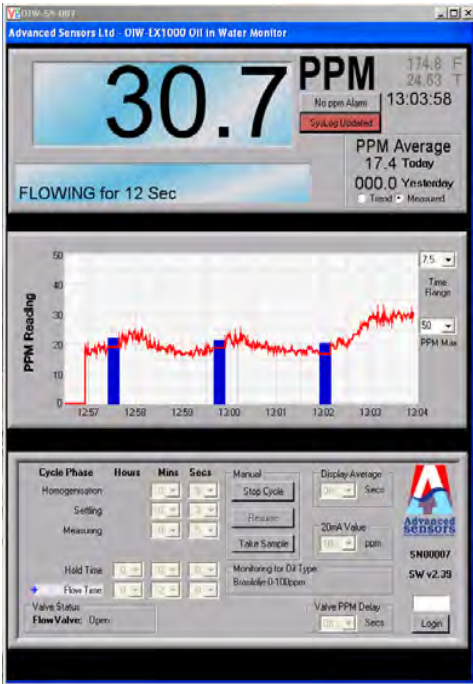
 - GC method (average of 4 spot samples):
13.5 mg/l

 - On-line analysis (spot sampling time):
17.7 mg/l

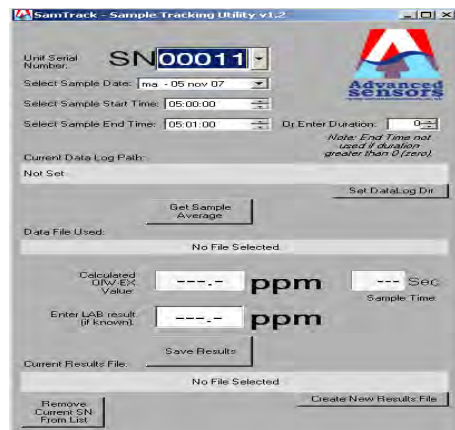
 - On-line analysis (mean over 24 hours):
17.8 mg/l

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)

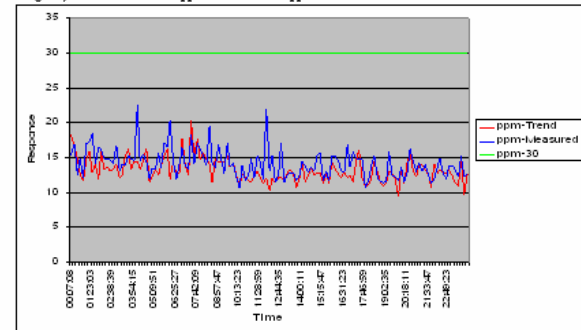
All data are collected from Data file: [SN0011_19_Sep_07-00_00_Wed_OIW_Data.csv]

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 analyzed

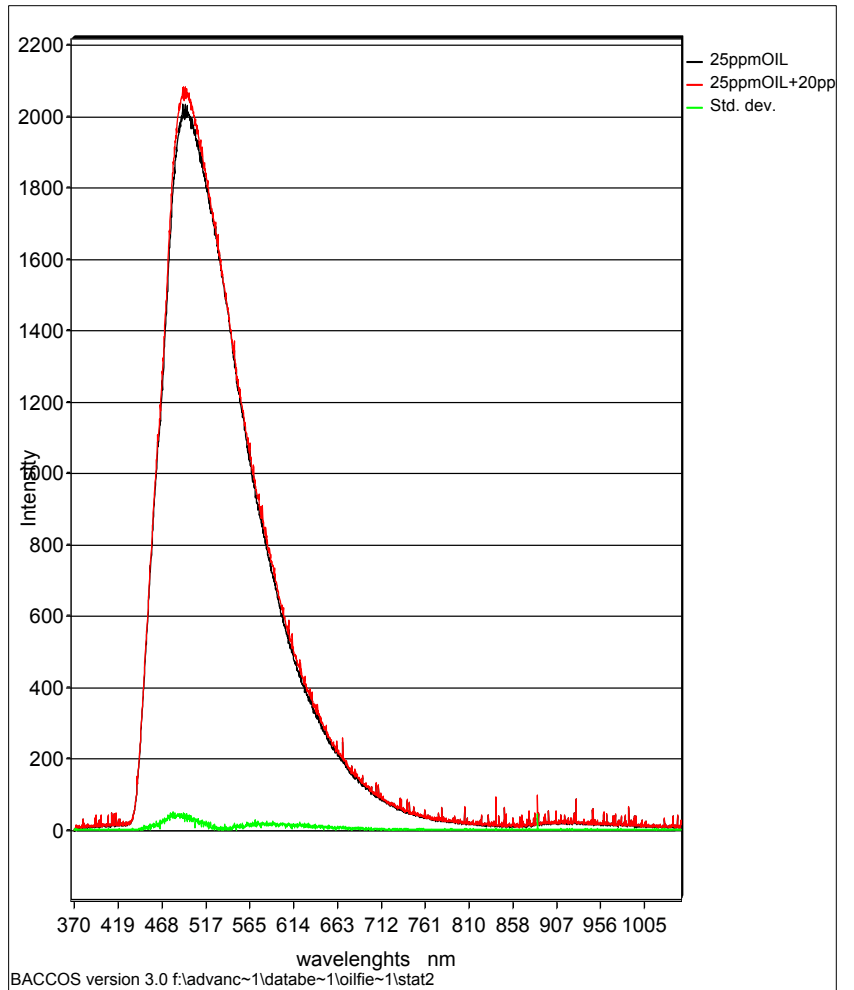
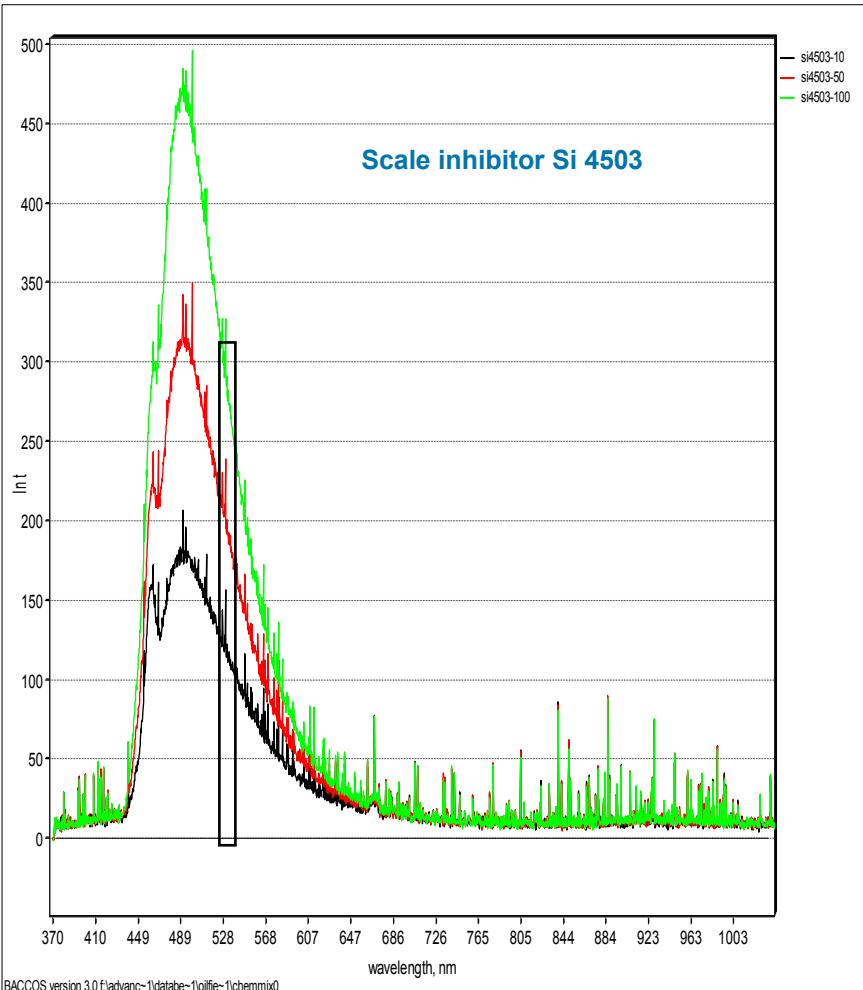
Time sampling	Monitor result in ppm	Est Method result in ppm	Diff (Monitor - Est method)
20:20:20 - 20:31:20	12	8.5	3.5
22:31:30 - 22:52:20	12	11	1

COMMENTS:

APPROVED: (Yes/No): ____

Date/Name: _____
 Date/Name: _____

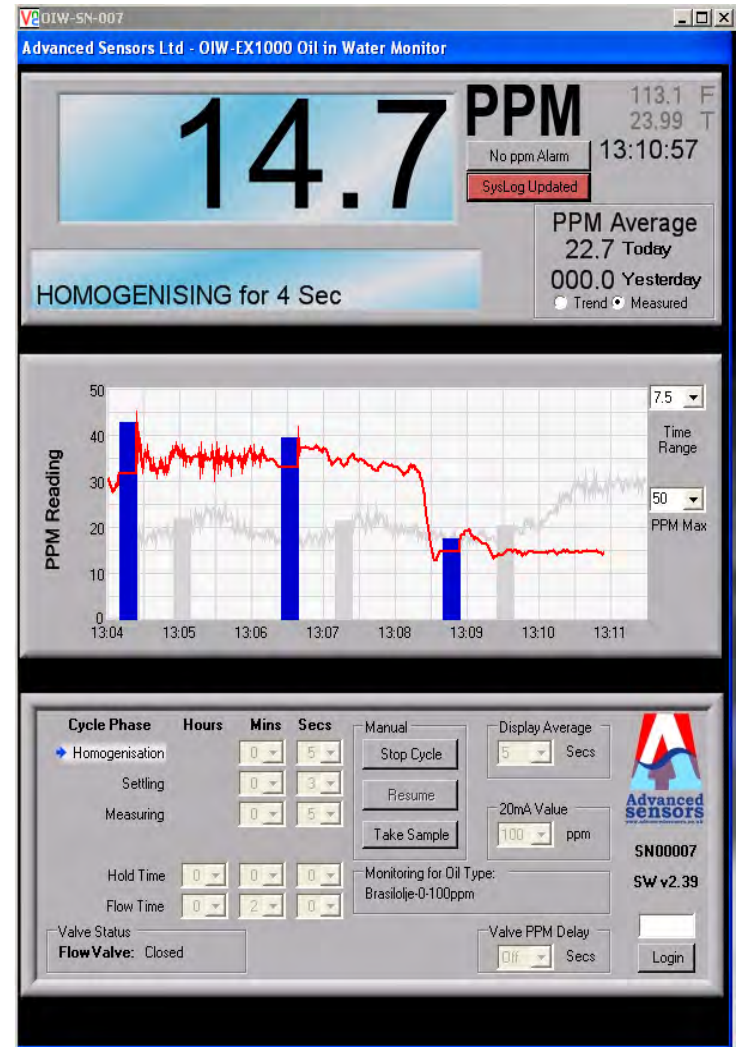
Analysis of oil field chemicals in produced water (Full Scan Spectrometer)



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

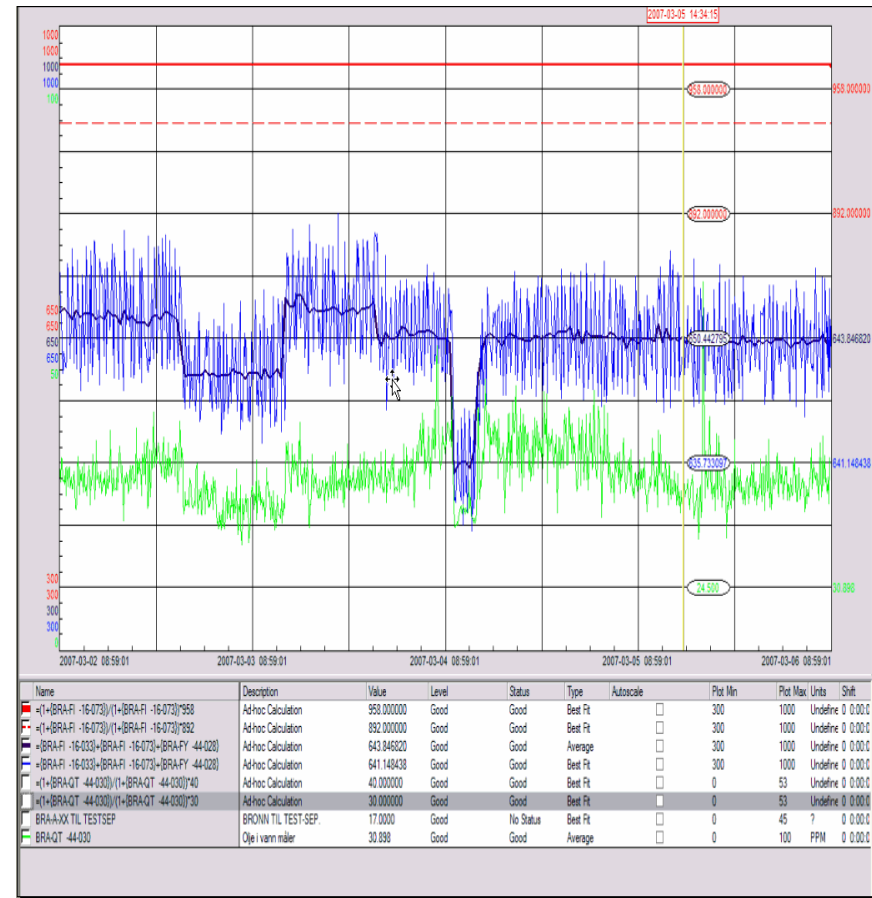
PRODUCTION

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

